

Understanding the information needs of field-based decision-makers in humanitarian response to sudden onset disasters

Erica Gralla

George Washington University
egralla@gwu.edu

Jarrold Goentzel

Massachusetts Institute of
Technology
goentzel@mit.edu

Bartel Van de Walle

Tilburg University
bvdwalle@gmail.com

ABSTRACT

The development and spread of new technology and the internet has opened a new world of possibilities to gather data and create information in a crisis. However, it is not clear which information field managers require to make the best possible decisions. As a result, it is difficult for volunteers, technology developers, and others, to collect and analyze data that results in information that is accessible and actionable for decision makers. To understand the information requirements of humanitarian responders, a workshop was conducted, bringing together eighteen

experienced humanitarian responders. The results of the workshop include preliminary frameworks for decisions and information requirements that are common during the initial phases of a sudden onset disaster. These frameworks will help volunteer and technical communities to understand the information field decision-makers require to make the best possible decisions.

Keywords

Decision-making, humanitarian response, information requirements

INTRODUCTION

The development and spread of new technology and the internet has opened a new world of possibilities to gather data and create information in a crisis (e.g., Guy, Earle, Ostrum, Gruchalla, and Horvath, 2010; Shahani, 2011). However, despite all the energy devoted to crisis mapping and other movements (e.g., Ziemke, 2012), it is not clear which information field managers require to make the best possible decisions. As a result, the requirements for decision support are not clear. Therefore, it is difficult for volunteers, technology developers, and others, to develop decision support systems or to directly collect and analyze data that results in information that is accessible and actionable for decision makers.

This research attempts to address that gap by providing guidance on the types of information required by decision-makers in crisis response. To understand the information requirements of humanitarian responders, a workshop was conducted. Its objective was to create an initial framework for decision making and an initial scope of the information requirements in the first phases of a sudden onset disaster, based on interactive input from field-based decision makers. The framework and information requirements should facilitate better support and, ultimately, better decision-making.

This paper describes results of the “Workshop on Field-Based Decision-Makers’ Information Needs in Sudden Onset Disasters.” First, this introduction describes the motivation, objective, scope, and process of the workshop. Next, the results are presented in two sections, focusing on decisions and on information. This paper is based on a detailed report (Gralla et al., 2013), which provides in-depth descriptions of the workshop process and the results, not only in final form but also in intermediate stages, including the results from the initial small group exercises within the workshop along with final versions based on participant feedback.

MOTIVATION AND RELATED WORK

Information management for disaster response has ignited interest among researchers, volunteers, practitioners, and many others in recent years. Researchers have worked on extracting information from new media sources such as Twitter (e.g., Ashktorab, Brown, Nandi, and Culotta, 2014; Shahani, 2011). Many more varied ideas for information gathering, analysis, and provision have been generated by volunteer technical communities such as the crisis mappers (Ziemke, 2012). In addition, researchers have developed information and decision support systems to help responders and response organizations manage information during disaster response (e.g., Calderon, Hinds, and Johnson, 2014; de Faria Cordeiro, Campos, and da Silva Borges, 2014).

However, it remains unclear precisely what information is required by individual responders and decision-makers. As a result, the requirements for these decision support systems lack definition of exactly what information is needed by which

responders or organizations, and analyses of available information cannot be precisely targeted to the needs of those on the ground. For example, Calderon et al. (2014) note the key requirement to get the right information to the right agents, but the system requirements are drawn from an extensive literature review and they leave it to the users of the system to filter and categorize information appropriate for their own use. This flexibility is valuable in that it recognizes that different users have different requirements, but it would have been still more helpful to enable the system to do some of this work for the user. Without an understanding of specific needs of specific decision-makers, this is quite difficult.

Recognizing this challenge, several researchers attempt to link information requirements to the needs of particular responders. For example, Endsley and coauthors (Endsley, Farley, Jones, Midkiff, and Hansman, 1998) assessed pilots’ information needs based on the goals, decisions and tasks they needed to accomplish. Li and coauthors (Li, Yang, Ghahramani, Becerik-Gerber, and Soibelman, 2014) examined the information needs of first responders in a building fire emergency. Each of these studies provides a specific set of information needs for particular responders, enabling the design of systems to provide that information in a targeted manner.

