

THEORETICAL APPROACHES TO EMERGENCY RESPONSE MANAGEMENT

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Keywords: emergency management, disaster management, crisis management, command and control

Abstract

The concept of Command and Control has until today been a central starting point in many theoretical discussions concerning efficient emergency response management. Different system architectures in civil contexts seem to correspond to military traditions and the hierarchical principles of Command and Control. In an emergency or crisis situation the responding actors are likely to be described as components of a system based on administrative delimitations like geographical and organizational boundaries. However, empirical studies indicate that a complex, dynamical and unpredictable course of event sometimes causes the emergence of new management constellations, the neglect of predetermined decision domains and other phenomena that could conflict with the Command and Control concept. Researchers like Quarantelli (1998), Comfort (1999) and Drabek (2003) among others have with different approaches earlier highlighted this discrepancy and several scientific publications are available. Nevertheless there appears to be a lack of discussions on complimentary theoretical approaches to emergency response management in the existing discourse. In order to get a survey of theoretical discussions on the concept of Command and Control and its usefulness for emergency response management, a review of literature has been done. Our result is that the approaches can be structured in three categories, which we define as *a detailed* approach, *a mission* approach and *a sceptical* approach.

Even though emergency management research could be regarded as an interdisciplinary research field we argue that a further integrated academic approach should be established to develop the theoretical discussions and enhance the capability of generating an efficient response when future crises occur.

Introduction

Emergency and crisis management has during the recent years been given a lot of attention in both media and in the academic world. Different types of educational programs in the subject area are at a rapid pace established at universities and other institutions offering methods for practitioners and administrators to better deal with the next terrorist attack, pandemic, fire or hazardous waste. It seems probable that this development will continue as our consciousness of risks for various reasons increases, simultaneously with public demands for efficient response management. One example of this development is the criticism conveyed by survivors, media, the public, experts and a commission on how the Swedish government responded to the Tsunami disaster 2004 (SOU 2005:104) which in its turn has given rise to a lively political discussion on responsibility conditions and the need for development of the management process on nation level. Inquiries following severe catastrophes, e.g. the one mentioned above, often draw attention to problems of inefficient co-ordination and indistinct authority structure within the responding systems.

One way to visualize one or several responding organizations is to present a hierarchical structure of various decision makers. This seems suitable for describing jurisdictional relations. Who is in charge



over whom? Who has responsibility for what? Problems could easily be associated to certain functions or predetermined information ways. It is reasonable to assume that our model or mental picture of how a responding system is constituted and behaves is greatly influenced by these models or administrative figures. But, are we aware of the real conditions that create the operational context in which the emergency management process exists? Are our models of the crisis response system marred by shortcomings depending on simplifications originated from a traditional military perspective? These questions arose on the basis of empirical findings alongside with a literature review.

In 2004 a research project funded by the Swedish Rescue Services Agency and the Swedish Emergency Management Agency began, with a very exploratory approach, to study the response processes following several major accidents in Sweden with focus on management functions on higher decision levels. During interviews with experienced officers among others, new phenomena came to light, phenomena that were not always considered in the preparedness process but had, according to the interviewees, a great impact on how the situation was handled. Administrative structures were neglected in order to better cope with the unique situations. Friendship and personal contacts seemed to have an effect on how different collaboration constellations were formed and authority centres arose outside the formal management structure. These findings led to a growing interest in how the theoretical reasoning in the subject has developed. In the literature various theoretical approaches have been used to understand, structure and analyze what could be regarded as the emergency response system. The concept of Command and Control seems to have influenced much of this descriptive and normative modelling. At the same time critical views on Command and Control as a theoretical base for emergency management have developed, mostly from sociologists like Quarantelli (1998), but also from representatives from other “schools of thought”, like disaster researcher Comfort (1999). This criticism has together with empirical findings lead to the following questions at issue:

How do researchers interpret the concept of command and control?

Is there a need for a further theoretical development in the discourse of emergency management?

In order to find answers to these questions the concept of Command and Control will be analyzed. Furthermore, we present some of the critical views aimed at the Command and Control concept and relate the discussion to empirical findings.

Three approaches to Command and Control

The concept of Command and Control is difficult to catch. The idea has been developed and it now exists in many versions and applies in various areas. C² became C³ (The additional C meaning communication) which in its turn has expanded to amalgams like C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance.) In this paper we stay with C² as a concept of principle.

It is clear that Command and Control unquestionably is an organizational phenomenon (Kronenberg, 1988). In the military context Command and Control appears to have been a theoretical starting point when designing organizational structures. The idea of predetermined authority centres in a defined system comes into view as a governing thought when examining different approaches to the concept. The following definition of Command and Control comes from the Department of Defence Dictionary of Military and Associated Terms (2002).

