**THE DISASTER
RESILIENCE LAB**

A JOURNEY INTO
THE INFORMATION TYPHOON

TYPHOON HAIYAN DRL FIELD REPORT

FINDINGS AND RESEARCH INSIGHTS

DECEMBER 2013

PART I – INTO THE FIELD

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PART I: INTO THE FIELD

1. INTRODUCTION

Typhoon Haiyan (Yolanda) has been described as one of the strongest storms that ever made landfall with top wind speeds of more than 300 km/h (Fischetti, 2013). Haiyan made landfall in the Philippines on November 8, 2013. Initial reports estimated 4.3 million people to be affected by Typhoon Haiyan. Later, the number rose later over 14 million people, who were directly affected by the storm, of which more than 4 million lost their homes and livelihoods (UN OCHA situation report number 34, as of January 28 2014). According to the Philippines' National Disaster Risk Reduction Management Council (NDRRMC) 6,300 people lost their lives (NDRRMC Update on Yolanda, as of April 17, 2014).

The devastation spread across six Philippine islands and 44 provinces. Owing to the fragmented geographic characteristics of the Philippines – a country, which consist of more than 7,000 islands – the damages varied enormously, in particular when it comes to damages from the storm surge, since the rise in water is driven by the topography of the country.

Only a few days after Typhoon Haiyan made landfall, the IASC Principals declared the disaster a Level 3 Emergency. More than US$ 460 million have been contributed in a joint effort for response and recovery – roughly 60 % of the required effort for funding (Haiyan Strategic Response Plan Monthly Report, April 2014). In the Camp Coordination and Camp Management Cluster alone, 566 partners including local NGOs and government organizations have worked on providing assistance to displaced persons (Haiyan Strategic Response Plan).

Many volunteers supported these efforts. As in most disasters, local actors were among the first responders providing aid particularly in remote places and islands, or organizing local economic networks (MEAL, 2013). As the information about the disaster went around the globe, many volunteers contributed remotely. They are often referred to as "*digital humanitarians*", including for instance the Humanitarian Open Street Map Team (HOT) and the Standby Task Force (SBTF). Digital humanitarian activities are often described as part of the volunteer and technical community (V&TC), which grew quickly in the aftermath of Haiti (Disaster 2.0 Report, GFDRR Report). Their methodologies for information collection and processing with crowdsourcing and microtagging have now been announced to "go mainstream" (Butler, 2013)

FIGURE 1: HAIYAN MAKING LANDFALL; SOURCE: UNOSAT

On 10 December 2013, humanitarian partners presented the Strategic Response Plan (SRP) for Typhoon Haiyan, requesting almost US$ 800 million to complement national response and recovery efforts until December 2014 (Haiyan Strategic Response Plan). Along with this joint global effort came a rise in information and information products that were meant to address the needs of different decision-makers. Platforms such as the Virtual OSOCC[1,] humanitarianresponse.info and reliefweb.int[2] are designed to foster online communication and information exchange between the very different worldwide communities involved in the response, ranging from humanitarian response practitioners, journalists, and policy makers, to researchers, and the affected populations.

1.1. The Information Typhoon

The traditional decision support paradigms, and common perceptions among practitioners (ACAPS Review on information needs after natural disaster) suggest that more information enables better (informed) decisions. Therefore, it has been considered as the main challenge for humanitarian information managers to overcome the lack, uncertainty or vagueness of information. In the response to Haiyan, the work of information management officers is based on this assumption: by providing frequent updates, situation reports, graphics, contact information sheets, meeting lists, and a stream of maps, their aim is to ensure that everybody can get an understanding of the situation that is as complete, accurate and timely as possible.

FIGURE 2: HAIYAN'S PATH - INITIAL MAPS

A very first example is the map above (Figure 2), published on humanitarianresponse.info just after the typhoon's landfall on November 8th, 2013. The map shows Haiyan's path, and pre-disaster population numbers in the nearby regions. According to the traditional paradigm, this simple map

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[1] For Typhoon Haiyan: http://vosocc.unocha.org/rss/vo_2455gzwe.html

[2] For Typhoon Haiyan: http://reliefweb.int/disaster/tc-2013-000139-phl

should be enriched as more information becomes available, or as information can be detailed, to provide a more granular, accurate and timely picture of the situation to enable more effective and efficient response operations. Indeed, many maps followed: as of February 2014, 3 months after the disaster, a total of 2,400 updates and more than 600 maps and infographics on Haiyan were available – on reliefweb alone. Despite the amount of information products available during recent humanitarian crisis and disasters, many responders describe difficulties in finding information that may be useful for their information needs (Capelo, Chang, & Verity, 2012; Crowley & Chan, 2010).