However, it is clear from the literature examined above that the information needs of responders are highly context-specific. The requirements of airline pilots shed little light on the requirements of first responders. General principles of information requirements may be derived, but the literature provides a limited basis for doing so at this point. As a result, each context requires an analysis of information needs in order to drive the development of support systems.

Very little work of this type has focused on disaster response in the international humanitarian context. A critical step is to ask those who manage response in the field what information they actually use to guide their decisions. The present study takes initial steps to fill this gap by linking information requirements to a framework for the decision making needs of international disaster responders.

OBJECTIVE AND SCOPE

The objective of the workshop was to create an initial framework for decision

making and an initial scope of the information requirements in the first phases of a sudden onset disaster, based on interactive input from field-based decision makers from traditional humanitarian organizations. The framework and information requirements should facilitate better support and, ultimately, better decision-making.

Scope

The scope of the decision-making considered in the workshop was limited in order to maintain tractability for workshop participants and get a thorough perspective on one set of key decisions. Further workshops should be developed to go beyond the scope outlined here. The scope was limited in terms of timeframe, decision-makers, and organizational roles.

Timeframe: The timeframe considered was limited to the initial response phase of a sudden onset disaster, i.e. the first few weeks or months prior to the recovery phase. The workshop focused on defining (1) the information required for making the initial decisions, as well as (2) the information flow to support subsequent decisions that arise as initial decisions are being implemented, perhaps spanning multiple staff rotations. Thus, the focus was on the initial phase, but later phases were included to the extent they would be considered within first-phase decisions.

Decision-makers: The workshop considered a combination of single-agency, inter-agency, cluster, and inter-cluster decisions. The cluster system is a set of inter-agency groups that coordinate aid activities among the agencies working within a given sector, such as shelter, health, food, or logistics. The scope of this initial workshop was open to a broad set of decisions, since there can be strong dependence across them (e.g. an organization's decision will impact inter-agency decisions).

Organizational roles: This workshop was limited to the decision-making perspective of the international response community. This includes a variety of international and non-governmental aid organizations, such as the United Nations aid agencies, International Red Cross Movement, and NGOs such as Oxfam and Save the Children. In this initial workshop, we did not specifically incorporate participants representing decision-makers in the host government nor the affected

population, but their decision-making requirements were considered to some extent in discussions.

Organization, support, and facilitation

The workshop was organized as part of the ongoing efforts of a Community of Interest focused on Decision-Maker Needs, and enabled through the support of the United Nations Office for the Coordination of Humanitarian Affairs (UN-OCHA) and the Assessment Capacities Project (ACAPS).

The workshop was facilitated by [blacked for blind review]. The organizers are extremely grateful to all the workshop participants for sharing their time and thoughts.

METHOD

There are many methods for eliciting information requirements from decision-makers. This study employs a simple technique, which we label a "workshop" but could also be considered a focus group, along with qualitative data collection and analysis. We conducted a workshop that brought together eighteen field-based decision-makers to discuss the decisions they made and the information they needed in the first days after a major disaster. We captured their responses and discussions and analyzed them to identify categories of decisions and types of information needs.

This method was chosen for several reasons. First, we considered it important to capture the views of a wide variety of humanitarian responders, because information requirements can differ significantly from organization to organization. The differences arise because organizations are typically focused on one or two "specialties," such as water and sanitation (Oxfam) or health (Medecins Sans Frontieres), and the information requirements differ accordingly. While it would be even more useful to identify information requirements for each specialty individually, this is left to future work. Second, access to experienced humanitarian response workers is difficult because they are often busy or traveling. To ensure that participation in the research was useful to them as well as to us, and that their time commitment was limited, we settled on the 2-day

workshop format. Other methods, such as goal-directed task analysis, require a longer time commitment and work best with individuals rather than with groups. Future research could complement our findings by employing these types of methods.

