Improving Humanitarian Relief Information and Communication Systems through Research

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Abstract

This paper introduces and discusses issues related to research, development and application of information and communication systems (ICS) to the effectiveness of humanitarian relief efforts. The conference panel not only addresses these issues, but also presents results from an NSF-sponsored, multidisciplinary workshop held in Nairobi, Kenya in June 2006 on this topic.

Keywords: humanitarian relief, information and communication systems, user centered design, collaborative research, research into practice

Introduction

While the advent of the 21st century has witnessed some of the worst humanitarian crises in recorded history, it has also witnessed an unprecedented demand for large-scale global collaboration among the various organizations involved in humanitarian relief efforts. These include international non-governmental organizations (NGOs), donor government agencies, recipient government agencies, the United Nations, corporations, and military entities. Increasing world poverty, unstable socio-political situations, the threat of terrorism, globalization, and the possibility of more catastrophic natural disasters due to global warming, mandate the continuing need for effective, timely, informed, and coordinated emergency risk assessment and response by multiple agencies and players.

New partners in collaboration on humanitarian relief efforts are universities, who are contributing on both the educational and research fronts. The humanitarian relief sector is evolving from a purely reactive sector to one that learns from its past efforts even as it applies that learning to building capacity for the next disaster. As Mark Haselkorn put it in an editorial:

“To a large extent, the humanitarian-relief sector reinvents itself with each new catastrophe. Faced with so much to do under such chaotic conditions, there is little time, energy or resources for ongoing assessment and improvement.

“Equally important, there is no formal humanitarian-relief profession; no degree that credentials workers, or journal devoted to research on improving humanitarian-relief systems. Field workers learn on the job and there is a turnover rate of nearly 80 percent per year in humanitarian-relief NGOs. Yet, humanitarian relief is, unfortunately, a "growth industry" attracting tens of billions of dollars each year.

“We need to change the way we support this critical and courageous industry. We need to empower its organizations and people, invest in their education, conduct research that provides them with better tools and techniques, and support the development of human and technology infrastructure that will enable workers to not only conduct their
complex work this time, but do it better the next.”[1]

Decision-making, risk assessment, capacity building, and knowledge management in these complex humanitarian relief efforts will require more highly developed information gathering and analysis. This is a critical opportunity for the research community to help NGOs address complex tasks such as data acquisition and management. This work requires a proactive and accelerated collaboration between academics and practitioners as well as new ways of operating across institutional constraints.[2]

One step towards this active collaboration took place at an NSF-sponsored, multidisciplinary workshop that was held in June 2006 in Nairobi, Kenya. At this workshop, representatives from the different types of organizations involved in humanitarian relief developed a research agenda on the understanding, development, and use of state-of-the-art information and communication systems in international emergency response efforts.

The issues addressed in this workshop included theoretically based and practically applicable operational models, process standards, information management frameworks, and technology platforms. The overall objective of this workshop was to define research—and develop a cadre of scientists and domain experts to conduct that research—that will both (1) enhance the ability of regional humanitarian relief agencies to respond to emergencies and (2) serve as a model of ICT infrastructure in support of interagency collaboration for the entire humanitarian relief sector.

Workshop discussion included the application of state-of-the-art user-centered design approaches to a collaborative research activity focused on the development and management of a regional emergency response information and communication system.

Current Status of Research in ICS and Humanitarian Relief

This section provides an overview of the status of humanitarian relief research with a focus on the application of ICS to communication and coordination issues. It provides the background for the following sections that report on recent efforts to understand the complex, dynamic, and interdependent challenges that make effective and timely humanitarian responses so difficult to achieve.

Each year humanitarian emergencies affect millions of people. These emergencies range from natural disasters that create sudden and catastrophic results to slow onset and complex political emergencies that present long-term threats to the welfare and stability of entire communities. While agencies and governments the world over struggle to understand the dynamics and impacts of these emergencies, research in this area is still relatively rare.

Effective information sharing is becoming increasingly important to the humanitarian relief sector. This is not just for supporting emergency response operations (e.g., sharing current situational data) but also as a means of enhancing the local capacity to respond to disasters before (e.g., in support of risk assessment and capacity building activities) and after they occur.

Within this general area of need, one critical research area in humanitarian relief addresses the challenge of integrating varied information sources and types into a cohesive system of technological tools and human factors. The challenges of this type of environment include information management, communication within and across organizations, and coordination or interoperability.[3] The integration of information—collection, analysis, and decision making [4]—depends on the success of the accompanying information infrastructure [5] or framework design [6] of the ICS.

