The coordination-information bubble in humanitarian response

Theoretical foundations and empirical investigations

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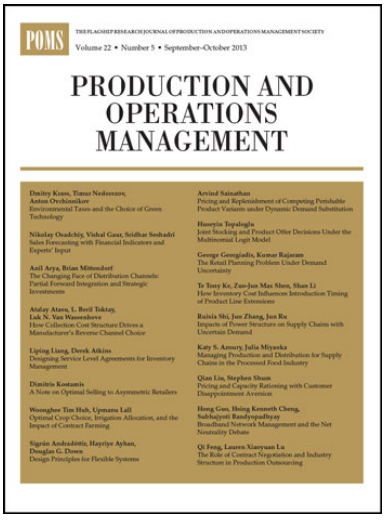

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The coordination-information bubble in humanitarian response: theoretical foundations and empirical investigations

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Abstract

Humanitarian disasters are highly dynamic and uncertain. The shifting situation, volatility of information, and the emergence of decision processes and coordination structures require humanitarian organizations to continuously adapt their operations. In this paper, we aim to make headway in understanding adaptive decision-making in a dynamic interplay between changing situation, volatile information and emerging coordination structures. Starting from theories of sensemaking, coordination and decision-making, we present two case studies that represent the response to two different humanitarian disasters: Typhoon Haiyan in the Philippines, and the Syria Crisis, one of the most prominent on-going conflicts. For both, we highlight how volatile information and the urge to respond via sensemaking lead to fragmentation and misalignment of emergent coordination structures and decisions, which, in turn, slow down adaptation. Based on the case studies, we derive propositions and the need to continuously align laterally between different regions and hierarchically between operational and strategic levels to avoid persistence of coordination-information bubbles. We discuss the implications of our findings for the development of

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methods and theory to ensure that humanitarian operations management captures the critical role of information as a driver of emergent coordination and adaptive decisions.

Keywords: Humanitarian Operations; Adaptation; Decision-making; Coordination; Sensemaking; Information.

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1. Introduction

Humanitarians respond to an ever-growing number of disasters. Along with progress in sensing, monitoring and communication technologies, information about disasters is continuing to increase in volume, variety, and velocity (Papadopoulos et al., 2017). There are many promises associated with the increasing access to information, such as improving efficiency and effectiveness of operations (IFRC, 2013). However, the deluge of information is adding to the proverbial chaos of a disaster, and there is increasing concern about its impact (Sandvik et al., 2014; van Wynesberghe & Comes, 2020).

It has been widely acknowledged that information in disasters is uncertain. Traditionally, this uncertainty has been attributed to data gaps resulting in many efforts to improve data collection. However, driven by technology innovation the very nature of uncertainty has changed. Because of the ease to create and share data, there is an increasingly fragmented and volatile information landscape: information is subjective and localized, of unknown origin and reliability (Monaghan & Lycett, 2013).

If information is to have an impact on humanitarian operations, it needs help responders make sense of their situation, support decisions and coordination. Yet, organizational mandates, objectives, and norms are gradually established as the response unfolds and more information becomes available (Comes & Van de Walle, 2016). Analytical models that require well-defined objectives and constraints are abundant in the humanitarian operations management literature, but the dynamics and emergence of decisions and coordination structures have not received similar attention (Holguín-Veras et. al., 2012).

Because humanitarian decisions are far from the ideal postulated for the rational decision-maker, it is important to investigate the mechanisms by which decision-makers use information to make sense of a volatile environment, to decide and to coordinate. This study investigates the interplay of information and sensemaking, decision-making and coordination (Section 2) by two case studies (research design: Section 3): the response to Super-Typhoon Haiyan in 2013 (Section 4), and the response to the Syria crisis (Section 5). By using qualitative research methods to identify the underlying mechanisms, we aim to make a first step towards the design of methods and approaches that take into these aspects. To do so, we identify critical factors and concepts that need to be taken into account to develop methods and models that are based on an understanding of sensemaking, decision-making and coordination across scales and the critical role of information therein (Section 6).

2. Humanitarian Information, Coordination and Decisions

Efficient disaster management, so literature contends, requires well-aligned data collection and information flows, decision processes and coordination structures (Chen, Sharman, Rao, & Upadhyaya, 2008). Disasters are highly dynamic, and with the many innovations in information technology there are new opportunities to get insights from the ground in near-real time (Altay & Labonte, 2014). This proliferation and volatility of information pressures decision-makers to rapidly respond (Höchtl, et al., 2016; Levin et al., 2012; Tsoukias et al , 2013), despite the complexity of the problem.

In literature, normative methods for complex decisions have been proposed, which are based on optimization models or simulations. Grounded in the paradigm of the rational decision-maker, they advocate modeling uncertainty as probability distributions, and adapting to new information as it becomes available. Meanwhile, the development of prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1974) has led to a sprawling literature on the cognitive aspects of how decision-makers process and use uncertain information (Klein et al., 2010; Lipshitz et al., 2001; Maule et al., 2000; Weick, 1993). Particularly in high-risk and time-compressed situations, decision-makers are found to be far from rational in terms of information sharing and use. As such, the models and methods that conventionally support decisions in humanitarian operations need to be extended and adapted to account for the impact of information processing and sharing on decisions and coordination.

In this section, we first discuss Humanitarian Operations Management (HOM) approaches that support adaptation to dynamically changing situations. Subsequently, we provide an overview of theories relevant to humanitarian sensemaking, coordination and decisions that reflect the role of

2.1 Adaptation Models and Decision Behavior

Acknowledging the uncertainty and dynamics of disasters, there is a considerable body of literature that focuses on facilitating adaptive change. In HOM, flexibility, agility and responsiveness have been advocated widely (Baharmand et al., 2017; Balcik et al., 2015; Charles et al., 2010; Oloruntoba & Gray, 2006; Van Wassenhove, 2006). These authors focus on changes in supply chains in terms of locations, routes, schedules, or actors along with systemic characteristics that facilitate change. They do not focus on adaptation processes and structures, or the question when and how plans should change.

In policy analysis and resilience literature, the notion of adaptive planning has been developed as a strategy to manage the timing and nature of change by identifying ideals pathways that consider a large range of future scenarios (Kwakkel et al., 2015). Adaptive planning implies that networks, structures, processes and – indeed – plans are designed to be revised over time. As such, adaptation is planned for, rather than taking place in an ad-hoc manner. However, adaptive planning relies on the assumption of a rational decision-maker adapting to newly available information (Walker et al., 2013). This is in contrast to the literature on decision behavior under time pressure and stress, which clearly indicates that in these situations, decision-

makers are far from rational and have a tendency to discount important cues if they are not in line with their earlier decisions or assumptions (Klein et al., 2010).

At the organizational level, characteristics of innovating and learning were initially described by Galbraith (1982). However, the roles, processes, rewards, and practices that have been described to lead to improvisation and innovation are not in line with the reality of humanitarian organizations, whose structure is designed to be operational, bureaucratic and highly efficient. Driven by the short time horizon of many humanitarian operations combined with a high staff turn-over, there is no clear systematic adaptation mechanism. Consequently, revisions of plans and strategic choices are often late, costly, and vendor lock-ins (in terms of systems, locations, commitments or people) frequently cause inefficiencies or imbalances (Baharmand et al., 2017).

To understand the underlying mechanisms and principles that do guide the adaptation processes in highly dynamic humanitarian settings, we develop an analysis framework that is based on the theories of coordination, sensemaking and decision-making. To acknowledge the volatility of disasters, we investigate the theories against the backdrop of an increasingly fast changing information landscape.

2.2 From Information to Coordination through Sensemaking

Coordination entails information sharing, collaborative use of resources, joint policies and definition of responsibilities (van der Laan et al., 2009). For humanitarian organizations, the UN cluster system provides a framework for coordination. It has been established in its current shape as a part of the humanitarian reform process to group organizations (UN agencies and NGOs) working in the same functional areas of humanitarian aid, e.g. logistics, shelter, or health (IASC, 2015). HOM research on disaster coordination thus far considers stable structures (Jahre & Jensen, 2010; Natarajarathinam et al., 2009) aiming to analyze the implications of the system for logistics processes.

Given the lack of a strong central authority in the UN cluster system, it has been argued that coordination should be achieved through increased cooperation and consensus building (Stephenson, 2005). However, the dynamics of disasters often give way to a spontaneous and unstructured set-up of coordination structures driven by individual leadership rather than organizational mandates and norms (Darcy et al., 2013). What is therefore missing in HOM is an understanding of how coordination structures emerge given the fragmentation and dynamics of disasters.

To understand this emergence and the interplay between information and coordination, *sensemaking* provides useful theoretical concepts. The sensemaking process is founded on a stream of unfiltered, chaotic data that needs to be structured, processed, and turned into meaningful and actionable information (Endsley, 1995; Weick et al., 2005). Sensemaking is a collaborative process (Brown et al., 2014; Endsley, 1995; Hardy & Comfort, 2014) in which meaning, preferences and aims are continuously re-assessed (Weick & Quinn, 1999), depending on the information discussed.

In disaster response, social processes are intermitted by the changing composition of groups and re-assignment of roles driven by the rapid rotation schemes of international organizations. Nosek and McNeese (1997) were among the first to discuss group sensemaking in volatile situations as "*the elicitation and creation of group knowledge relevant to an emerging situation*". Sharoda and Reddy (2010) identify the most important properties for such settings as: (i) prioritization of relevant information, (ii) sensemaking trajectories (keeping track of meaning over time) and (iii) activity awareness, combining social awareness (actors and relationships) with action awareness. Closely linked to the sensemaking process is the idea of contextual rationality. In his seminal work, Weick (1993) defines contextual rationality as: "*Action motivated to create and maintain institutions and traditions that express conceptions of right behavior*". As such, contextual rationality guides coordination through establishing common norms, which are vital to achieve a consistent interpretation of information and thereby alignment.

Together, sensemaking and contextual rationality support the translation of the continuous and unstructured stream of data and information into: (i) a joint understanding of the situation and context over time (trajectories and social awareness); (ii) framing and scoping of the problem in terms of priority information and ongoing or planned activities; (iii) binding normative structures. In other words, sensemaking supports and helps shape the emergent coordination structures.