Workshop process, data collection, and data analysis

The workshop was conducted over two full days in September 2012. Eighteen decision-makers from various aid organizations participated in the workshop. Each participant had extensive field experience responding to sudden-onset emergencies in roles such as sector lead (e.g. health, water and sanitation, nutrition, shelter, logistics), information management officer, and overall humanitarian coordinator.

Day 1 consisted primarily of group activities asking participants to brainstorm decisions and information requirements. First, participants were asked to brainstorm all the decisions they would make in an emergency response, then categorize them in various ways. In a second exercise, participants were asked to brainstorm “what they want to know” in an emergency response. On Day 2, participants were asked to review and provide feedback on the consolidated results of the Day 1 exercises. (The full workshop program is provided in [blacked for peer review].)

All the products of brainstorming exercises were collected and analyzed by the researchers, along with researchers’ field notes based on the feedback and discussions. The analysis followed the guidelines of grounded theory (Glaser and Strauss, 1967). The data were coded to identify the types of information and types of decisions made by responders. These codes or categories inductively emerged from the data based on iteration between codes and the data. The data analysis proceeded in two stages. In the first stage, the researchers performed a very fast preliminary analysis overnight, between days 1 and 2, enabling the workshop participants to provide feedback on the initial sets of categories. The second stage was conducted after the workshop, and resulted in the final set of categories described below.

RESULTS: DECISIONS AND INFORMATION

The results of the workshop shed light on the *decisions* participants discussed and the *information* needs identified. The key results outlining the types of decisions made in a response are given in Table 1, which lists seven dimensions along which decisions might be arranged. These represent alternative ways of organizing or categorizing decisions, such as by time, criticality, or scope. The key results outlining the information requirements for response are given in Table 2. The figure summarizes information requirements and arranges them along a timeframe of response.

The results above, particularly Table 2, should prove useful to those developing information and decision support systems, because they identify the information needs of a variety of responders and, critically, map them to a timeline of response.

The list of information needs will not surprise anyone familiar with international humanitarian response. All workshop participants agreed that this was a reasonably comprehensive summary of information requirements that was nevertheless concise enough to be useful. Despite the lack of surprises, the workshop participants emphasized that it was extremely useful, even to them, to have this list captured and written down. It would be useful, they suspected, in communicating their requirements to other parts of their own organizations and to cooperating agencies, and it would also be useful as a “checklist” of sorts to ensure they had not forgotten to investigate an important issue. The workshop made clear to both the researchers and participants that it was difficult for each responder to articulate all the information requirements, despite their intimate familiarity with them.

The second aspect that makes Table 2 useful is that it maps information to a rough timeline indicating when that information is most critical. The mapping was based on discussions and a survey administered to workshop participants, asking them to note *when* they most needed this information (in the first days, first weeks, or first months). The result makes clear that humanitarian needs must be determined right away, but that information on one’s internal organizational capacity and mechanisms for coordinating with others can be learned somewhat later if necessary. Participants emphasized that all information was needed “as soon as

possible”, but that need was more critical for some types of information than for others.

DIMENSION	CATEGORIES
TIMEFRAME	First days (flash appeal) First weeks (mid-term review) Later (donor conference)
SCOPE	Agency/organization Cluster/sector Inter-cluster, government, shared actions Global
LOCUS/AUTHORITY OF DECISION-MAKING	Global Regional National Local
CRITICALITY	Lifesaving, Mission/Sector Risk Impact on Beneficiary (e.g. tradeoffs, timeliness)
FREQUENCY/DURATION OF DECISION	One-time Quarterly-Yearly Monthly Weekly Daily
INFORMATION GAP (CONFIDENCE)	Probably have info Can find out Can guess No idea
FUNCTION	Govt/Donor Relations Media/Public Relations Partner Relations Programming Operations/Logistics Security/Access Resource Allocation

Table 1. Decision dimensions and categories

SUMMARY AND CONCLUSIONS

The “Workshop on Field-Based Decision-Makers’ Information Needs in Sudden Onset Disasters” enabled us to develop preliminary frameworks for decisions and information requirements that are common during the initial phases of a sudden onset disaster. These results, which are based on the outcome of one workshop, should not be considered definitive for any of these topics. However, given the extensive experience of the decision makers assembled for the workshop, the results offer an important first attempt to understand decisions and information requirements. Feedback on this report and follow-on activities will enable further refinement and, more importantly, use of the frameworks described in this report.