Research into the human and political nature of ICS in humanitarian relief includes the challenge of those possessing the pertinent knowledge not being in the position of authority to make decisions.[7] Other research has explored the complexity of sovereignty and values impacting information flow and decision making in humanitarian emergencies.[8] On the political front of international policy related to humanitarian response and responsibilities, the role of the United Nations in coordination and communication was closely examined.[9]
The influence of knowledge management (KM) research is evident in humanitarian relief research through examinations of standardization [10], the applicability of KM structures to humanitarian relief ICS [11], and KM frameworks for decision making support.[12] Similarly, design of an information center system has used workflow modeling to inform its structure.[13]

Coordination of information, including the use of incident command systems [14], is an important aspect of humanitarian relief research. Recalling that ICS sits in a total environment of technology, people, and policy, other research examines the intersection of coordination and trust in networks of various humanitarian relief actors (Stephenson, 2005).[15]

Humanitarian relief research also includes the topic of logistics, such as the movement of goods and people as well as functionally coordinating complicated channels of distribution.[16], [17], [18], [19]

Research into geographic information systems and remote sensing applications in support of humanitarian relief and ICS is widespread. [20], [21], [22] Satellite images and detailed ground-based measurements provide both emotionally impacting images (e.g., tsunami devastation) and precise data (e.g., exact locations of potable water sources in flooded areas) for decision making.

Finally, medical applications of ICS in humanitarian relief, from delivering remote clinical care [23] to effective management of mass-casualty events [24], deserve special mention because of the potential to save human lives with quick, precise treatment of the most needy.

**Research Methods for Active Participation in Improving ICS for Humanitarian Relief**

Humanitarian relief is an industry that moves quickly and may have little patience for research it perceives as idle or purely “academic.” Instead, for our efforts to be relevant, we must partner with relief NGOs to solve their problems, not just ask and answer interesting questions. One research methodology in particular, Action Research (AR), fits this need for applied, organizationally specific research work.

Action research became widespread in social science research circles, particularly education, in the United States and Britain in the 1940s.[25][26] AR seeks to both solve a critical organizational problem impeding performance and at the same time generate new applicable theoretical knowledge. To do this, the researcher team collaborates with the organization to identify a problem and design an intervention intended to solve the problem.

In order to assess the performance change and begin building new knowledge, the researcher collects and analyzes data according to preexisting research questions. This action research series follows a generally accepted succession of diagnosing a solvable problem, planning alternative solutions, choosing and implementing one, evaluating that solution’s success, and specifying the organizational performance change and resulting learning which took place.[25]

For our work with the Inter-Agency Working Group (IAWG) and potentially other NGOs, we have begun this action research process. The NSF-funded workshop allowed significant stakeholders in East African relief operations to gather, exchange concerns and ideas, brainstorm possible alternative solutions, and articulate a research agenda proposing which solution to implement and, at a high-level, how to research its implementation. In the coming months we will continue to collaborate with our relief industry partners to step through the action research cycle to both solve real-world problems for NGOs and begin generating new theoretical knowledge of relief communication systems.

A strong partnership among NGOs and university researchers conducting quality action research in the field addresses the important need of coordinated Information Communication Technology (ICT) and information management in humanitarian relief, as highlighted by a recent evaluation of seven NGOs and their ICT capacity.[26] Not only are agencies—NGOs, the UN, local governments, and local NGOs—fragmented in their own coordination of information and ICT, but these agencies are also not synchronized to communicate with each other. As a
result, information flows are hampered when actors lack clearly defined roles and responsibilities related to ICT and information coordination.

A concerted research effort into information needs and user requirements for ICT and information coordination will address the fragmentation found in communication efforts at the field and headquarters level. Instead of valuable information disappearing when a staff member leaves a project or an area, research projects will seek to develop guidelines, procedures, and tools to retain this information for the organization to utilize. Instead of IT, radio, and telephony managers working in isolation (a reality exposed by the evaluation), research will highlight important field requirements for these efforts to coordinate activities resulting in efficient use of these valuable ICTs. The action learning research described above and employed by university researchers working with NGOs will decrease the fragmentation found in ICT and information management by humanitarian relief actors.

Report on an NSF-Sponsored Workshop to Define an ICS Research Agenda in Humanitarian Relief

The main goal of the Nairobi, Kenya workshop held in June 2006 was to define a research agenda that will enhance the ability of regional humanitarian relief agencies to proactively establish necessary agreements and infrastructure before emergencies occur. The expected outcomes of this workshop included an agenda for subsequent collaborative research, and proposals for new models to improve the sharing, coordination, integration, education, training, and management of information in support of emergency relief efforts.

Like any interagency, interdisciplinary research effort, the planning and design of the collaboration to occur during the workshop required rigorous, yet insightful effort that considered the diverse organizational, cultural, and educational backgrounds of the participants. As a communication environment intent on creating a constructive research agenda, the workshop encompassed academics and practitioners from at least 20 organizations including American and African universities and NGO personnel from around the world. This context presented powerful communication challenges.

To better understand—and therefore overcome—these challenges, our team will continue to draw on theory and practice to design communication and collaboration environments empowering attendees to generate an actionable research agenda focusing on applications of advanced information technology to humanitarian relief emergency ICS.