2.3 Information and Humanitarian Decisions

As the stream of information shapes sensemaking and emerging coordination structures, priorities and views on how to manage the disaster are continuously adapted (Comes, 2016). Nevertheless, HOM models largely assume stability of objective functions and constraints (Galindo & Batta, 2013). Typically, these models optimize humanitarian operations with respect to efficiency, effectiveness and equity or fairness (Gralla et al., 2014; Holguin-Veras et al., 2013). While the need for capturing trade-offs between conflicting criteria is recognized (Gutjahr & Nolz, 2016), few authors explicitly elicit or measure objectives and preferences (Gralla et al. 2014; Holguin-Veras et al. 2013). The result is a limited understanding of the processes that determine how humanitarian decisions are made, or the mechanisms that drive the volatile nature of preferences during a disaster response.

Given the sparse literature in the humanitarian domain, we rely on findings from decision analysis. In stressful conditions decision-makers follow intuitive rules to make fast decisions (Gigerenzer et al., 2012). Such rapid heuristics are mostly applied for low impact decisions. Few authors have investigated fast *strategic* decision-making in volatile contexts (Baum & Wally, 2003; Eisenhardt, 1989b). Dean and Sharfman (1996) also studied the underlying decision processes. Research on rapid strategic decisions concludes that, despite short time, fast decision-makers use more information than slow decision-makers and tend to develop more alternatives, reflecting the exploratory nature of their decision processes (Eisenhardt, 1989b).

While the empirical findings on rapid decisions provide insights into individual reasoning, there is no work on the emergence and adaptation of processes for rapid decision-making in humanitarian operations. In addition, with the focus of HOM literature on natural sudden onset disasters (Galindo & Batta, 2013), it is unclear if the findings on decision-making discussed above are valid for complex longer-term operations that are typical for conflicts.

2.4 Synthesis

Figure 1 synthesizes the theoretical findings, and the interplay between the different concepts. Starting from the top, our argumentation is as follows: through emerging coordination structures, organizations acquire roles and responsibilities that, in turn, shape their decision-making. Decisions require specific data to inform planning and implementation. Therefore, upcoming or on-going decisions direct data collection and information flows. The stream of information, in turn, informs the sensemaking process that shapes the understanding of the situation and is instrumental in determining priorities or mandates, ergo coordination structures. What emerges is a continuous cycle of sensemaking, formation of mandates and assignment of responsibilities (coordination) and explicit or implicit formulation of aims, preferences and constraints that lead to decisions.

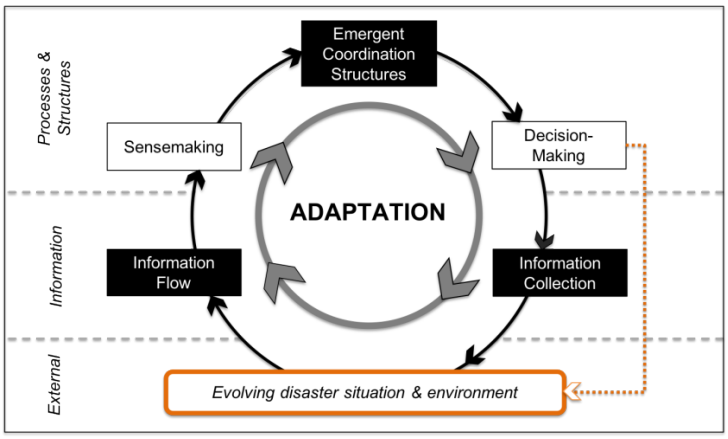

Figure 1: Cycle of sensemaking, emergent coordination and decision-making. New elements in black.

The alternating cycle of sensemaking and decision-making has been described by several authors (Gralla et al., 2016; Muhren et al., 2008). We extend this view in three ways, highlighted by the black elements in Figure 1. First, we add emergent coordination structures, roles and mandate explicitly to the processes and mechanisms considered. This focus enables us to go beyond individual decision-making behavior, and to consider the impact of strategic shifts at the level of organizations. Second, we specifically investigate the role of information in this process, and the co-emergence of information flows. Third, our research evolves around the idea that operations need to be adaptive to (new) information. Although theoretically adaptation should be central given the dynamics of a disaster, the initially cue-based process of formulating priorities and mandates is self-reinforcing as expectations are created and retained (sensemaking trajectories) and

coordination structures mature (Comes, 2016; Maitlis & Christianson, 2014). We argue that the volatility and fragmentation of information that has become typical in disasters is not only a product of the changing situation, but reflects the changing coordination structures and decision processes, requiring organizations to continuously collect and search new information. As such, the changing information landscape is both a driver of adaptation and a symptom. We will use this theoretical framework as the basis for our case studies.

3. Research Design

This section presents our design for field research and data collection, including the sample and selection of sites, as well as the research methods used to develop our framework.

3.1 Research Design

As argued in Section 2, existing theories do not explain the emergence coordination structures and information flows; and the underlying adaptation mechanisms. Our goal is therefore to inform theory building from insights obtained in two field case studies. Qualitative case studies enable the generation of new frameworks when existing explanations are inadequate (Kaplan & Duchon, 1988; Yin, 2017). Case studies have been described as particularly useful to understand the dynamics within a given setting (Eisenhardt, 1989a; Wacker, 1998). As such, a case study approach is suitable to study the adaptation of processes and structures in the dynamic context of a disaster.

We conducted three field studies that provide the basis for our work: the response to the natural disaster of Typhoon Haiyan in the Philippines (2013) and the response to the Syria crisis (2014 and 2015). The opportunity to conduct field research in two different contexts enables a powerful multiple case study research design. As our aim is to establish foundations, investigate the underlying phenomena, and build new theory, we choose for depth of investigation in three case studies over the breadth of possible cases. The resulting insights can subsequently inform the design of methods and models that can later be tested, validated and applied to other research designs in a broader range of settings.

The field aspect in disaster settings requires a research design that is robust to disruptions of communication, workflows and protocols, and potential biases introduced by the nature of the research environment. Auf der Heide (2006) provides an overview of data collection challenges in field conditions, including the difficulty to get representative sample sizes. Considering those constraints, we decided for both case studies to purposefully explore the response by choosing itineraries and interview partners that enabled us to obtain an overview of different settings and contexts.

For each case, we collected data until the point of theoretical saturation, where the incremental improvement in theory or methods is small because new data confirms existing propositions. Our sample includes for both cases a balanced set of UN-agencies and international NGOs (iNGOs, see Appendix). In addition, we also conducted interviews with local representatives (public authorities and local NGOs) in the

Philippines, as well as interviews with donors in the Syria Crisis. Since we do not have a broad enough sample for these groups to draw robust conclusions on the interplay between local representatives or donors with humanitarians, we focus purely on the humanitarian organizations.

3.2 Data Collection

For the two case studies together, a total of 71 on-site semi-structured interviews were conducted. By combining the interviews with focus groups and observations we increased the validity of our study. The interview protocols for both field research studies were based on key concepts developed from the theoretical foundations discussed in Section 2. We focused on the set-up and evolution of decision processes and coordination structures and the interplay between information, sensemaking and decisions.

For the first case study, the authors led a research team that visited the Philippines in December 2013, five weeks after the Typhoon hit. The team consisted of three senior researchers and one PhD student with backgrounds in humanitarian logistics and information management. We developed our field itinerary to cover different contexts and to ensure access to decision-makers and key coordination functions. After an exploratory phase with five initial interviews to scope the field research, we conducted 29 onsite semi-structured interviews (varying from 30 to 90 minutes) with representatives from UN and governmental agencies, iNGOs, charities and affected population. In addition, we observed several coordination meetings (between 1 and 2,5 hours) and a full day field trip to remote regions. A full account of our data collection in the Philippines is provided in Appendix A.

The work on the Syria crisis, our second case study, is based on two field studies conducted in May 2014 and June 2015 as part of an UN Office for the Coordination of Humanitarian Affairs (OCHA) review mission. During the first visit, the research team was based in the office of the regional humanitarian coordinator in Jordan (Amman). The second visit broadened the scope of the initial visit by studying the perspectives across three countries in the region: Jordan (Amman), Lebanon (Beirut), and Turkey (Gaziantep and Antakya). Access and security conditions as well as availability of decision-makers in key functions determined our planning. After 2 initial exploratory skype interviews we conducted 42 in-person semi-structured interviews in total (16 in 2014 and 26 in 2015) with representatives from UN agencies, international and local NGOs and donors with a representation in Syria. In addition, we conducted semi-structured focus groups of stakeholders and experts from different organizations that shared the same geographic location and context, and we observed coordination meetings. All details are provided in Appendix B.

3.3 Data Analysis

The goal of the data analysis was to build a theory that explains adaptation mechanisms in dynamic situations via the interplay of sensemaking, coordination and decision-making. The role of information is instrumental in this process. While theoretically (rational) decision-makers are assumed to adapt to new

insights, we specifically explore how information shapes sensemaking, thereby driving the emergence of coordination structures, decision processes, objectives and preferences. Building theory is an inductive process, in which the theory emerges from data, in a process of "*capturing the complexities of the real world, and then making sense of it*" (Pettigrew, 1990).

In a first step, in order to extract initial concepts from data, we use an inductive process, inspired by grounded theory applied to organizational settings (Martin, 1986) and case study methods (Eisenhardt, 1989a; Jahre et al., 2009). Data analysis started with each case separately. Per case, we use an initial qualitative conceptualization step (Kaplan & Duchon, 1988) to identify key concepts related to sense-making, coordination and decisions, and how these processes, in turn, drive adaptation of the ongoing humanitarian operations. This analysis is enriched with observations and contextualized data through a secondary data review (including situation reports, internal documents on coordination structures and information sharing) that reflect the evolution of the respective disasters, and provides context and a timeline of events, which is essential to understand the evolution of the situation. What emerged from this step was (1) a set of codes describing the main drivers and barriers to adaptation; and (2) an initial narrative on the emergence of coordination structures and decision processes per case.