In parallel to the digital efforts, information is transferred directly via word of mouth between humanitarian responders, municipalities, charities, government officers and affected communities. This exponentially diversifies information flows. Merely capturing information that is communicated in a given context to distribute it to many only adds to the complexity. As a result, there is an information explosion of typhoon like proportions evolving more dynamically than ever before. Our understanding cannot keep pace with the explosion of updates, reports, maps and graphics.

1.2. The Disaster Resilience Lab

The researchers of the Disaster Resilience Lab have been working individually on the challenges of information management; sensemaking; decision support; and humanitarian (information) technologies in disaster management. As Haiyan made landfall, we were trying to keep track of the unfolding response. As outlined in the first Section, the response to Haiyan had two sides: on-site and local vs. online and remote. To find answers to our questions that reflected both realities, it was insufficient to work remotely. We created the umbrella of the Disaster Resilience Lab (DRL) to bring together our individual perspectives and background and jointly conduct field research on Haiyan. The questions guiding and motivating our work are:

1. **The Role of Information Management:** what is the role of information management officers today? How is information management embedded in the response operations?
2. **Information Sharing and Coordination:** how is information shared between actors and organizations? How is it filtered, processed, and transformed into actionable insights? What are the success stories, and what are challenges?
3. **Understanding and Monitoring Risks:** how are risks assessed and monitored? How is information from various partners analysed to efficiently recognize gaps between aid provided and needs in a dynamic environment? How are emerging risks and new threats understood by various actors and how does this translate into monitoring?
4. **Information Products Impact Evaluation:** how are crisis information products impacting humanitarian operations? Why are certain technologies, products, and modalities are recognized, valued and used? What is missing?
5. **Logistics and Supply Chain Management:** how is information about needs translated into goods distributed, and what is the impact of aid on markets, and infrastructures?

Our different perspectives and backgrounds were not only influencing the way we interpreted information products when working remotely, but were also present in our intuitive understanding of the operations and the questions we asked in the field. In this sense, our research is an effort of building a common understanding not only across scientific disciplines, but between research and practice via continuous interactions, asking questions, revising and adapting our understanding of decision-makers' needs.

FIGURE 3: THE DRL FIELD TEAM IN GUIUAN (WITH ANDREW MARTIN, UN OCHA)

1.3.   Into the Field

Conducting field research in areas that are struck by a disaster is beyond the usual activities of some research disciplines, specifically the field of mathematics, computer sciences, or engineering. In other areas, such as field epidemiological research in public health the traditional research methodologies have been revised to fit dynamic humanitarian contexts (Checchi & Roberts, 2008; Roberts & Hofmann, 2004). The question about the added value of fieldwork of researchers is legitimate: research in the field is often viewed as more dangerous, costly, confrontational, and exhausting. The results can be much harder to obtain, often using methodologies not fully accepted by academia; questioning scientific rigor making it difficult to publish the results in peer-reviewed literature. A priori theories, where researchers anticipate some of their results prior to analysis and plan accordingly, are also hard to achieve.

Why revise our roles? Why did the DRL researchers venture into the field, while the experienced DRL practitioners supported us from their desks? We believe that research in disaster management can only be relevant, if it involves a process of co-creation. To learn, we have to break norms, overcome barriers of current thinking or "best" practices in both science and practice. Therefore, we decided to flip roles. Our field team included researchers from disciplines where desk research predominates, while the remote support was staffed with experienced first responders in both local and global emergency settings.

Breaking norms is risky. But we believe that these risks are (sometimes) necessary to take a leap forward. The many scientific results in geography and mathematics, hydrological or meteorological models, experiments on safer construction methods, and tests of more reliable and robust communication networks, have not (yet) lead to better preparedness for and management of disasters at a global level. In the past 30 years, research and the number of publications on disasters, vulnerability and resilience have grown exponentially. So have the damages from disasters – in any scale you might want to choose: from number of fatalities, to affected population or economic losses (Cutter et al., 2013; De Bono, Chatenoux, Herold, & Peduzzi, 2013).

