Summary

When disaster strikes the common perception is that *chaos* arises and emergency response organizations need to put the situation under *control* by employing a centralized *command* structure. 'Command and Control' is the dominant paradigm for many disaster theories and for the response organizations themselves. However, current studies in disaster sociology have proven this idea of control to be unrealistic. Disasters generally do not end up in chaos. Instead the capabilities of societal and organizational structures remain in place, whilst being put under pressure. The relief effort thus requires *coordination* and *cooperation* with different stakeholders in a network of responding organizations. Therefore the following question is central in this PhD dissertation: *how do emergency responders coordinate the response operation across the boundaries of their organizations in fast paced environments?*

The results of this research indicate that while in the preparation phase for emergencies organizational designs are created, plans and protocols are administrated, and centralized command structures are instated, a different coordination approach appears during the response operation itself. In four empirical chapters I build up an account which illustrates that cross-boundary coordination during emergency response is based upon emergent adaptation, deference to expertise, and spontaneous networking across the boundaries of organizations in response to changing interdependencies. Crisis managers require these practices to deal with unexpected situations and unknown threats they encounter in emergency response operations.

On a theoretical level this offers counter intuitive evidence to conceptualize coordination processes in fast-paced environments. The dominant coordination approach articulates that coordination is achieved through integration based on three conditions: accountability, predictability and common understanding. In contrast, my results indicate that crisis managers cope with the fast paced environment by engaging in coordination processes that are rooted in conditions of *fragmentation*. Fragmentation often has a negative connotation of disconnectedness and failure. Yet, in this dissertation I show that fragmentation is not necessarily negative, and matches much closer to the reality experienced by crisis managers on the disaster scene. This is the case as crisis managers are inclined to reinforce the functional, knowledge, and normative boundaries they encounter, instead of bridging them. This allows them to demarcate their responsibilities, engage in continuous adaptation, and employ their expertise, to keep sufficient speed

and flexibility in the response operation.

Fragmentation is not only identified in the crisis managers' work practice, but it also appears during a second study focusing on the drawing of maps of the disaster scene. Maps of the disaster scene are commonly used in command centers to develop situational awareness. The professional term for these maps is a *common operational picture*. The common operational picture can be regarded as a boundary object, because it allows crisis managers to bridge the boundaries between them by engaging with the object. By looking into the language crisis managers use to discuss their interdependencies whilst drawing maps, four different coordination strategies were identified: *selecting tasks, phasing action, standardizing information,* and *transforming understanding.* A process analysis of these strategies revealed that crisis managers employ different coordination strategies. The dominant coordination strategy is based upon segmentation, hinting to a fragmentation logic.

Similar coordination issues become visible when zooming in on sensemaking processes during the construction of the common operational picture in a third study. In crisis management the common operational picture is increasingly incorporated into more advanced information systems. This development is rooted in an information warehousing logic. It holds that information can be collected, sorted, and exchanged in an accessible and univocal form. In practice, however, professionals interpret similar information differently as they make sense of the information based on their different professional backgrounds. The analysis of three crisis situations indicates that different ways of sensemaking trigger a negotiation process. Negotiation is an important process in crisis management, because it allows crisis managers to clarify their position and specify their needs, without depending on shared ideas, interest, and norms. This is difficult to accomplish in fast-paced environments. As a result of negotiations different narratives are constructed, each with their own value. However, dominant narratives can only be negotiated if sufficient time is taken to reflect during command meetings. If crisis managers neglect this process and forget to address all interests, coordination problems and misunderstandings are likely to resurface in later phases of the incident.

Finally, fragmentation also becomes visible in the fourth study at the level of networks. This study focuses on the analysis of the response operation to a fire in the Schiphol train tunnel. The network analysis shows that the network segments on multiple occasions during the response operation. Although many network study are based on a accumulation of network interaction across a certain time period, this study shows that

a response network undergoes major changes during much shorter time periods. This stresses the necessity to incorporate time dynamics in network studies of emergency response operations. In addition, the segmentation of the network again illustrates the role of fragmentation during coordination processes, this time at the level of network collaboration.

Combined, these four empirical studies challenge the dominant role of integration as condition for coordination in crisis management. In this dissertation I show that not only integration, but especially fragmentation is an alternative approach for coordination under time pressure. Hereby, this research expands current organizational knowledge on coordination and disaster management. Designing structures and developing technological solutions does not offer a way out for coordination under pressure, but their efficacy depends for a large extend on their configuration in action. Still, it is also important not to dismiss integration, as it features so dominantly in the preparation phase and in the logic of command doctrines. Integration and fragmentation can be regarded as two different coordination approaches that have a paradoxical relation. The paradox is that while integration is often the way emergency management organizations prepare for response operations, in practice crisis managers based their coordination on a fragmentation approach that allows them to employ their expertise, and increase speed and flexibility during the operation.

This also has important implications for practice. An analysis of after-action incident reports reveals that recommendations are often based upon an integration approach. Improvements of structures, protocols and procedures are regularly advised, while the research findings in this dissertation indicate that a different coordination logic is used on the disaster scene. Plans and protocols are required to activate the emergent crisis response structure, but cross-boundary coordination also requires a fragmentation approach to harness the expertise driven, flexible mode of operations that is practiced by crisis managers.