In a second step, we further interpret and conceptualize the data to understand and explain the differences and commonalities across the case studies. First, data that was coded in a similar way was compared across cases to seek patterns or differences in the way coordination structures or decision processes evolved. The results are described more detailed per case study. In a second step, we revisited the timelines and narratives of the cases to describe overall patterns and mechanisms and explain differences related to the different environments and contexts. Importantly, the timeframes and geographical scope of both responses are different. Therefore, the focus in the narrative for the Haiyan case is adaptation in overcoming an initial 'void' of data; whereas the Syria case is directed to the continuous adaptation needed in a dynamic conflict. This second step led to the revision of our theoretical framework, and the identification of important mechanisms and barriers for adaptation (Section **Error! Reference source not found.**).

4. Case study 1: the response to Typhoon Haiyan

Reaching the shores of the Philippine archipelago on November 8, 2013, Haiyan acquired the status of "super-typhoon", reaching sustained wind speeds of 230 km/h (145 mph) upon landfall. Haiyan became the deadliest Philippine typhoon on record, killing at least 6,200 people and damaging an estimated 1 million homes. Within days, a system-wide level 3 (L3) response was activated, marking the highest level of humanitarian crisis. The Haiyan response became the first large-scale response to a sudden-onset disaster since the protocols for coordination under the Transformative Agenda were adopted in 2011. For an updated version of the protocols, see (IASC, 2015). We present next the findings from our field work with

respect to sensemaking, decisions and coordination (Section 4.1), followed by a characterization of adaptation (Section 4.2).

4.1 Findings on Sensemaking, Coordination and Decision Processes

The findings of this case study are presented in the form of theoretical principles describing how decision- and sensemaking processes were coevolving with the set-up of information management and coordination structures. This approach follows Mintzberg et al. (1976) and Turoff et al. (2004) who formulate principles to guide decision processes in dynamic crises. Table 1 provides an overview of the main concepts that emerged from our interviews, along with the number of interviews in which a concept emerged for different geographical contexts. To enrich and illustrate the main points, we provide sample quotes. Per sample quote, the category of organization is provided. Coding IDs are not added here, as some of the interviewed roles will allow the identification of the interviewees.

Table 1: Decision-Making and Coordination Structures in the Response to Haiyan

Concept	**# Int**	**Geogr. Context**	**Sample Quote and category** UN agency (UN); NGO; local organization (loc)
Sensemaking: dominance of individual perceptions and trusted networks or products	6	Guiuan	*When the telephone allows, we have continuous interactions like that. Between us. It is quick. There is synergy, you know the guy. It is like that. There is no other way. There is no time to do things other than that. You run like crazy. [UN]*
	6	Tacloban	*It is so much of nuisance when you have to wait for 30 minutes for a [web-]page to open. You waste a lot of time and then the information is not relevant anymore. It is like, forget it and let me just do my seeing and believing. [NGO]*
			It is us seeing it [data] rather than us actually taking the time to look at it. [UN]
	2	Cebu	*In a disaster people are short of information. So, they are very eager to get information. They are very vulnerable to rumors. [Loc]*
			Information is: what you see is what you get. [NGO]
	3	Manila	*[Social media information] is not in the regular MIRA framework. It doesn't fit any statistical models, not sure how to deal with it and incorporate it, translate to response. [UN]*
Decision processes: simplification and satisficing as dominating strategies under time pressure	8	Guiuan	*We were receiving 50-60 flights per day. There is not much time to think, what priority is. It is priority to boom boom boom one after the other. [UN]*
			We accept chaos to start operations. [NGO]
			We just need simple messages, but we overcomplicate stuff. We are victims of our own black magic of sophisticated systems. [UN]
			We chose Guiuan as hub, because it has a port, an airport and was badly hit. That is all. [NGO]
	10	Tacloban	*Honestly, we have done many assessments and I have never looked at one of them. For me it is not a decision-maker, no way. First of all, I don't have the*

			time. [Decision-making] is something I do with experience and common sense plus a broad knowledge and understanding of the setting and the requirements. [UN]
			As they say, better is the evil of good or something like this. You have to settle with good enough. If we would want to come up with a perfect system, we would still be debating right now. [NGO]
			In decision-making you have to keep on moving. You cannot sit still and reflect too long. By taking a decision you are moving and then you can adjust and learn. [UN]
Volatile coordination structures I: fragmented efforts *within* humanitarian organizations owing to fragmented communication	8	Guiuan	*I only got four calls from Manila during the first weeks. After that, they came to introduce strategic direction. [UN]*
			<Organization> took Guiuan first: they arrived with their boxes and took the hospital… but we work with <organization>. This is a love story in the field. [NGO]
			Communications were very bad. Administration was taking operational decisions, and we took administrative decisions at operational level. [NGO]
	4	Tacloban	*Each cluster would have to identify the approach for coordination and decision making. I don't think they have done that. [NGO]* *Our coordination was successful here. It was hardly recognized in Manila. It is definitely not recognized in a global system. [UN]*
	3	Manila	*We are providing information to donors and Headquarters. We are only feeding the beast. [UN]*
Volatile coordination structures II: Lack of interoperability *between* local, national and international structures	2	Guiuan	*You can force coordination. You just say: "If you don't comply you are out." [UN]*
	4	Tacloban	*I was like, I'm sorry isn't this Leyte? Cause this is the island called Leyte. There is a province with a governor called Leyte. He looks at me like I'm an idiot and said no this is Tacloban and we are an independent city state. Which they have been for 1,5 years. This was not in my briefing. It is a small thing, but […] for the coordination that means completely different approaches. [UN]*
	3	Cebu	*The local and the international parties started working together 3 weeks after the storm. [Loc]*
			The transformative agenda does not embrace the government enough. We've been so focused getting order in our own system that we forgot we are actually working as a part of something. The national government is not included enough. Yes, they should co-chair clusters but in the initial phase you can forget it. We are so busy getting our things right. [UN]
	7	Manila	*People parachuted into the UN through the political system have no understanding of the organization on the ground. [UN]*

Sensemaking and Decision Processes

In the initial surge of the operations, deployment and prioritization decisions need to be made rapidly, within 48-72 hours. Instead of formulating and solving a problem as suggested by Gralla et al. (2016)), interviewees consistently report that actions were cue-based: "*There is not much time to think, what priority is. It is priority to boom boom boom one after the other"* (see Table 1). Operational simplifications and reliance on personal experience driven by a lack of reliable information and extreme time pressure dominated decision processes. Efforts dedicated to assessment were simply discarded: "*Honestly, we have done many assessments and I have never looked at one of them".*

In the absence of analytic decision support, typically, choices entailed only a small number of options or criteria that decision-makers felt comfortable with managing and "*thinking through*" or had experienced in other contexts. For instance, the choice for Guiuan as a major hub was made: "*because it has a port, an airport and was badly hit. That is all."* (cf. Table 1). The quotes in Table 1 also highlight that the approach taken was "*to settle with good enough", i.e.,* satisficing, not optimizing behavior, while acknowledging the need to continuously adapt ("*you have to keep moving").*

Proposition 1. Decision-Making. *In the initial response, decision processes are based on simplifications. Satisficing is the dominating strategy.*

The more disrupted the infrastructure, the more interviewees relied on individual perceptions. Table 1 shows that the deeper into the field (Tacloban and Guiuan), the more frequently sensemaking was identified as a key concept in interviews. With limited access and communication restricted to voice and text messages in Tacloban and Guiuan, direct perceptions or information from trusted sources were largely judged as more meaningful, relevant and reliable than official UN information products. An important factor here is time pressure, and the fact that many information products or dashboards required time for processing and were therefore discarded. In other words: "*It is us seeing it rather than us actually taking the time to look at it."* (cf. Table 1).

Interviewees also confirmed the importance of sensemaking as a major function of (local) decision-making: they collaboratively build a coherent understanding of the local evolution of the situation: "*There is synergy, you know the guy. It is like that. There is no other way."* The long lead times of information requests gave ways to speculation, rumors and reliance on perceptions or social networks: "*It is like, forget it and let me just do my seeing and believing"* (Table 1). As such, the elaborate data collection, verification and triangulation *contributed* to localized and cue-based decisions at operational level. As such, the disruption between local and direct sensemaking and remote sensemaking at headquarters level gave way to a fragmentation of response efforts.

Proposition 2. Sensemaking. *Information products and analyses created at strategic level for alignment are discarded as too complicated or too time-consuming at operational level. There, sensemaking is driven by individual perceptions, restricted to local networks and vulnerable to rumors.*

Coordination structures

The disconnect of strategic and operational levels led to a confusion of mandates and responsibilities. Within the initial communication void and unclear decision structures, operational decision-makers had to invent and set-up local processes they deemed would best serve their needs. This is reflected in quotes such as: "*Administration was taking operational decisions, and we took administrative decisions at operational level."* This led to inefficiencies: the seaport of Guiuan, for instance, quickly became congested, and the lack of explicit prioritization exacerbated the situation. From this *"chaos to start operations*", priorities emerged slowly with the re-institution of communication channels to strategic planning and coordination. However, the re-introduction of hierarchies did cause friction operationally: "*I only got four calls from Manila during the first weeks. After that, they came to introduce strategic direction"*, and interviewees at operational level felt that their success in setting up coordination locally was "*hardly recognized in Manila. It is definitely not recognized in a global system"* (Table 1).

Adding to the vertical and lateral coordination issues within the humanitarian system were inter-organizational coordination challenges. The rapid up-scaling of response structures as a part of the system-wide activation (or L3) was set against the backdrop of a lower middle-income country with strong national capacities and a well-developed disaster management system (Carden & Clements, 2015). The declaration of an L3 as a part of the humanitarian transformative agenda entails the activation of significant resources and surge capacity. While there were processes and programs in place for data collection and coordination with the humanitarian system (Ebener et al., 2014), interoperability between the humanitarian cluster system and the Philippines response framework was a challenge, both at operational and strategic level, cf. Table 1, coordination II. The problems related to the coordination between government and international response in terms of priorities and time horizons led to criticism of the transformative agenda for *"not embrac*[ing] *the government enough"* (Table 1).