For all of us, working in the DRL team, this field trip led to new insights. Being researchers, we often start from the aim of understanding the problems in practice from afar – instead of going into the field. Yet, we are aware of the biases that this work may induce, and the limitations in objectivity and neutrality that go with field research.

All the more, we are grateful for the support we received: from our home institutions, organizational supporters, and crowdfunders. Most importantly, we thank our interviewees, who took the time to answer our questions during an on-going response. In a post disaster situation, tensions and stress remain at high levels, and we respect the prerogative of response operations. This report shall continue our conversations with our interviewees, and the organizations that have supported our work. Our aim is to share our views from a research perspective. We recognize that we are learners – and as usual learning goes along with mistakes: we may have misrepresented content or provide views which are not necessary unique or new. We appreciate your openness, and thank you for the time you spent with us. Without your contribution this trip would not have succeeded!

FIGURE 4: LEAVING EUROPE; PICTURE BY M. VAN DEN HOMBERG

FIGURE 5: (RE-)SEARCHING IN THE FIELD

METHODS AND RESEARCH DESIGN

2. PREPARATIONS

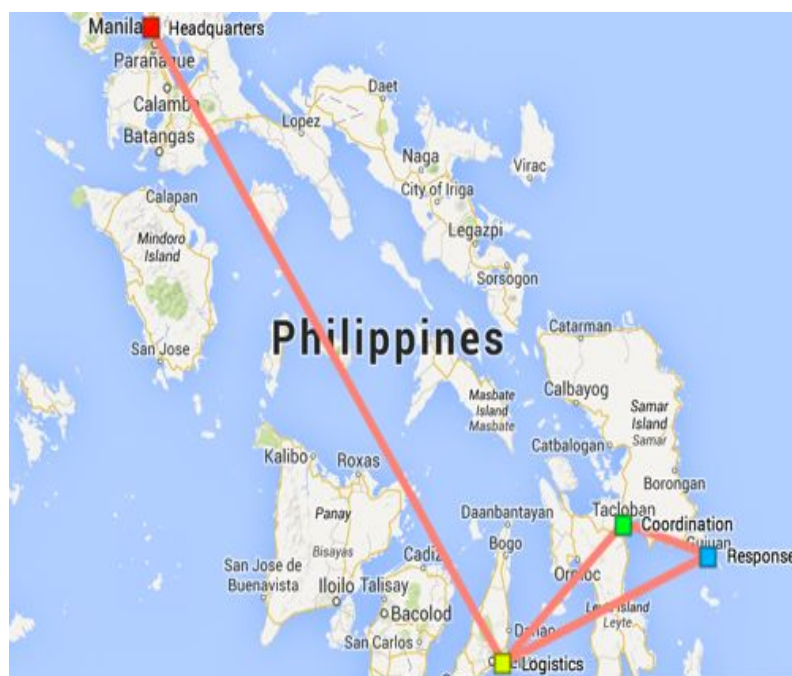### 2.1 The Challenge: Quick and Dirty Design?

The need for **transdisciplinary research** for disaster management is uncontested (Hughes, King, Rodden, & Andersen, 1994; Pearson & Clair, 1998). The integration of aims from a diverse group of researchers into one common goal requires a process to leverage the individual skills. The research design and processes need to be reworked such that the individual techniques, methods and approaches can be combined into a common approach. Members engaging in transdisciplinary research need to quickly learn about their colleagues' research approaches be it methodology, theory, or assumptions in truths of understanding the world around us. Our team views our work as *trans*-disciplinary: a holistic approach that requires integration and co-creation rather than a multitude of individual approaches in concert with one often seen in multi-disciplinary efforts. The field aspect, in particular during a disaster response, is another dimension of complexity, which requires a redesign

of coordination, communication, workflows, and infrastructures that may not frequently be intuitive to many traditional researchers.