A Proposed Research Agenda for ICS in Humanitarian Relief

The overall objective of the workshop was to define a research agenda guided by those items listed in Section IV in order to enhance the ability of regional humanitarian relief agencies to respond to emergencies. In addition, we sought to help create a model of ICS infrastructure in support of interagency collaboration for the entire humanitarian relief sector. With a history of independent field operators and interagency tensions, humanitarian relief currently possesses a number of barriers to effectively implementing a change-oriented ICS research agenda. This panel explored those barriers during the workshop.

Clemons et al. [27] articulate a framework to identify and understand the various barriers stemming from the historical inertia of current humanitarian relief systems infrastructure. They identify five types of risks that threaten the success of efforts to revamp systems:

- Financial risk (too little return on investment).
- Technical risk (needed changes will require technology or methods which do not yet exist or are unproven).
- Project risk (developing work outside the organization’s area of expertise).
- Functionality risk (user and organizational needs will not be met)
- Political risk (user resistance will prevent system changes).

Of the five types of risk involved in reengineering processes, two stand out in humanitarian relief ICS. First, functionality risk is about the need to enable
the pursuit of new organizational strategies. Users resist efforts to change habitual actions that proved successful in the past; they prefer using them to learning new strategies consistent with improved systemic procedures. This creates functionality risks leading to a second major risk area for relief ICS change—political risk.

Political risk illustrates the potential of a change or proposed change to enhance or make obsolete the existing competencies of the people in the system. As people interpret the changes of a system as threatening (changes that would devalue their existing competencies) or enhancing (changes that would increase the value of their existing competencies), they resist or support the changes with whatever political power they have in the organization that could be substantial enough to reduce the level of redesign in the system. This creates an interesting dynamic between the need for system changes and the tendency of users to resist change because it threatens the value of their current competencies.

Similarly, the stated purpose of this workshop was to more fully understand the relief ICS changes organizations needed. In large part motivated by the radically changing conditions of relief emergencies, the partners at the workshop initiated a research agenda focused on changing relief ICS. Consistent with Clemons et al’s framework, the issues of political resistance which this agenda may create will only be revealed as the partners push the research forward.

Conclusion

The synergies realized from the partnering of academic researchers and practitioners during this workshop set an agenda that will produce new knowledge such as (1) a more thorough understanding of the needs, information requirements, and environments of key user groups; (2) a more complete process map of emergency response information flow; (3) a deeper understanding of how to increase local capacity for emergency response; (4) the identification of synergies and economies of scale that can be achieved through information sharing and (5) the articulation of a strategic framework that encourages these synergies.

While the workshop initially concentrated on East African humanitarian issues, the eventual goal is to broaden the research agenda and sharing of results to include the entire humanitarian relief community.

For information about the workshop proceedings, contact Dr. Mark Haselkorn at markh@u.washington.edu.

References


**About the Authors**

Alexandra (“Sandy”) Bartell is a technical writer and web designer for the Boeing Company as well as a Ph.D. student in the Technical Communication department at the University of Washington. Her primary research interests center around the application of information technologies to social issues. Her masters work focused on information technology applied to aviation security for air travelers while her doctoral studies have now broadened to include the use of information communication systems in relief efforts for catastrophic disasters.

Steve Lappenbusch is a Ph.D. student in the University of Washington Technical Communication department, College of Engineering. Steve has worked as a manager at global media provider, taught students from middle school age to adult, and currently works as a research assistant at the U.W. His work as a research assistant involves fieldwork, interviews, and the analysis of data to understand how engineers plan and learn. His dissertation topic area is relief communication systems, specifically the difficulties relief organizations face in designing and maintaining reliable communication to and from the field.

Randall B. Kemp is a Ph.D. student in the Information School at the University of Washington in Seattle, WA, USA, since September 2004. He is studying and researching towards the Ph.D. in Information Science, focusing on information management in the humanitarian relief sector, particularly geospatial information. For the 2005-2006 academic year he is a research assistant with the Interdisciplinary Program in Humanitarian Relief at the U.W. Randy has worked in libraries from California, to Michigan, to Colorado, with a three-month internship in the Library of Congress. He also holds a Masters degree from Denver Seminary and the University of Michigan.

Mark Haselkorn is professor and founding chair (1985-97) of the Department of Technical Communication in the College of Engineering at the University of Washington. His work has spanned more than two decades of leadership in interdisciplinary technology areas such as assessment of information technology in organizations, design of electronic communities and online services, and management of knowledge and communication in large organizations. Dr. Haselkorn’s current focus is improving information and communication systems for international humanitarian relief efforts and health care. He is co-director of the University of Washington’s Interdisciplinary Program in Humanitarian Relief. Past efforts include a wide range of activities concerning the Y2K problem and over $5 million in funding (1989–1995) in the area of intelligent transportation systems, including development of the first Web-based real-time traveler information system (Traffic Reporter, 1990). Dr. Haselkorn is the current Vice-President of the Professional Communication Society (PCS) and is the PCS Standards representative.