The lack of coordination among humanitarian organizations, and between international and national response is also reflected in and driven by the information layer. At headquarters and regional coordination levels (in Manila), a primarily analytical and data-driven process targeted at advocacy and accountability was instituted, focusing on standardized products and formats to meet urgent information needs. Data from local actors that did not meet the standards was often not included in the humanitarian reporting mechanisms. This is also reflected in a duplication and multiplication of assessments: while the first humanitarian Multi-Cluster Rapid Initial Assessment (MIRA) was completed end of November, it had to be aligned with local information later on and was republished end of December. In sum, this leads us to the following proposition regarding coordination:

Proposition 3. ***Coordination*** *within humanitarian organizations is characterized by fragmentation between field-based operational response decisions and strategic planning at national or international level;*

inter-organizational differences of systems and paradigms amplified this disconnect, leading to emergent and volatile roles and responsibilities, hampering efficient coordination and planning.

4.2 Adaptation in the Response to Haiyan

Driven by limited access, humanitarian needs became known locally and gradually organizational mandates took shape. Many of the initial decisions needed to be made on the basis of incomplete or lacking information. According to one interviewee, even "*the Philippine army said that until CNN got in, they didn't understand the extent of the disaster"* (Table 2). At the same time, responders were trying to react to the urgent needs they saw in their immediate vicinity (cf. Table 1, Sensemaking). As such, they focused on alleviating the suffering that they saw around them, neglecting information search and an exploration of the wider scale and scope of the disaster. Therefore, the adaptation processes we observed were slow concerning the scale, scope and geographical locations. This was particularly true for Guiuan, the last response hub established, roughly 10 days into the disaster, and acknowledged by our interviewees: "*10 days is a long time to realize that [the response is scattered]. It could be after 2-3 days. But I was busy. This is why it took so long."* (Table 2).

Proposition 4A. ***Initial Adaptation.*** *The combination of uncertain information, time pressure and high needs in the immediate vicinity leads to a focus on responsive action over a thorough exploration of the situation, which hampers sensemaking and slows down adaptation in the initial response.*

Table 2: Adaptation in the Typhoon Haiyan Response

Concept	# int	Geogr. Context	**Sample Quote** and category [UN agency; NGO; local organization]
Reactive response and **slow adaptation** to initial informational voids	6	Guiuan	*The first days, first 48 hours the first assessments are coming in. Afterwards the logistics cluster realized that this emergency was very complex and had different hubs. They needed more people and were not prepared for that.* [UN] *10 days is a long time to realize that* [response is scattered]*. It could be after 2-3 days. But I was busy. This is why it took so long. Why I could not do any better.* [UN]
	5	Tacloban	*The UN perspective is supporting government gaps – but without knowing that [the gaps], this is a difficult job*. [UN] *The Philippine army said that until CNN got in, they didn't understand the extent of the disaster, depending on the location.* [UN]
	5	Manila	*False information on needs with false information on output leads to false information leads to wrong response. And we continuously try to adapt to new false data.* [NGO]
Adaptation to changing positioning of organizations and availability of	4	Guiuan	*We saw different hubs emerging.* [UN]
	3	Tacloban	*One of the main reasons for shifts is the new architecture that we are implementing that is the transformative agenda which is a sort of strategic response plan. That process is very heavy and very demanding. […] In the past you would do a flash appeal where you had a crisis situation, these are the projects we are going to do, and this is what they cost. Now you say these and these are the situation and these are the issues we want to*

funding		*address with these price tags and you can choose projects and that changes all the time.* [UN]
3	Cebu	*At the end of the day an organization has an interest in projects because that is where money, funding, and staff all of that comes together. We have another very well-functioning country team in <location>, the country team in <location> is not very functioning and becomes very competitive rather than a prioritized environment.* [UN]
5	Manila	*Resources were abnormally high. There is a lot of funding and interest, which will soon fall off.* [NGO] *The donors are the elephant in the room. They drive our response.* [NGO] *UNDAC leaves after 3 weeks. There is a limited transfer to people who stay longer. They know they leave within 3 weeks, so very different planning horizon.* [UN]

As communication was restored, the effectiveness of initial decisions became increasingly recognized at strategic level, leading to centralized interventions and adaptations to streamline planning. Throughout those adaptations and changes, roughly four to eight weeks into the disaster, uncertainty persisted because of incomplete monitoring and reporting, reflected also in the double MIRA. As the appetite for information at headquarters level transitions into coordination, and international humanitarian response was pushed to align with national governmental interests. Yet, friction remained: while the government's strategic response plan was published in the beginning of December, the Humanitarian Country Team (published end of December) was "*developed, approved and released* […] *without Government involvement"* (IASC, 2014).

The strategic response plan brought about a change of funding, moving from the initially "*abnormally high*" (Table 2) resources to consolidated planning and more constrained budgets. These new requirements changed the priorities that had emerged locally "*Now you say these and these are the situation and these are the issues we want to address with these price tags and you can choose projects and that changes all the time"* (Table 2). Moreover, interviewees at all levels perceived this process at least in part as driven by the prospect of funding and visibility, and as such the interests of donors or the attention of the media were understood as drivers of priorities, rather than their operational insight.

Proposition 4B: Continuous Adaptation. *Changing positioning and organizational mandates to meet the expectations and requirements set by the media and donors create major uncertainty and a prolonged need to continuously adapt far beyond the initial phase of the disaster.*

5. Case Study 2: the response to the Syria Crisis

The conflict in Syria has entered its sixth year with no foreseeable end in sight. UN Emergency Relief Coordinator Valerie Amos declared a Level 3 Humanitarian System-Wide Emergency for Syria on January 15, 2013. Since then, the humanitarian community has scaled up its efforts and many organizations have

since run into their organizational limits. To date, it is estimated that 13.2 million Syrians, more than half the population, need humanitarian assistance. Over 10 million people have been displaced, of whom 6.2 million internally. The Syria crisis is a major protection crisis marked by disregard of International Humanitarian and Human Rights Law, with the emergence of new actors and parties that do not subscribe to the humanitarian principles, adding to the complexity of the response.

Generally, the response in conflicts poses specific challenges to operations management. Decision-making and coordination structures are set up to provide aid to those in need while maintaining protection aims to ensure safety of beneficiaries and responders. In conflicts, information sharing is a risk (Van de Walle & Comes, 2015), and particularly cross-border or cross-line operations are highly sensitive (Tomasini & Van Wassenhove, 2009). Obtaining real-time information from partners on the ground is difficult, and operations need to consider extremely volatile access and security conditions, which often go hand in hand with swift changes of needs and demand patterns.

5.1 Findings on Sensemaking, Coordination and Decision Processes

As for the first case study, we formulate our findings as theoretical principles of sensemaking, decision-making and coordination based on interviews that were conducted during two field visits in 2014 and 2015, enabling us to compare our findings across geographical contexts and over time.

Sensemaking and Decision processes

Driven by a lack of access and the security situation in the country, confirmed or verifiable data about the situation in Syria remains scarce (Sida et al., 2016). Particularly the operations within Syria were described as "*responding in the dark"* (Table 3). Despite considerable efforts to identify the most credible sources and comparing information from different origins to avoid the perception of being inaccurate or conflicting with officially stated information, data verification remains extremely difficult. Most interviewees were frustrated by the sensitivity of information, and the lack of guidance on how to handle it: "*Lots of confusion, and no protocols on information sharing, even three years in crisis."* (Table 3) Several interviewees stated relevant data was often lost in confidentiality concerns: "*There are a million excuses for this, but there is no excuse any more for this secrecy."*

Given the political nature of the crisis, the advocacy and negotiation efforts conducted at the highest level of the UN Security Council cast a long shadow on the operations on the ground. The prerogative of strategic concerns is ubiquitous across the interviews we conducted. Information managers and responders were struggling to keep up with frequent ad-hoc requests to support advocacy, frequently breaking into planned operational information and decision-making cycles. The strategic decision processes were opaque from the field perspective: "*Headquarters and donors want to control the game. And they want to choose their own reality"* (Table 3). Some interviewees even described decisions at headquarters level as conflicting with humanitarian principles (see also Table 4). Because official information was thought to be

biased or distorted ("*We currently use political numbers to have a common denominator and agreement transported in the indicators*", Table 3), we observed a clear and growing divergence between operations on the ground that were following similar strategies of simplification and satisficing as we observed for Haiyan, and the global political realm, which added to the atmosphere of mistrust and enforced rather than eliminated barriers to information sharing.

Proposition 5. Decision-Making. *The highly uncertain and politicized environment prevents operational decisions from maturing from simplification and satisficing to evidence-based decisions.*

Because of the siloed and opaque decision processes and information flows, data is fragmented and subject to considerable uncertainty. In the absence of agreed processes and procedures to reason under uncertainty, processes of information sharing, and verification were perceived as too slow ("*We even BCC all partners. It slows everything down. Everything is slowed down.")*. Furthermore, representing information as static and factual situation reports, maps, and indices on dashboards, whereas the situation and the information about it are highly dynamic and uncertain effectively induces consensus-finding barriers. Interviewees confirmed consistently that rather than knowing how the situation was, they missed "*trend analysis, particularly for volatile situations",* As such there was a sentiment of information sharing not being at pace with the evolution of the events, such as the Battle of Aleppo in 2014. In this situation, interviewees reverted to their personal networks, and we observed the dominance of strong narratives and rumors within the respective organizations and geographical locations inducing particular views, if not biases (Comes, 2016). This was particularly detrimental in terms of collective sense-making for the Syria response in the region. Despite efforts to create a *Whole of Syria* approach, the narratives, standards and norms remained fragmented across geographical locations.