The problem of scale: it was clear from the very beginning that we could not possibly cover the full geographic, or organizational scale of the response to Haiyan. Other than in standard experimental approaches in behavioural economy or social psychology, trying to isolate small scale and relatively confined environments, such as control rooms or specific problems (Hughes et al., 1994), or experimental or advance epidemiological approaches that aim to generalize findings (Brown et al., 2008) we decided to purposively *explore* the impact of Haiyan and the response to it by choosing an itinerary that enabled us to get an overview about the different settings and contexts.

We developed our field itinerary following the following rationale:

- Overview of different characteristics of damage (wind, storm surge, level of damage);
- Overview of different contexts (rural settings vs. cities);
- Access to decision-makers and key coordinative functions (clusters, hubs, field offices);
- Access and transportation (respecting time restrictions and transportation availability)

The DRL Itinerary

Manila (Dec 12-15)
Headquarters and advocacy

Cebu (Dec 15-17)
Logistics and recovery

Tacloban (Dec 17-19)
Coordination in the field

Guiuan (Dec 19-21)
Ongoing response & field operations

FIGURE 6: THE DRL FIELD ITINERARY

Our leitmotiv of each stop on our trip is summarized in Figure 6, showing the geographic location of the hubs the DRL field team visited.

Time pressure was another critical element. Research, particularly in social sciences, is a prolonged activity that builds on stable relations with a community. In the setting of a disaster, such a timescale would not be possible for two reasons. First, the availability of professional responders is constrained because of rotating assignments and time-pressure. Second the response phase itself is typically limited to a few weeks after the disaster.

In sum, our research method aimed to fit multiple purposes, reflecting the complexity and diversity of the group members as well as the overall strategic goals. Moreover, each team member's level of experience – both in terms of research and field experience – needed to be respected and integrated into the design.

2.2   Sharing Information Without Shared Knowledge?

Along with our possibilities to get involved in a globalised world, the differences between the people involved in a disaster have been growing over the past decades. For instance, we are all too aware that practitioners and responders can oversee the applicability and consequences in the field far more intuitively than we can. Three major drivers of this trend are *globalised communication* settings, differences in the *immediacy,* and a growing *heterogeneity* of actors.

FIGURE 7: PREPARATIONS - WHAT WILL WE NEED IN THE FIELD?

Globalised communication enables information exchange between local communities, humanitarian responders, researchers, donors, and volunteers. Yet resources, expertise, skills, language and culture in a specific disaster response vary enormously, influencing the ways in which individuals and organizations process information and make decisions.

Immediacy and proximity determine how aid is provided, including the access to the population or area affected, but also the capacity to process information, plan, analyse, make decisions and communicate them (Alexander, 2006). The closer we are to the disaster, the better we can understand the needs, requirements, and the on-going response at a local level. At the same time, the urge to respond and the restrictions of working in a disaster struck area affect the capacity to provide aid, including resources, time and capacity to analyse, process and communicate information at the local level. There is a dichotomy between operational and strategic realms of decision-making, between headquarters and the field. Adequate and efficient response can only be achieved by effectively combining local and immediate information and action with remote capacity and resources.

Heterogeneity of decision-makers: the joint work of thousands to respond to a disaster implies that experience, backgrounds and skills – even the context, in which we respond – vary. Each person or group uses different words (terminologies), and technical language (jargon) that can be found back in conversations or documents. *Codified* knowledge is the basis for expert systems, databases, maps and reports. This type of knowledge is believed to be easily exchanged and shared, and often becomes the main – if not the only – subject of reflections, debate and review, particularly in evaluations, assessments, and scientific research. It is thought by many that much of this knowledge is separate from actual practice (Eraut, 2000). *Personal* knowledge, acquired by experience is another cognitive resource, which enables an experienced responder to act in a complex disaster situation. This type of knowledge naturally determines the ways, in which we understand and interpret information (sensemaking) and supports the way we make decisions and act.

For us, this means that sometimes we may unintentionally misrepresent and misunderstand the very environment that we are engaging in and investigating, but we see this as a an opportunity to learn and revise. Rather than avoiding and not addressing this gap that inevitably exists in practitioner-oriented disaster research, we understand it as an integral part of our work.