“The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities and procedures which are employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission.”



No doubt, there has been a military influence on how the society should prepare and respond to different kinds of civil crises. A threat must in one way or other be taken care of irrespective of the matter being a hostile state or a natural disaster. Some theorists do not make a distinction between civilian and military Command and Control. In “Command and Control in Civil Emergencies” (Edit, 2003) the editor writes that civil Command and Control is virtually the same as the military version. The same elements are present. However, differences between civil and military contexts can without doubt be found –Military forces can actively take the initiative. In civil emergencies actors are “reactive”. A uniform understanding of what the concept of Command and Control really means does not seem to exist, neither among theorists nor practitioners. The theory of Command and Control is changing with the emergence of new adversaries challenging the system and new technologies supporting it (Rosen, Grigg, *et al* 2002), although one can observe a common denominator in all interpretations of the concept. The basis of all Command and Control is the authority vested in a commander over subordinates (MCDP 6, 1996).

When reviewing emergency management literature and listening to the academic discussions three different approaches to Command and Control seem to emerge. We have chosen to categorize these approaches as the *detailed* approach, the *mission* approach and the *sceptical* approach.

The Detailed Approach

The detailed approach involves the military “Anglo-Saxon application” of Command and Control when a central authority through a mechanistic control structure commands and controls the units in a lower hierarchical level in a unidirectional way. Commanders are in control of their subordinates and subordinates are under control of their commanders. In the traditional approach the top-down perspective is consistent through the whole system.

This approach can be observed in some military contexts but also in civilian ones. Before the Great Depression of the 1930s the bureaucratic structure was dominant, greatly influenced by Weber’s idea of bureaucracy, where power is ascribed to positions rather to the individuals holding those positions. When examining emergency response organisations the detailed approach to Command and Control appears to have an effect on certain administrative structures and constitutes a cultural phenomenon within organizations. An example of when this interpretation of Command and Control is present is when a commander in detail exercises Command and Control over a handful of firemen trying to rescue someone inside a burning house. The commander decides what actions to take and which priorities to make. He or she gathers information from the fire-fighters and the fire-fighters will be given detailed orders to realize in order to achieve a predetermined goal.

In MCDP 6 (1996) the term detailed control is used when a commander controls with “tight-reins”. Command and Control in this approach is centralized and orders and plans are explicit. According to this text the detailed control emphasizes a vertical information flow, with information flowing up the chain of command and orders flowing down. This type of control is, according to the authors, the preferred method when time is not a critical factor, when procedures must be closely adhered to for safety reasons, or when restrictive rules of engagement demand close monitoring and extensive reporting of events.

The Mission Approach

This approach is well captured by the Marine Corps Doctrine Publications (1996). In chapter 1 they discuss the behaviour of a complex system, characterized by reciprocal action and feedback. This view of command and control has several important features which distinguish it from typical Command and Control. In the text they focus on the military context. Nevertheless the argument seems to be applicable in civil emergency management as well. They see the military organization as an open system, interacting with its surroundings, rather than as a closed system focused on internal efficiency. The feedback loop makes Command and Controls a continuous, cyclic process and not a sequence of discrete actions. The action-feedback loop also makes Command and Control a dynamic, interactive process of cooperation. Finally, the most important characteristic of this approach, this view does not



see the commander as being above the system, exerting Command and Control from the outside –like a chess player moving the chess pieces – but as being in integral part of this complex web of reciprocal influence. The author ends the section saying: “It is unreasonable to expect Command and Control to provide a precise, predictable, and mechanistic order to a complex undertaking as war.”

Rosen, Grigg *et al.* (2002) describes detailed and mission Command and Control as extremes along a spectrum of command structures. The mission Command and Control can be related to “Auftragstaktik”, a German concept which dates back to the 19th century. Anglo-Americans use the term “mission-type orders” for Auftragstaktik. (Hoffman, 1994). The link to mission Command and Control becomes clear when analyzing the concept. The essence of Auftragstaktik is to give the subordinate commander a general mission. (Hoffman, 1994) Mission Command and Control decentralizes decision-making authority and grants subordinates significant freedom of action. (Rosen, Grigg *et al.* 2002)

In “Systems theory and the science of military Command and Control” (Skyttner, 2005) Skyttner introduces the living-system approach (inspired by Miller, 1978). A living system is a physical phenomenon existing in space and time containing a hierarchy with gradually increasing complexity. In the living-system theory the boundaries of the system are more conceptual than physical in higher system levels. This way of looking at the concept of Command and Control incorporates much of the ideas presented above. Skyttner means that the most important component in a system of Command and Control is the human being, a fact that could be interpreted as a non-mechanistic conceptual view.