Proposition 6. Sensemaking. *The combination of secrecy and mistrust, led to localized sensemaking in different geographical regions of the conflict and the emergence of conflicting localized sensemaking trajectories and norms, increasing fragmentation laterally, even within the same organization. The dominance of advocacy in a highly uncertain and volatile conflict leads to a mistrust in official information at operational level, thereby amplifying the hierarchical fragmentation between the strategic and operational level of the response.*

Table 3: Decision Processes and Coordination Structures in Syria

Concept	# Int.	Geogr. Context & Year	**Sample Quote** and category [UN agency; NGO; Donors]
Decision-making dominated by ad-vocacy	6	Amman 2014	*Headquarters and donors want to control the game. And they want to choose their own reality.* [UN] *We are not able to have whole of Syria meetings with donors; we can't formalize these or organize these. Where are gaps? And what does that mean for our funding*

			– we are not able to do that. [UN] *Targets are set such that they can be made. All these sharp figures, all the sets of indicators. They are not needs-based indicators, they are intervention-based indicators. This is reporting to the donors*. [NGO]
	5	Amman 2015	*It was the hugely political red tape because of the pseudo legality of the cross-border operations.* [UN] *We use political numbers to have a common denominator and agreement*. […] *But to plan the response, we are completely relying on what local partners tell us. [*UN]
Sensemaking: extreme uncertainty and fragmentation lead to incoherent localized sense-making	8	Amman *2014*	*You don't have a baseline, you don't have comparable data, so you track, but you go from one month to another and start as if you begin again.* [Don] *The level of uncertainty is extreme. We don't know enough. We are responding in the dark*. [UN] *There is suspicion, unwillingness*. [NGO] *The big problem is there is no information about what the interventions are in Syria, although it is big money, the biggest piece of the cake*. [Don] *Lot of confusion, and no protocols on information sharing, even three years in crisis. It is a very fractured situation.* [UN]
	4	Gaziantep 2015	What we are missing is trend analysis, particularly for volatile situations. [UN] *We still do not know which organization is working where – we only get IDs of organizations. Who – we do not know. [NGO]* *We even BCC all partners. It slows everything down. Everything is slowed down. [UN]*
	7	Amman 2015	*In most crises, we coordinate to understand what is happening. Here we cannot do that. We do but the picture is not as holistic as in other cases. We are reading everyone's sitreps and trying to put it together.* *There are a million excuses for this, but there is no excuse any more for this secrecy. [UN]*
Lack of coordination I: competition between regional actors	10	Amman 2014	*We have genuine concerns about rubbing information into Damascus' face, to avoid being kicked out there. We need to enable them to save their face. [UN]* *Coordination will start from country level – regional role is going to be a challenge; given history and foundations that we have now. Probably Turkey, Jordan, Iraq will build up coordination mechanisms, maybe will come together, but trust levels are so low. As long as it is not, we will muddle along in this limbo. [UN]*
	3	Beirut 2015	*When it started, <Org1> Amman was support office to Syria, then it became the regional office […]. Then <Org1> Lebanon started to do their own thing, like supporting the coordination led by <Org2>. [UN]* *The thing that had a very negative impact was the fight between the offices on the ownership. Like we collect the data, it should be our own product. Once they created a regional office, the country offices were worried about their role and losing grasp on their leadership. Everyone wanted to become the super-office and*

			knows the best. [UN]
	6	Amman 2015	*NGOs are very autonomous in Gaziantep. Coordination is very fractured. [NGO]* *We are undermining our own undermining our sectorial agreements. [UN]* *Whatever 4W gets out, the acceptance has to be that the government knows everything. This creates genuine coordination issues; it is sector by sector that we are dealing with this problem. NGOs using different names did not tell the gov openly – when published, gov kicks them out, examples of people being kidnapped, schools that were bombed. [NGO]*
Lack of coordination II: information as a source of power leads to informal shadow coordination networks	5	Amman 2014	*Competition is an issue. Competition about access, cross border partners; relationship with armed or non-armed actors. That is why information is not shared. [NGO]* *No one knows what the needs really are. Info is presented in such a way that it serves the actors. [NGO]* *The reason is that <Organization1> screwed <Organization2> in the past. <Organization1> took the <Organization2> information and used it for political games. So, we are now very concerned. [UN]* *In reality, nothing is secret here. It's an illusion of the mind. We share information based on goodwill and relations, not as part of a system. [UN]*
	4	Gaziantep 2015	*For coordination, it was a difficult operation, because the response was started by NGOs, most structures were informal, and the work was just going on. [UN]* *This is not a democracy. If one partner does not agree to that de-anonymization, I am at risk of losing that partner. [NGO]*
	3	Amman 2015	*We are lucky to own the data. [UN]*

Coordination structures

Our findings show that there are considerable frictions between the realms of influence in the region. Most interviewees confirmed that particularly Security Council resolution 2165 authorizing cross-border traffic enabled coordination between the two separate operations from Damascus (within Syria) and Turkey (cross-border), see also Table 4 below. Before the resolution, cross-border activities largely carried out by NGOs exceeded the UN operations from Damascus in scale and budget. Perceptions of the other were dominated by mistrust, partly fueled by competition between the operations within Syria and the cross-border counterpart and partly by the dynamics of the conflict. Moreover, interviewees acknowledged the different way of operations as a barrier: "*Coordination was difficult, because the response was started up by NGOs, most structures were informal, and the work was just going on"* (Table 3). While the environment has been slowly improving since 2015, competition between the offices or hubs in the region remained fierce: "*Once they created a regional office, the country offices were worried about their role and*

losing grasp on their leadership. Everyone wanted to become the super-office and knows the best" (Table 3).

Proposition 7A. Coordination. *The geographical fragmentation of the response fueled by fragmented sensemaking trajectories and incompatible modes of operation leads to competition between regional hubs, even within the same organization.*

Besides actual security concerns, privileged access to scarce information turns this very information into a source of power (Yang & Maxwell 2011). This is also recognized by the interviewees: "*More than anywhere else, information is political in Syria*". As information is seen as power, coordination and establishing relations largely evolve around information sharing. Against the backdrop of politicized and scarce information, in which organizations competed for *"access, cross border partners; relationship with armed or non-armed actors",* and funding, competition was identified as the reason *"why information is not shared*." (Table 3). Consequently, the humanitarian community continues to work in self-created fragmented coordination structures, characterized by the strong role of personal networks. Information becomes an instrument in the political struggles fueled by intra-organizational competition between national coordination structures in the region and inter-organizational competition for funding. The atmosphere of mistrust hampered official exchange even of information that is common knowledge between all actors. All interviewees confirmed, for instance, that critical locations (schools, hospitals, power plants, etc.) are known by all parties, and yet the data was only available bilaterally and informally. For example, WhatsApp was used communicate with informants and local representatives of Syrian NGOs despite security concerns. This poses challenges to established principles such as verifiability of information and impartiality of the humanitarian organizations. These concerns have also been raised by official evaluations of the response (Sida et al., 2016).

Proposition 7B. Coordination *Given the competition and the role of information as a source of power, two parallel coordination structures emerge: official coordination in the cluster system, and informal coalitions that support operations in closed local networks bypassing official hierarchical structures.*

5.2 Adaptation in the Syria crisis

The revisions of organizational strategies were shaped by two aspects: drastic and often unexpected (albeit foreseeable) changes of the situation, primarily in terms of access or needs, paired with a continuous struggle to maintain the standards of the humanitarian system and its working principles in a hostile environment driven by non-humanitarian actors.

The revisions to changing external conditions under uncertainty is similar to the adaptations required in the natural disaster. But the volatile situation of an ongoing conflict, create continuous uncertainties and thereby the need to change and adapt strategies and coordination structures. Together with the indefinite timeframe and scope of the operations, this creates an overwhelming sense of uncertainty. The fragmented

information landscape exacerbates the situation (see Table 4). First, since strategic planning could not consider information that was not in line with the official statements or reporting, there were significant gaps between planning and operations, leading to inefficiencies and misallocations. At the same time, the fragmentation and delayed or highly aggregated sharing of information between the different regional hubs even within the same organization hampered sensemaking laterally. In this sense, hierarchical and lateral fragmentation together create and contribute to the uncertainty in the Syria response, and thereby delay the necessary adaptation.

Moreover, even three to four years into the crisis, interviewees still referred to the misconceptions in the set-up of the response operations, which started as "*preparedness*" and was built on the expectation that the "*government was about to fall*" (Table 4). The fact that interviewees still perceived this as a barrier to operations highlights how slow adaptation processes are, if they are set against organizational expectations, and require a change of mandates, processes and procedures. Similarly, while the cross-border resolution (SCR2165) was perceived as an improvement, the existing social and organizational networks were slow to adapt, and UN agencies reported that they were "*not aware of the other partners*" (Table 4). Since the severity of the situation is recognized by all actors, different attempts were undertaken to adapt the formal coordination structures, yet leaving the *informal* structures intact resulting in continuously shifting official structures with little improvement of information sharing or actual coordination. This continuous struggle between intra- and inter-organizational stability and adaption, as highlighted by the following quotes: "*We struggle all the time. All the usual issues here are magnified on the situation*." "*We are constantly searching for new structures, which indicates that the current structures are not working*." (both Amman, 2014).