FIGURE 8: SO DIFFERENT FROM AMSTERDAM/SCHIPHOL: AIRPORT GUIUAN

3. RESEARCH DESIGN

3.1 Protocols

Remote preparations of the DRL team started at the end of November. Since the field team embarked for Manila on December 11, 2013 we had roughly two weeks to design our research. There were bilateral connections between the team members, but the entire team met in person only *after* the trip. Individual members had pre-existing relationships through the ISCRAM community and crisis mapping activities. It was our network of trusted relationships that set the foundation for this project.

In our preparations, we convened virtually via Skype to combine our individual research agendas into a synergised protocol of common questions on decision-makers' needs. The collaborative design of semi-structured interview protocols provided a

FIGURE 9: DESIGNING A TRANSDISCIPLINARY RESEARCH PROTOCOL

general roadmap (see Figure 9) while allowing us individually team to follow up with more detailed inquiries. To enable individual researchers to meet their specific research interests on information management, sensemaking, risk, impact evaluation, logistics, and crisis mapping we designed protocols that reflected the individual interests and the requirements for research in the respective disciplines. These were, by the very nature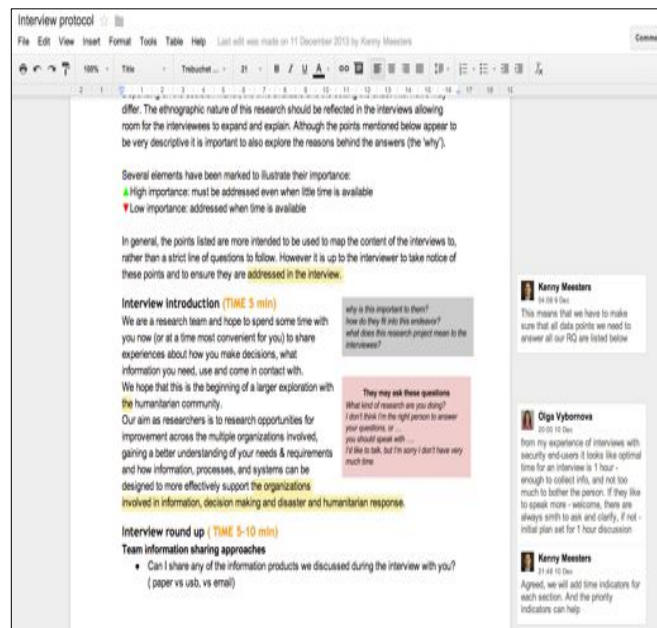 of the team, in part quantitative (e.g., on the logistics capacities, needs, or time to reach an area) and in part qualitative (e.g., on preferences for information products or communication behaviour). The **interview protocols** were created in an iterative process of revision and co-design: the team used Google Docs, to annotate questions and hypothesis with comments and remarks. In hindsight, the protocols served a two-fold purpose: guiding and framing our interviews, and establishing a common understanding of our different research backgrounds.

FIGURE 10: LOGISTICS MAP BOOK

Specific **information product books** were used as complementary material for impact evaluation in-depth interviews. The nine books consisted of samples of the earlier mentioned information products found on reliefweb, provided by the digital humanitarians and local agencies. These books contained maps, disaster statistics and

text-based information products such as situation reports. Our aim was to track the flow of information products across the different regions; therefore special books were tailored geographically for Manila, Cebu, Tacloban and Guiuan. To better understand the impact on dedicated decision-makers' needs, others were made to support the logistics and crisis mapping research aims. All map books were curated remotely. File sizes were compressed to 25-25 % of the original sizes, allowing them to be emailed to the field team in a progressively limiting digital environment. The books were transferred to the team early (roughly five days before arrival at the respective locations) at the cost of immediacy and timeliness, because the remote research members anticipated a lack of connectivity for file transfer, especially in Tacloban and Guiuan.

3.2 Maps, Maps, Maps

In addition to the information product books that contained a wide selection of information products, specific attention was given to geographical (map) products. Maps are ever-present in disasters – the response to Haiyan was not an exception. The picture below was taken at the OSOCC[3] in Tacloban and highlights the way, in which maps are displayed and can be accessed in the field.