A brief review on teaching literature on Command, Control and Coordination for international rescue and relief operations (Nato/PfP course 2004) and discussions with course participants indicate that the interpretation of the concept varies also in this field. Mission Command and Control is described in the teaching literature and the concept of co-ordination is given a lot of attention, but the understandings of Command and Control in these international connections sometimes also seem to be associated with a traditional military culture. The Swedish Rescue Services Agency, who is an international actor and a training institution, partly conveys a mission approach to Command and Control. International relief organizations operate in very complex environments where the administrative hierarchies aren't comprehensive and where the order mandate is not always very clear. Many different organizations, e.g. voluntary, military, local, governmental and international ones, operate both jointly and independently in contextual dependent environments which demand freedom of action, possibilities to ad-hoc solutions and incorporate administratively power neutral co-ordination functions. These circumstances appear to have influenced the actual application of Command and Control.

The Sceptical Approach

Some disaster researchers and organization theorists show a negative attitude to the Command and Control concept as a basis for disaster management or as a basis for management in general.

Comfort (1999) relates the concept of Command and Control to mechanistic models of systems in operation developed in physical sciences and engineering. Furthermore, she interprets the basic assumption underlying the models as if the problem is well defined and systems can be closed to outside interference and disturbance, they can function without error. According to Comfort the principle of Command and Control is clear specification of the authority relationships among subunits in order to increase control over performance of the whole organization. The Command and Control organizational design has proven functional and robust in well structured, routine conditions but is weak in uncertain, dynamic conditions (Comfort, 1999). She also writes that first response services such as the police, fire service and emergency medical services operate primarily with a Command and Control orientation and describes the efforts that have been made to adapt the strength of Command and Control principles to disaster environments, where common training and skills enable multiple units to work readily in co-ordinated action, but flexibility is needed for rapid response.



Quarantelli (1998) shows a clear negative attitude towards the concept of Command and Control as a basis for disaster management. He means that in many countries there is a strong tendency to assume that the best model for disaster organizational preparedness and managing is what has been called a “command-and-control” model. The notion taken from the military area that a top down, rigidly controlled, and highly structured social organization model ought to be developed for disaster purposes, is questioned. According to Quarantelli direct studies in the disaster area have not only shown that Command and Control models seldom are organizationally viable, but more important, would be poor models for disaster planning even if they could be implemented in the real world. He gives prominence to what he calls an *emergent resource coordination model* instead of a Command and Control model. Rather than attempting to centralize authority, it is far more appropriate to develop an emergent resource coordination model. The problem is one of coordination, not control. Quarantelli implies that disasters have implications on many different segments of social life and the community, each with their own pre-existing patterns of authority and each with the necessity for simultaneous action and autonomous decision-making. This makes it impossible to create a centralized authority system. Quarantelli writes that we ought to leave aside the fact that the command and control model is more fiction than fact even in the military area. It is not the way armies, navies or air forces actually operate, especially in conflict situations; stereotypes and group mythologies to the contrary.

Recently Drabek and McEntire (2003) conducted a review of literature on disaster sociology. They state that their collection of literature is representative of the significant debates, which have taken place in the sociology of disaster over the last 15 years. In their review they observe that recent research illustrates considerable tension between two models that seek to explain emergent phenomena and provide policy recommendations for emergency managers. Drabek and McEntire say that some scholars and most practitioners advocate Command and Control structures for disaster events while many sociologists recognize the spontaneous emergence of personnel and resources after disaster. Others favour a more complex perspective, and suggest the need for standard operating procedures in certain circumstances and altered bureaucratic structures and processes in other situations. Drabek’s and McEntire’s analysis of the literature results in a criticism of what they call the bureaucratic approach in which they include Command and Control structures. In their review they conclude that the Command and Control model is based on inadequate theory, incomplete evidence and a weak methodology. In relation to this conclusion they say that the assumptions of the Command and Control approach to emergency management are predominantly faulty. Drabek and McEntire conclude that their review of the literature shows the limitations of the Command and Control managerial model for disaster response.

Seddon presents in his book “Freedom from Command and Control” his thoughts on command and control thinking and what he describes as systems thinking (Seddon, 2005). He describes systems thinking as an alternative to Command and Control in service organizations and emphasizes among other things the need for individual freedom. Command and control designs stifle freedom. (Seddon, 2005). Furthermore he proposes an outside-in perspective instead of a top-down hierarchy. Seddon’s main interest is, as said before, focused on service organizations, but his reasoning seems to be applicable to emergency response activities, as they reasonably can be regarded as a service function of the society.