Table 4: Adaptation in the Syria Response

Concept	No int.	Geogr. Context & Year	Sample Quote and category (UN agency [UN]; NGO; Donors [Don])
(Late) ad-aptation to changing external conditions	4	Amman, 2014	*Our project started as preparedness, you know, where to intervene when the war is over.* [NGO]
	4	Amman, 2015	*Our initial weakness was heavily influenced by this general thinking: okay the government is about to fall. A lot of assumptions that were being made at the time.* [UN] *Since the resolution* [SCR2165]*, UN agencies started moving in. Including IOM doing cross-border. Other than that, we are not aware of the other partners. iNGOs & Syrian NGOs.* [UN] *We increasingly centralize the leadership of different sectors to regional coordination. But that might become more decentralized if the battlefield changed, so fragmentation is more pronounced.* [NGO]
	2	Gaziantep,	*Especially after Idlib that whole landscape changed, government pulled out, opened up a*

		2015	*whole new humanitarian space from the Turkey side. Each NGO have their own system, so they have data.* [NGO]
	3	Beirut, 2015	*There was a massive influx* [of refugees], *which could have been predicted with a little bit of effort – but there was just nothing.* [UN]
Systemic challenges: emerging non-humanitarian actors	4	Amman, 2014	*We are working inside and outside the multi-lateral system* […] *There are a thousand armed groups who distribute food to two million people*. [UN]
	3	Amman, 2015	*It is a lot of work to do the reporting, and they do not see any benefit – because their target donor's behavior is different.* [UN] *We have tried creating a working relation between the traditional humanitarian system and the Arab system, but we are providing information according to the western mentality. They are not interested in having a document of 10 or 15 or 20 pages – they will not read it.* [UN] *The diaspora is another major chunk that is taking place, and this is blank for us. But this is not humanitarian. This will not match every single part by the book. […] For 4 years, communities are besieged or hard to reach. It means people survive relying on support from either the Gulf or the diaspora.* [UN]
	4	Gaziantep, 2015	*There are more than 300 news organizations, many Syrian. Bringing them into cluster system is challenging.* [NGO]
Systemic challenges: violation of humanitarian principles	4	Amman, 2014	*We continue to work. Despite the institutions.* [UN] *There is no unity among the agencies. In terms of humanitarian principles, they are taking a battering.* [UN]
	3	Gaziantep, 2015	*By no means, we can consider this operation is normal, or we can consider this operation as comparable with any natural disaster.* [NGO]
	5	Amman, 2015	*Parties in this conflict do not respect humanitarian laws. There are no ethics. Fuel for some reason is not reaching the country. And the impact is that hospitals will stop operating.* […] *Activities will stop or slow down now at harvest time.* […] *we are not the decision makers about for which commodities this fuel will be used. Probably by the military.* [UN] *The humanitarian system for complex disasters should be very vocal on protection. The principles are now violated. Validity will be vanished.* [UN]

At the same time, the emergence of new actors such as local NGOs and civil activists or donors from the Gulf states questioned the relevance of humanitarian coordination and made it difficult to adhere to humanitarian principles and standards. The use of non-standardized information systems like WhatsApp as mentioned in the previous section, or the lack of reporting structures for the donors from the Gulf are not interoperable with the UN coordination structures or decision processes. Following the emerging landscape, where coordination and decisions are made in an agile, asynchronous and distributed way, humanitarian organizations were continuously seeking compromises and structures to enable collaboration with local NGOs, diaspora, or Syrian activist groups.

Proposition 8. Adaptation. *Although humanitarian realize the need to continuously adapt to volatile conflicts, the organizational structures, networks, processes and deeply engrained narratives cause significant delays, or lead to compromising standards and principles.*

The Syria crisis clearly stretches the limits of the humanitarian system. As such, it can be an indicator of an upcoming "*episodic*" structural change, which is disruptive in nature (Weick & Quinn, 1999; Barnett & Carroll, 1995). Mintzberg & Westley (1992) describe the period of struggle, which typically precedes structural change: "*changes in the environment may have so upset standard procedures that many of the operating behaviors may also be in a state of flux. At worst, a period of struggle may represent a state of limbo or delay, the official leaders of the organization not knowing which way to turn.*" While the period of struggle is typically followed by learning and structural change, uncertainties during this period affect all levels of the operation, including aims, preferences, constraints; decision processes and coordination structures; and the information layer that connects and informs both realms.

6. Discussion

The cases confirm that coordination structures and decision-making processes during the response to a humanitarian disaster are emergent and continuously adapting through sensemaking, feeding upon and into the information available which, in turn, reflects the dynamic nature of a disaster (cf. Figure 1). Table 5 provides an overview of all propositions we developed from our cases on the response to Typhoon Haiyan and the Syria crisis. It shows that the continuous and often unpredictable changes in information, decision-making and coordination were reported to cause instability and confusion particularly at operational level. This can be explained by disrupted sensemaking trajectories and a lack of activity awareness (see Section 2.2), which, in turn, reflect on decision-making and coordination. At the same time, we also found that the social awareness and binding norms of the sensemaking process influenced coordination across localized networks. This multiplicity of narratives, processes and structures led to a lack of convergence and slowed-down adaptation.

Table 5: Overview of Propositions on Decision-Making, Sensemaking and Coordination

	HAIYAN	SYRIA
DECISION-MAKING	1. In the initial response, decision processes are based on simplifications. Satisficing is the dominating strategy.	5. The highly uncertain and politicized environment prevents operational decisions from maturing from simplification and satisficing to evidence-based decisions.
SENSE-MAKING	2. Information products and analyses created at strategic level for alignment are discarded as too complicated or too time-consuming at operational level, leading to hierarchical fragmentation. Operational sensemaking is driven by individual perceptions, restricted to local social networks and therefore vulnerable to rumors	6. The dominance of advocacy in highly uncertain and volatile conflicts leads to a mistrust in official information at operational level, amplifying hierarchical fragmentation. The combination of secrecy and mistrust lead to localized sensemaking in different geographical regions and the emergence of conflicting localized sensemaking trajectories and norms,

		increasing fragmentation laterally even within the same organization.
COORDI-NATION	3. Coordination within humanitarian organizations is characterized by fragmentation between the field-based operational response decisions and strategic planning at national or international level. Inter-organizational differences of systems and paradigms amplified this disconnect, leading to emergent and volatile roles and responsibilities, hampering efficient coordination and planning	7A. The geographical fragmentation of the response fueled by fragmented sensemaking trajectories and incompatible modes of operation leads to competition between regional hubs, even within the same organization. 7B. Given the competition and the role of information as a source of power, two parallel coordination structures emerge: official coordination in the cluster system, and informal coalitions that support operations in closed local networks bypassing official hierarchical structures

6.1 Fragmentation of sensemaking impairs decision-making and coordination

Our findings on sensemaking, decision-making and coordination indicate that disrupted information flows led to fragmented sensemaking, which, in turn, leads to unstable and ineffective coordination structures and biased decisions. For Haiyan, the initial uncertainty combined with extreme pressure led actors to create their own localized narratives and discard official information products as 'too time-consuming' (Proposition 1). Our findings are in line with the well-documented tendency of decision-makers to simplify problems under time pressure and rush to action before a situation is understood (Comes, 2016). Therefore, important cues are discounted or ignored (Weick, 1993) and strategic implications are neglected, with the argument of 'unsuitable' information. This information filtering mechanisms led to a highly localized sensemaking process that was vulnerable to rumors and individual perceptions (Proposition 2). Yet, this process drove the emergence of coordination structures in the field, where the priorities for the initial response decisions were determined detached from planning at strategic level, even within the same organization (Proposition 3).

Commonly, uncertainty in disasters is attributed to disrupted infrastructures and a lack of access. The assumption is that as more and better data is available and access is improving, sensemaking, decision-making and coordination will somewhat automatically improve as well. However, our findings show that even for natural disasters, information does not necessarily improve sensemaking, decision-making or coordination. This is in line with earlier research on sensemaking that shows that more information can sometimes degrade performance, although confidence continues to increase so that decision-makers are increasingly (over-)confident in the wrong decisions (Klein et al., 2006).

The Syria case introduces an additional layer of complexity as the response efforts spanned multiple countries in the region, and the many and frequent human rights violations challenged the humanitarian principles. The politicized environment that turned information into a source of power led to an atmosphere of overwhelming uncertainty. Particularly, there was a deep mistrust in official information products at the operational level (Proposition 6) confirming the hierarchical fragmentation that we also observed for Haiyan. This extended uncertainty prevented operational decision-processes from going beyond the initial stages of simplification and satisficing based on trusted sources and networks (Proposition 5). Driven by the mistrust in institutions and trying to keep up with the pace of volatile developments on the ground, localized sensemaking in different regional hubs emerged. This led to the emergence of a fragmented contextual rationality (cf. Section 2.2.) and separated standards and norms regionally. This instability and fragmentation led to friction and fragmentation laterally, even within the same organization (Proposition 6). This double fragmentation amplified the already high uncertainty and thereby contributed to a prolonged situation of competition between regional hubs (Proposition 7A) and the emergence of parallel "shadow coordination" structures (Proposition 7B).

Our findings on Syria therefore echo and amplify the findings for the natural disaster response in Haiyan. While for Haiyan the most dominant divide was between strategic and operational level, for Syria we also observed a more pronounced lateral divide between the different geographical regions of the conflict, even though the response efforts had already been going on for years, providing ample opportunity and time to improve alignment and coordination. A possible explanation for this continuous lack of alignment are fragmented adaptation processes.

6.2 Adaptation not at pace with volatile situations

While the literature on planning and decision-making conventionally relies on the paradigm of a rational decision-maker who continuously adapts to the (best available) information, we observe a plethora of barriers to adaptation in our case studies. In the Haiyan response, humanitarians prioritized responsive action locally over broad information acquisition and the creation of a shared understanding of the situation. This led to delays and gaps in the immediate response and slowed adaptation (Proposition 4A), particularly in identifying the full geographical scale and scope of the disaster.

Table 6: Overview of propositions on adaptation

	Haiyan
time ↓	**4A.** The combination of missing or uncertain information, time pressure and high needs in the immediate vicinity leads to a focus on responsive action over a thorough exploration of the situation, which hampers sensemaking and slows down adaptation in the initial response. **4B.** Changing positioning and organizational mandates to meet the expectations and requirements set by the media and donors create major uncertainty and a prolonged need to continuously adapt far beyond the initial

	phase of the disaster.
	Syria
	8. Although humanitarians recognize the need to continuously adapt to volatile conflicts, donor demands or changing political environments, organizational structures, processes and deeply engrained narratives that solidify over time cause significant delays, or lead to compromising standards and principles

The long lead times for strategic planning at national or international level create an organizational void in the initial response phase, which was therefore characterized by self-organization and emergence locally. The resulting fragmented sensemaking (cf. Table 5) created localized narratives of how the operation unfolded, and strong expectations about the future trajectory, which made the creation of a joint strategy difficult. While such path-dependencies are well-documented for strategic decisions (Webster, 2008), the fragmentation of the humanitarian response creates similar dependencies at operational and local level. This effect is amplified by changes of organizational mandates and positioning driven by donors and media attention, prolonging the sense of uncertainty beyond the phase of the initial response. The conflict between operational and strategic priority and the perceived unpredictability of strategic directions created the need to continuously adapt (Proposition 4B) to *internal* uncertainties created by the humanitarian system itself, rather than by an uncertain external environment.