FIGURE 7: MAPS AND INFORMATION PRODUCTS IN TACLOBAN

To gain a better understanding about the information accessible, we worked together with MapAction and other volunteer crisis mappers on a survey of maps. We especially thank Helen Campbell, who coordinated this part of the project for MapAction. MapAction had a team deployed to Tacloban, delivering information in mapped form, from data gathered at the disaster scene. This initiative was driven by our conviction that sensemaking and a 'shared operational picture' are crucial for making well-informed decisions and quickly delivering aid to where it was needed. Together, we developed table to be completed by volunteers to better understand information availability for decision makers from publically available online information.

The Community of Interest on Decision-Makers' Needs established the foundations for this work. This community organized a workshop on Decision-Makers' Needs in Sudden Onset Disasters in 2012 that was hosted by the Digital Humanitarian Network. The presented framework set the stage for a set of recommended key decisions and questions the first few weeks of disaster response (Gralla, Goentzel, & Van De Walle, 2013). The original framework and list of questions were transformed and applied to the Haiyan response. The planning team selected specific questions, guided by how feasible questions could be researched by remote teams and input from MapAction on what may be most relevant to the current disaster response work.

The review was meant to support the DRL team and provide feedback to MapAction on the use of their products compared to others, and potential directions for future engagements. To enable us to

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[3] On-Site Operations and Coordination Centre

work with research volunteers, the questions were listed in a Google Spreadsheet. Some of the questions were edited to provide more detail or clarification. We decided that it would be useful to know if internet-based information to answer these questions was predominantly available from:

1. National sites from the Philippines (initially the NDRRMC site)
2. International humanitarian response sites (reliefweb.int and humanitarianresponse.info)
3. Others

Researcher volunteers were asked to initially research the sites listed in the spreadsheet, but to then also look for information on other national and international humanitarian sites.

FIGURE 11: WELCOME TO TACLOBAN

Therefore, three separate spreadsheets were created, with all the questions in the rows, and then column headings that included the following characteristics of the information source:

- Title and URL
- Date of information Source
- Dates of figures/tables/maps within the data source (useful for establishing how up-to-date information contained in reports was)
- Format of the information
- Level of relevance (high, medium, low) to answering the question
- Finest level of geographical granularity of the data source
- Answer to the specific question (as obtained from the information source)

Volunteers were recruited form the CrisisMappers network. They collected data while the field team embarked to the Philippines, and spot analyses were sent out to the field team soon thereafter.

3.3 Team Design: Field and Reachback Support

The rise of new information and communication technologies is a facilitator for new (virtual) forms of collaboration, enabling experts with different backgrounds to work in the field and remotely on the same problem. In this way, it is now possible to have researchers, responders, and volunteers with different backgrounds, needs and interests work in concert. The core idea is to share the work such that research activities, such as collecting and analysing field-based information, can be combined with the capacity of experts and volunteers that do not have the restrictions that typically hamper the work in disaster struck areas, such as limited access to computational power, or resources. In this way, necessary research preparations, observations, and early reflections/analysis can be more efficient than ever before.

Among the major challenges that impede the realisation of that vision are the hyper locality and hyper temporality of many problems; judging information relevance or quality is only possible in context – which is subject to sudden changes and shifts. Therefore, we decided to engage in a continuous, (inter)active and transparent process of communication and sensemaking using a support team that had rich expertise in disaster and crisis settings rather than with the global community of volunteers.

As the DRL research team, we used technology as a bridge and conduit for the redesign: the role of **reachback and standby support.**

FIGURE 12: REACHBACK SUPPORT IN ACTION - WHILE
JENNIFER WORKED ON SPOT ANALYSES

The idea of reachback support stems from a longstanding history of military operations and descriptions of agile command posts and joint operations (Rypkema et al., 2006; Weinrod & Barry, 2010). While the research team may have markedly different aims and goals, the mechanism of being able to "reach back" to another location with more robust resources (e.g., information access, connectivity, staff with less logistical and environmental demands) is what may be common in both settings. Technology as a mechanism with which to harness and leverage reachback approaches has also

been described (Lackey, 2003). Others cite new reachback approaches as being driven by strategic choice and collaborative strategies (van der Kleij, Lijkwan, Rasker, & De Dreu, 2009). There are likely more examples in academic, grey literature, and informal communication channels that expound upon reachback approaches across multiple domains.

A well-experienced urban search and rescue (USAR) responder described reachback support with virtual skilled volunteers anecdotally. With limited time, restricted resources to process information and maintain ongoing situational awareness, he reached back to USAR team members not currently deployed to the post Haiti earthquake environment. Over brief communications, he described the field team's needs, time requirements, and examples of what information was needed for USAR field operations.