The decision categories and information requirements developed during this workshop can form the basis for additional frameworks, and generate requirements for information technology developers. Future work can test these frameworks with additional sets of decision-makers and in different types of contexts. In addition, future work can attempt to link information requirements to sets of decisions. Attempts to make this link in the workshop were less successful, in part because of the complexity of assigning specific information requirements to specific decisions and in part due to the lack of time to facilitate an appropriate discussion during the workshop. Nevertheless, linking information requirements to a response timeline is a good start and may be sufficient for determining and prioritizing which information to collect at any given time in a response.

One goal of this workshop was to help volunteer and technical communities to understand the information field decision-makers require to make the best possible decisions. These results lay a foundation for this understanding, by providing (1) a framework and set of information required by field-based decision-makers, and (2) categories and types of decisions made by decision-makers. Anyone seeking to support humanitarian action by providing and organizing information can utilize these results to (a) prioritize their efforts toward important information, and (b) organize their information in a manner intuitive and useful to humanitarian decision-makers.

Response timeline' ,,,,,,,,,> (first'days)	,,,,,,,,> (first'weeks)	,,,,,,,,> (first'months)
<p>Context'and'Scope</p> <p>Scope&f&emergency&situation Impact: &amage&on&nfrastructure, &velihoods, &tc. Geographic&areas&affected Assistance&requirements Affected&population Number&of&affected, &ocations Status&of&affected: &isplaced, &ulnerable, &tc. Context Local&ocio&conomic&political&ontext Local&environmental, &weather, &velihoods Local&community&apacity, &oping&mechanisms Public&media&perception Public&perception, &awareness, &attention Media&perception Political&will, &onor&will</p> <p>Humanitarian'Needs</p> <p>Needs Number&n&need Types&of&needs&health, &helter, &water, &tc.) Locations&of&needs Needs&of&sub&groups: &isplaced, &ulnerable Priorities Geographic&priorities Priorities&cross&ectors Within&sector&priorities</p> <p>Responder'Requirements</p> <p>Basic&nfrastructure&for&responders Security, &ccess</p>	<p>Capacity'and'Response'Planning</p> <p>Other&ctors' &apacity&and&esponse: (incl. &gov't, &nilitary, &ocal&community, &ommerical, &id&gencies) Responses&of&other&ctors&who, &what, &where, &tc.) Capacity&of&other&ctors&skills, &equipment, &scale, &tc.) Internal&apacity&and&esponse Internal&esponse&plan Internal&apacity, &tructure Available&esources: &inancial, &ersonnel, &stocks, &echnical</p> <p>Operational'Situation</p> <p>Security Current&hreats Future&hreats&and&isks Access Limits&to&access Logistics&apacity&and&tructure Monitoring Issues Trends Accomplishments Measuring&and&outputs Measurable&indicators&for&output Standards</p> <p>Coordination'and'institutional'structures</p> <p>Coordination&of&the&esponse External&oordination&with&other&ctors, &arious&evels) Internal&oordination&with&other&parts&of&the&org.) Mechanisms&of&nf&ormation&sharing Relevant&aws&and&olicies</p>	<p>Looking'Forward</p> <p>Recovery&and&econstruction National&development&strategies Needs&and&plans&for&recovery Preparedness Information&to&collect&before&risis</p>
<p>Meta,Information</p> <p>Information&availability Sources&of&nf&ormation Accuracy, &alidity&of&nf&ormation</p>		
	<p>Agreement&n&needs Extent&of&assessments Actions&to&improve&access&to&nf&ormation</p>	<p>Preparedness&nf&ormation</p>

Table 2. Summary of information requirements, arranged along a response timeline.

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