Although the response to the Syria crisis is now in the seventh year, it is still characterized by shifting and volatile lines. As such, the Syria response combines a dynamic situation, similar to the immediate response phase, with strong local narratives and path-dependencies that we observed for Haiyan later-on. Because of the extended duration of the conflict, hierarchical and lateral fragmentation between the different regional hubs became deeply engrained in the response structures. This combination of the urgent need to react to tremendous human suffering with highly fragmented and politicized structures makes it extremely difficult for organizations to keep at pace with the situation, even though the need for continuous and rapid adaptation is broadly recognized (Proposition 8).

The framework of organizational strategic decisions by Eisenhardt & Zbaracki (1992) provides a useful framework to understand why the disconnect between the local hubs early in the response persists. The transition from a situation where local hubs take responsibility to fill a real or perceived void (e.g., by running cross-border operations), to regional planning with the reinstitution of clear hierarchies and reporting lines can be understood as a prolonged political process (see Table 6), in which decisions are dominated by power, coalitions are formed, and information is a means to enhance these power positions.

Decision processes are understood less as problem solving activities, but as conflict resolution, which fits well with the frictions and competitive environment described in Section 5.2.

6.3 Synthesis

To synthesize, we start with the idea that disrupted information flows in a disaster response shape sense-making, and thereby coordination and decision-making (cf. Figure 1). Our findings confirm a close relation between sensemaking, coordination and decisions: we showed that disruptions of information flows in both cases lead to localized sensemaking and a lack of coordination. In turn, this creates a fragmented information landscape, where information is not shared, shared too late, or not trusted, consolidating or even amplifying the initial disruptions, despite attempts to (better) coordinate.

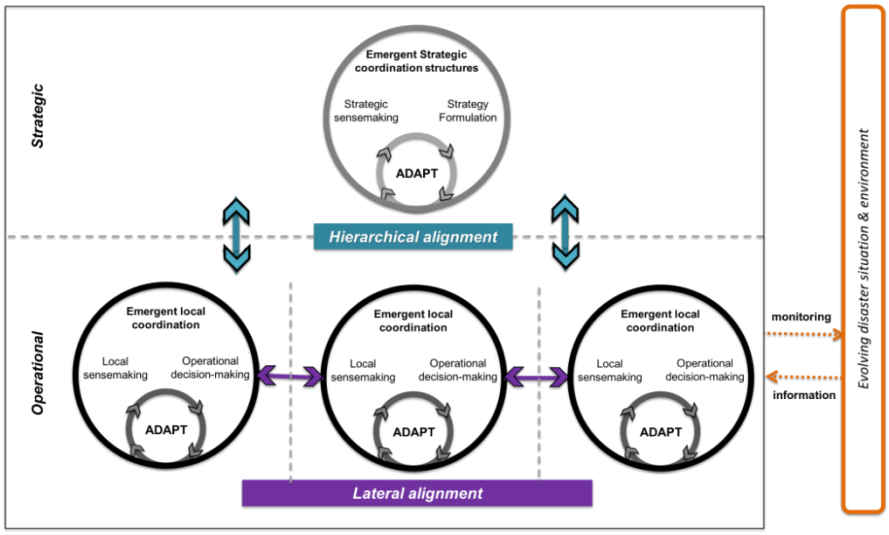

Figure 2: The need to orchestrate information flows and align strategic and operational processes

The dynamics of a disaster require rapid and coordinated adaptation. Yet, the findings from our case studies highlight that the fragmentation and disconnect of information flows lead to the emergence of multiple localized pockets or bubbles of sensemaking, decision-making and coordination. Even if the need to adapt is widely acknowledged, each of these bubbles is characterized by its own cycle. This parallelism leads to friction and uncertainty laterally (between different geographical regions) and hierarchically (between operational and strategic level). Figure 2 synthesizes these findings and extends Figure 1 by making explicit the barriers to sensemaking, coordination, decision-making and adaptation.

Our findings show that the initial lack of information (sharing) is an important source of misalignment. The emergence of decision processes and coordination structures as "*accidents of timing and sensemaking*" (Comfort, 1993) has also been observed for smaller scale sudden onset crises (ibid). While Comfort (1993) presented the introduction of information (technology) as a promising solution, our findings indicate a persistence of fragmentation for both Haiyan and Syria even after communication is reinstituted. In addition, much of the information about mandate, aims, response capacity, and access depends on decisions

at strategic level. The continuous and at times unpredictable adaptation of plans, priorities or budgets causes uncertainty at operational level. We therefore argue that the hierarchical alignment between strategic and operational levels and lateral alignment between different regions need to be addressed. So far, efficient information sharing mechanisms that respect the requirements and timing of decision-making and coordination at different levels or regions are lacking. Because of the path-dependencies and the persistence of initial decisions and contextual rationalities, we argue that these processes and mechanisms need to be established at the very onset of the response.

6.4 Research Agenda

Our paper shows that our current understanding of emergent and dynamic disaster phenomena and their impact on the performance of humanitarian operations is limited. To ensure that mathematical HOM models can take into account these elements, further insights are needed that allow us to understand and quantify the mechanisms that shape the co-evolution of information, sensemaking, decision-making and coordination. Based on our findings, we propose three research areas that together can help align the response laterally and hierarchically and improve adaptation in humanitarian operations.

Research Area #1: The co-evolution of sensemaking, coordination and decision-making

Thus far, there is very little work on the evolution of humanitarian coordination structures, and the interplay between standardized structures at headquarters and the emergent structures in the field (Holguín-Veras et al., 2012); neither is it known how coordination unfolds between organizations with different mandates and norms such as humanitarians and public authorities, the military or civil society. To test and further validate our propositions, we foremost emphasize the need for further empirical studies to capture the nature of sensemaking, decision processes and coordination structures across a range of disasters and roles, including slow-onset disasters or pandemics, and formalize the dynamic interdependencies between them.

While Sue & Ostrom (1995)'s *Grammar of Institutions* provides a useful starting point to understand the emergence of coordination structures and the interaction between strategic planning and operational ad-hoc coordination, we advocate explicitly considering information (flows) to capture the networks, scale and timing of information sharing. In addition, to understand the impact of *fragmentation* on the emergence of sensemaking, coordination and decision-making, traditional coordination theory that focuses on integration and coherence (Wolbers et al., 2018) needs to be extended. Fragmentation here refers to different contextual rationalities at different levels and roles, emerging through disrupted communication or different processes and retained via sensemaking trajectories.

Research Area #2: Modeling Information Sharing as a Barrier and Driver of Adaptation

Throughout this article we stressed that information alone is not sufficient for better sensemaking, co-ordination and decision-making. The focus on technology and the widespread access to data and analysis

tools gives rise to an unprecedented number of forecasts, predictions and analyses, adding noise and uncertainty – and providing decision-makers with an excuse to discard and neglect information. Therefore, it is first vital to understand the value and use of information in humanitarian operations. While the theory of value of information (Feltham, 1968), provides a useful starting point, it needs to be extended to include the sensitivities and potential risks of information sharing as well as principles of humanitarian information management (Van de Walle & Comes, 2015).

We identified uncertainty and time pressure as factors that lead to the initial focus on responsive action, versus searching for information broadly. There is a plethora of experimental or case-study driven research on rapid decision-making that analyzes how individuals process and use (uncertain) information to make a decision (Eisenhardt, 1989b; Payne et al., 1996; Tversky & Kahneman, 1974), showing that time pressure leads to changes in information processing, risk preference, and performance. Yet little is known about the trade-offs between action and information acquisition, or the impact of information acquisition strategies on decision performance. Therefore, experimental and empirical research is needed to assess and quantify the perceived priority of information to understand information acquisition in different contexts. Understanding information priority can target and direct the creation of information products and streamline the overwhelming multitude of data analytics and optimization models to those who need it most.

Based on insights of informational value, use and adaptation behavior, simulation models such as agent-based models can contribute to understand how micro-level decisions lead to the emergence of patterns at systems level. While there are few models on information diffusion in the cluster system (Altay & Pal, 2014), there is no connection to specific HOM decisions or coordination structures. Because of the importance of misinformation and rumors, particularly in conflicts, the risks of (rapid) information sharing need to be analyzed in terms of privacy violations, spreading of rumors and misinformation.

Research Area #3: Humanitarian Operations Management, revisited

The theoretical and empirical insights about coordination, decision-making and information sharing open up research opportunities for optimization and normative models. Crucial is the integration of modeling techniques that go beyond traditional analytical HOM optimization models, and are able to integrate behavioral aspects, adaptation in dynamical systems, and emergence in complex systems.

System dynamics (SD) has been suggested as a possible way to describe the dynamics of humanitarian response (Besiou et al., 2011). SD has been used to analyze the impact of information delays on the performance of operations (Peng et al., 2014; Phelps et al., 2016). This work could be extended by new deprivation cost functions (Holguin-Veras et al., 2013) that include the effect of missing or late information towards specific regions or communities. Based on insights about how information is shared, used and affects performance, scheduling models can optimize and orchestrate information flows laterally and vertically to reduce delays and bottlenecks. Allocation and scheduling models can support the prioritization

of information acquisition versus other operational response activities. Insights about changing values and preferences over time or as a function of donor decisions can be integrated as an additional element of uncertainty into strategic HOM models such as facility location problems.

7. Conclusions

Understanding adaptation to dynamically unfolding disasters is key to advance research and practice of humanitarian operations. While the need for adaptation is commonly assumed to stem from lacking or uncertain data, we identify the emergence of coordination structures as an important source of prolonged uncertainty. We derive our findings from two case studies that enable us to explore different contexts: the response to Typhoon Haiyan in the Philippines, and the Syria Crisis. In both cases, the lack of a reliable structure in humanitarian operations gave way to spontaneous, unstructured, and reactive decision-making driven by individual and local leadership rather than organizational mandates, joint standards and norms. This led to continuous revisions of processes and structures along with an adaptation of mandates and aims, driven by new insights or changes in the information, as well as rivalry between and among humanitarian organizations, and new challenges to the humanitarian response system in today's crises. From there, we derived a series of propositions on sensemaking, decision-making and coordination that address the fragmentation of humanitarian operations both vertically and laterally. We furthermore argue that the combination of uncertainty, time pressure and fragmentation lead to significant delays in adaptation to new insights.