> '*Find out anything you can from Léogâne, the best maps you can find, identify potential targets, where are there large building, hospitals, shopping, create lists, and GPS coordinates*.' (excerpt from Disaster 2.0, Crowley ad Chan, 2010)

Specifically where to look for information, how to make sense of the information provided and the optimal way to present remote situational awareness back to the field USAR team was likely not fully specified. A reachback and standby support team with knowledge of these dynamic information and environmental requirements can potentially interpret "find out anything", "best maps" and "potential targets" that fits the needs of the field team.

FIGURE 13: THE TEAM CALLING CHICAGO - AT IHP CAMP TACLOBAN

There are likely many more example of successful and challenged circumstances from disciplines and environments that explore reach back and standby support activities for which we have inadequately addressed in this paper and require further research.

In the field, our communications evolved as the team went to more severely affected regions (i.e. Tacloban and Guiuan) where digital environments became either more fragment and unstable. Our internet connectivity was intermittently available in Tacloban and in Guiuan, but bandwidth was limited such that it was hardly possible to download or send files. Mobile connectivity was severely restricted, and only intermittently functional at time and in specific geographic locations.
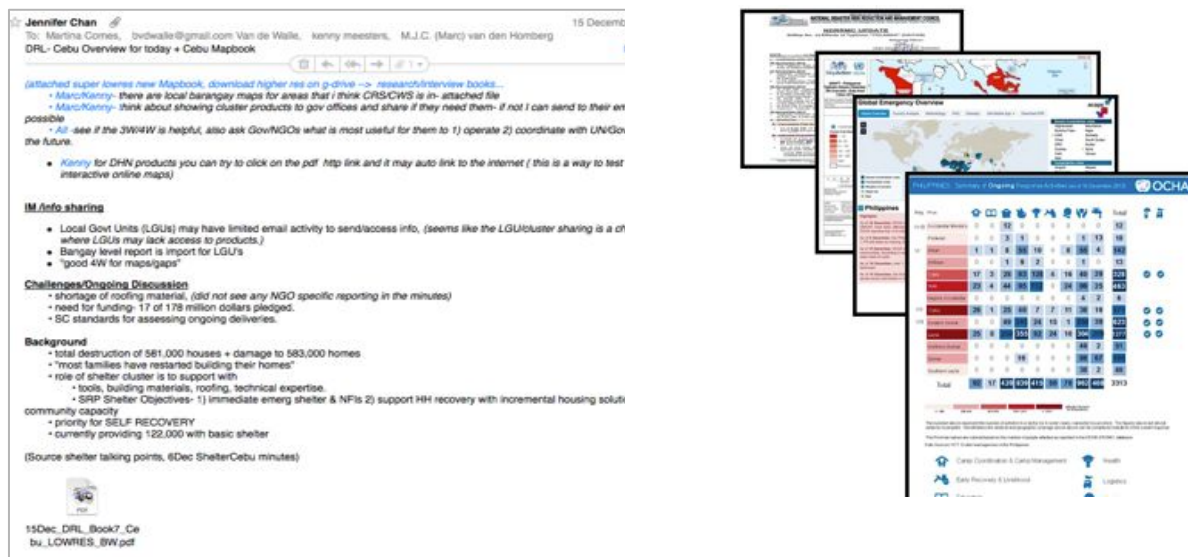

FIGURE 14: IN FIELD COMMUNICATIONS SENDING NEW MAP BOOKS VIA MAIL

The field team took notes during every interview, which were at times complemented by video and audio recordings capturing the full interview. The interview notes were transferred back to the remote research team members, in email, document file, audio file or video files to enable spot analyses, feedback and guidance in preparation for the next interviews. Transfer times varied based upon time availability and connectivity. However having the reachback team in different time zones (US and EU) helped to optimize the turn-around times.

We maintained daily personal contact, ensuring that the activities of field team and reachback support remained well-aligned. Further in the field, the reachback support also became a de-briefing opportunity, forcing the field team to perform quick reflections about their daily work, and to plan ahead. Communication itself had to become highly efficient and respect the realities in the field.

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