In the Leader to Leader Institute Wheatley (1997) discusses living systems and self-organization, but unlike Rosen, Grigg et.al (2002) she uses these concepts as an alternative approach, i.e. not as a part of a developed Command and Control concept. Even though Wheatley has a broad approach and does not specifically mention emergency management, her reflection is interesting. She means that patterns of relationships form into efficient systems of organization and that organization is a naturally occurring phenomenon. As a living system self-organizes, it develops shared understanding of what is important, what is acceptable behaviour, what actions are required, and how these actions will be performed. Furthermore, she writes that as the system develops, new capacities emerge from living and working together. Wheatley is critical to the view of organizations as machines.

Discussion

Our interest in the discussion on Command and Control depends on our conclusions from analyses of emergency response management in three disasters in Sweden. In the summer of 2004 there were extensive floods in the south of Sweden and high water levels hit many communities. In January 2005 a great storm struck the southern part of the country. (Krisberedskapsmyndigheten, 2005). Forests were destroyed, people were isolated, serious electricity distribution problems occurred and some areas had to wait several weeks for the service to be resumed. In February 2005 a large emission of sulphuric acid in the city of Helsingborg occurred (Helsingborgs stad Brandförsvaret, 2005). 16 000 tons of sulphuric acid leaked out in an industry close to a residential area. The rescue operation continued for three days and the situation was uncertain. Many inhabitants had to stay indoors for several hours and measures were taken to cordon off large areas.

The structures of decision-making in these disasters did not emerge in accordance with the concept of detailed Command and Control in the whole operational context. Central in the concept of detailed Command and Control is the top down perspective. The authority comes from the commander at the top of the organization or the operational context and there is a more or less hierarchical organizational structure aimed to execute this authority downwards.

The empirical behaviour of decision-making in the analyzed disasters seemed, to a considerable extent to function in a bottom up perspective. Local decision makers were the first decision makers engaged in the dynamic courses of events. They were also “closest” the emergency and had to make decisions from their interpreting of the situation long before knowledge of the situation reached higher levels of management. An important function of higher levels then was more to co-ordinate these local decision makers than to exercise overall authority.

Our hypothesis, based on our analyses of the structures of the emergency response management in the three disasters, is that the central response management problem is to bring about a functional balance between a bottom up perspective and a top down perspective instead of exercising an authority from the top of the operational context. The formation of this balance depends on the dynamics in the course of events and different conditions in the operational context. In some phases of the course of events the top-down perspective is predominant and in other phases the bottom up perspective is predominant.

The three identified approaches to the concept of Command and Control can be discussed in relation to the problem of balance between top down and bottom up perspectives. The *detailed* approach of Command and Control neglects the problem of balance. The strict detailed chain of command from a central authority does not pay attention to the dynamic surroundings and is perhaps valid in a static surrounding. The *mission* approach is still related to the idea of a central authority in the system but can handle the balance problem through decentralized authority in accordance with the centralized authority. The decentralized authority gives possibilities to cope with dynamic surroundings. Researchers with a *sceptical* approach deny the possibility to create a centralized authority system and mean that disasters have implications for many different segments of social life and the community. Each such segment has its own pre-existing patterns of authority and the necessity for simultaneous and autonomous decision-making (Quarantelli, 1998). Quarantelli says that rather than attempting to centralize authority, it is far more appropriate to develop an emergent resource co-ordination model. The problem is one of co-ordination, not control. This approach denies that the dynamics and the great number of interests make it possible to create a central authority. The problem of balance in the management is solved by co-ordination.

According to research there is a clear tendency towards informal co-operation forms. Even normal organizations become more network-like. The development is from hierarchies to network and network demands trust. (Arwidsson, 1991) These statements are interesting as they seem to correspond to our empirical findings. The detailed approach to Command and Control does not take this development into consideration. In MCDP 6 (1996) the authors write that detailed control does not



normally work well in a rapidly changing situation; nor does it function well when the vertical flow of information is disrupted. Therefore, it is not the preferred method of control under conditions of great uncertainty and time constraints.

Conclusions

The concept of Command and Control is interpreted and used differently depending on research discipline and practical circumstances. To avoid misunderstandings in the existing discourse there is a need for clarification in theoretical as well as in practical connections.

The criticism in the sceptical approach to Command and Control seems to a great extent to be focused on the detailed approach to the concept. In the Marine Corps Doctrine Publications (1996) Command and Control is described with words like co-ordination, dynamics and context depending which neutralizes some of the criticism broadly aimed at command and control from Quarantelli (1998), Drabek and McIntire, (2003), Comfort (1999) among others. Instead of seeing co-ordination as an alternative to Command and Control it sometimes is incorporated in the concept.

Our conclusion from the study of literature and from our analyses of the three disasters is that the central problem in emergency response management is to make balance between top down and bottom up perspectives in a dynamic surrounding instead of exercising a central authority downwards. We mean that there is a need for a theoretical development from that point of view.

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Acknowledgements

This research project is funded by the Swedish Rescue Services Agency and the Swedish Emergency Management Agency.

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