Implications for Humanitarian Organizations: Despite the importance of rapid decisions under time pressure and low levels of predictability in humanitarian operations, systematic techniques to support decision-making are often unknown to, unavailable or not tailored for humanitarian decision-makers in the field. Our findings point at the importance of adequate information systems particularly at the onset of a response. Indeed, as more and better information becomes available and the capacity is ramped up, more information is available. But to benefit from this information, decision-makers need to break out of their information and coordination bubble and monitor their environment to understand emerging trends and adapt their decisions. Ideally, such adaptations are already foreseen in the initial plans. This will, in most cases, require more complex and decentralized structures and strategies that combine reactive and proactive elements, and include approaches to data preparedness that account for the (expected) information needs and partnerships with information and communication providers.

Implications for HOM Research and Modeling: our case studies highlighted that the dynamic nature of disasters and the associated information via sensemaking create volatile decision processes and fragmented coordination structures that persist even after communication is re-instituted. In our discussion, we argue that current HOM models need to be adapted and extended beyond the paradigm of the rational decision-maker to design models that are tailored to the context and improve decision performance. First, a deeper

theoretical understanding is needed of the phenomena related to emergence, behavior, or dynamical systems across different types of contexts and disasters. To this end, empirical work, behavioral experiments and case studies are needed to contextualize and further validate the propositions formulated in this paper. Additionally, modeling and simulation techniques that allow for exploration of the implications of information sharing and decision-making behavior at micro-level are promising to test hypotheses under different conditions and explore the emergence of patterns at systems level. These techniques should include agent-based modeling, system dynamics, and scenario analysis. Finally, these insights and findings need to be translated back into HOM modeling and optimization through deriving and validating appropriate functional forms and representations of these phenomena.

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Appendix A. Overview of data collection for Typhoon Haiyan

Method	Dates	Location	Purpose	Organization	Role	Coding
Preparations						
Exploratory Interview	12/04/2013 - 12/08/2013	Skype	Initial scoping of field research informing the research design	Nethope	Coordinator Emergency Response	Ph-NGO01
				UNDAC	UNDAC Team member	Ph-UN01
				Shelter Cluster	Shelter Cluster Lead	Ph-NGO02
				MapAction (2)	CTO; Lead for Haiyan operation	Ph-NGO03,04
				UNOCHA	IMO	Ph-UN02
Field Research						
Observation of Meetings	12/13/2013 - 12/15/2013	MNL	Observations of coordination and decision-making at regional level	IM Working Group Mtg (1,5 h)		Ph-IM01-ob
				OSM Meeting (1 h)		Ph-coord01-ob
Semi-Structured Interview			Information flows and evolution of uncertainties	UNOCHA (three interviews)	IMOs	Ph-UN03-05
				IOM (2 interviews)	senior ops officer; IMO	Ph-UN06,07
			Set-up and evolution of coordination structures and decision processes at different levels; impact of information	Shelter Cluster, Canadian Red Cross	Shelter Cluster Lead	Ph-NGO06
				UNICEF	Cluster coordination	Ph-UN08
				UNDAC	Team lead and head of initial UNDAC deployment in TCL	Ph-UN09
Semi-Structured Interview	12/16/2013	CEB	Adaptation of planning processes with establishment of different hubs; coordination with the logistics cluster	UNOCHA	Team lead	Ph-UN10
				IFRC	FACT team member	Ph-NGO07
			Evolution of coordination with local initiatives; information flows	RAFI (Ramon Aboitiz Found.)	Representatives (2)	Ph-Loc01,02
				Taskforce Paglig-on	task force leader; advisor	Ph-Loc03
Observation	12/17/2013-12/18/2013	TCL	Coordination structures in the field (OSOCC)	Shelter Cluster mtg (1h)		Ph-coord02-obs
Semi-Structured Interview			Information requests and evolution	MapAction	Technical project leader	Ph-NGO08
			Coordination with local NGOs and evolution of decision processes	CRS	Emergency regional advisor	Ph-Loc04
				Caritas	Executive secretary	Ph-Loc05
				UNDSS	Security officer	Ph-UN11

			Coordination with military actors; security situation and its impact	UNOCHA	Civil-mililtary coordination officer	Ph-UN12
			Coordination with NGOs outside of the cluster system in the field	MSF	Medical coordinator with the response team	Ph-NGO09
				Humedica	Coordinator Tacloban Hospital	Ph-NGO10
			Set-up of coordination & decision between HQ and field	UNDAC	Head of office Tacloban	Ph-UN13
Observation	12/19/2013-12/21/2013	GUI	Information sharing and coordination in the deep field; impact of disconnect	IM Working Group mtg (2 h) General Coordination mtg (1 h)		Ph-IM02-ob Ph-coord03-ob
Semi-Structured Interview			Coordination and decision processes in the deep field, impact of resuming connection to other coordination levels	WFP	Logistics cluster coordinator Guiuan	Ph-UN14
				UNHCR	Protection cluster coordinator	Ph-UN15
				OSOCC	Team lead	Ph-UN16
				UNHCR	Protection Officer	Ph-UN17
				IOM	Head Sub-Office, CCCM Coordinator	Ph-UN18
Observation			Observation of operations with affected population in hard to reach areas	IOM: field work in remote villages (1 day)		Ph-DM-ob
Semi-Structured Interview			Coordination and decision processes of NGOs outside of the cluster system in the deep field	ICRC	Head of office Guiuan	Ph-NGO11
			Coordination with local actors and decision bodies	City Hall	Representative of the Mayor's Office	Ph-Loc06
				City Hall	Secretary of the Legastive Council	Ph-Loc07
				Internews	Radyo Bakdaw	Ph-NGO12

Appendix B. Overview of Data Collection in the Syria Response 2014 and 2015.

Syria Response: 2014						
Dates	Location	Method	Purpose	Organization	Role	Coding
Apr-14	Skype	Exploratory interviews	Initial scoping	UN-OCHA	Information Analyst (2 interviews)	S1-UN01,02
28/04/2014-01/05/2014	Amman / Jordan	Semi-Structured interviews	Set-up and evolution of coordination, monitoring and decision processes	DFID	Donor	S1-D01
				ECHO	Donor	S1-D02
			Information flows and relation to coordination; evolution of uncertainty and impact of data sensitivity; cross-country coordination	UN-OCHA (3 interviews)	Head of Information Analysis Unit (IAU), Information Analyst, GIS officer	S1-UN03-05
				Syria International NGO Forum (SIRF)	Coordinator Information Management	S1-NGO01
				REACH	Information Analyst	S1-NGO02
			Coordination with NGOs; adaptation to change in UN strategy	SIRF	Head of SIRF	S1-NGO03
				International Refugee Council	Head of Office	S1-NGO04
	Amman, Damascus (via Skype)	Group interview	Information gaps and decision-makers' needs	Syria Needs Analysis Project (SNAP) (2 interviews)	Head of Office and Information Analyst (both seconded by NRC)	S1-NGO05,06
			Set-up and evolution of coordination in different country contexts, monitoring and decision processes	WFP (3 interviews)	Head of Information Management, Food Security, Logistics	S1-UN06-08
				US AID – OFAD (2 interviews)	Syria Regional DART Team Lead, Analyst	S1-D03,04
		Focus Group		UNICEF (2h)	Protection, WASH, Education, Information Management	S1-UN-FG

Syria Response: 2015						
Dates	Location	Method	Purpose	Organization	Role(s)	Coding
12/06/2015-15/06/2015	Jordan (Amman): 'All of Syria'	Observation	Information sharing and sensitive information; analytical gaps	Information Analysis Unit Meeting (1h)		S2-IM01-ob
				Syria Information Management & Analysis Working Group (SIMAWG) (2h)		S2-IM02-ob
		Semi-structured interview	Set-up and evolution of coordination, monitoring and decision processes	ECHO	Donor	S2-D01
				USAid	Donor	S2-D02
			Coordination between UN, iNGOs and emerging actors	Syria International NGO Forum (SIRF)	Head of SIRF	S2-NGO01
			Information flows and relation to coordination; evolution of uncertainty and impact of data sensitivity	WHO (3 interviews)	Health; Head of Information Management; Food Security and Livelihoods	S2-UN01-03
				UN-OCHA (2 interviews)	Head of Information Analysis Unit (IAU); Head of Information Management	S2-UN04,05
			Evolution of coordination structures and role of information	UN-OCHA	Head of Office	S2-UN06
				UNICEF	Head of Office	S2-UN07
			Decision-makers' information needs	UN-OCHA	Regional Humanitarian Coordinator	S2-UN08
		Focus group	Uncertainty, new information technologies	UN-OCHA (2 h)	Data, GIS, Analysis, Communication and Social Media	S2-IM03-ob
			Information flows and relation to coordination, incl. Skype to Damascus	UNICEF (3 h)	WASH, Health, Nutrition (via Skype from Damascus), Education	S2-coord01-ob
16/06/2015	Lebanon (Beirut): the refugee Crisis	Observation	Information analysis and uncertainty	Regional Analysis Team (RAT) Meeting (1 h)		S2-coord02-ob
		Semi-structured interview	Information flows and relation to coordination; evolution of uncertainty and impact of data sensitivity	UN-OCHA (4 interviews)	IMO; GIS, HAO, Head of office	S2-UN09-12
				UNISDR	Head of Office	S2-UN13
17/06/2015-18/06/2015	Turkey (Gaziantep): cross-border operations	Semi-structured interview	Information flows and relation to coordination;	UN-OCHA	IMO	S2-UN14
			Evolution of coordination with (non-traditional) NGOS; information sharing	Mercy Corps	Humanitarian Advisor	S2-NGO02
				Global Communities (Syrian NGO)	Lead	S2-NGO03
			Cross-country coordination and evolution of decision-making structures; role of information	WHO	Cluster Lead	S2-UN15
				FAO	Cluster Lead FSL	S2-UN16
				UN-OCHA	Head of Office	S2-UN17
19/06/2015	Turkey (Antakya)	Group interviews	Evolution of coordination with (non-traditional) NGOs; information sharing	Save the Children	Health specialist, IMO	S2-NGO04
				GOAL	Nutrition specialist, IMO	S2-NGO05