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ABSTRACT

Humanitarian non-governmental organizations (NGOs) are increasingly facing complex challenges due to the high frequency of natural disasters and the growing number of actors in the humanitarian relief sector. One of these complex challenges is the management of information. In an attempt to mitigate these challenges, NGOs are increasingly collaborating through inter-organizational structures such as collaboration bodies to find mechanisms to coordinate information technologies. These collaboration bodies facilitate four kinds of "cross" collaboration; 1) cross organization, 2) cross border, 3) cross levels, and 4) cross technology. Within each collaboration body the role and function of a project also takes on special significance as much of the cross collaboration activities are channeled through projects that cross all four types of collaboration. In this paper we examine four case studies set in two collaboration bodies focused on IT in the humanitarian sector.

Keywords

Collaboration, Humanitarian, Disasters, Non-Governmental Organizations, Information Systems, Projects

INTRODUCTION

The goal of this paper is to theoretically explore collaborative Information Systems (IS) projects as a "gateway" to collaboration between large, international Non-Governmental Organizations (NGOs). We present a preliminary analysis of four case studies of IS projects initiated by two collaboration bodies within this sector. We assert that these collaboration bodies facilitate four kinds of "cross" collaboration; 1) cross organization, 2) cross border, 3) cross levels, and 4) cross technology. In addition, within each of these collaboration bodies the role and function of a project takes on special significance as much of the cross collaboration activity is channeled through projects that cross all four types of collaboration.

In the remainder of this work, we first present a brief introduction to the context of IS in the humanitarian relief sector. We continue by illustrating the contribution this work makes to mainstream IS literature. Theoretically, we primarily draw from literature on IS governance. After presenting our methodology and research design, we examine four case studies set in two collaboration bodies focused on IS in the humanitarian relief sector. We chose to highlight two projects for each of the two collaboration bodies under consideration. We conclude with a cross case analysis and discussion of implications for both the humanitarian relief sector and the body of IS literature.

CONTEXT

Information Collaboration Among Humanitarian NGOs

Inter-organizational collaboration between NGOs involved in providing humanitarian and disaster response continues to challenge the international humanitarian relief community. Barriers to collaboration arise from the NGOs themselves, stemming from their sheer numbers, lack of resources, and desire for autonomy. (Uvin, 1999, p. 19). Researchers have identified numerous IS related problems, including the quality and timeliness of information (e.g., De Bruijn, 2006; Fisher, 2001), unpredictability of required information (Longstaff, 2005), unwillingness to share (Ngamassi et al, 2008), and mismatch in location, information overload, and misinterpretation of information (Bui et al., 2000, Saab et al., 2008). Also, the information issues in inter-organizational collaboration are closely related to the issue of uncertainty, with higher levels of uncertainty requiring greater amounts of information to be processed by decision makers (Galbraith, 1977). To overcome these barriers, formal NGO 'collaboration bodies' have emerged, with a number focused exclusively on information technology and management (IS) issues.

Collaboration bodies are meant to resolve the problems of information redundancy, duplication of effort, poor planning and implementation, and basic lack of knowledge and information regarding the humanitarian situations. Inter-organizational collaboration has a number of barriers to its effective implementation that have been consistently identified across the literature: 1) bureaucratic barriers and turf-protection, 2) divergent goals and conflicting interests, 3) resource dependency, 4) competition for scarce resources, 5) information issues, 6) assessing and planning joint activities (Uvin, 1999; Bui et al., 2000; Saab et al., 2008). In a nutshell, NGO collaboration is intended to ensure that priorities are clearly defined, resources are efficiently utilized and duplication of effort is minimized to serve the ultimate goal of providing coherent, effective and timely assistance to those in need (Harpviken et al., 2001).

Contributions to Information Systems Literature

Mainstream IS research does not fully capture the complex environment of collaboration bodies within the humanitarian relief sector. First, traditional IS research demonstrates a top-down bias. Second, IS project management is assumed to occur amid a high level of IT resources and clear lines of authority, two conditions unlikely to be found in a multi-organizational, humanitarian relief, IS development context. Third, despite calls for greater recognition of the multi-organizational context (e.g. Raghupathi, 2007), traditional IS research fails to recognize that organizations and their systems development initiatives are embedded in complex local environments that involve a variety of actors, which collectively are not governed by a single organizational IT governance arrangement.

We contribute to the IS literature in two ways. Firstly, IS collaboration is often the first form of collaboration entered into by NGOs (a gateway). Organizational coordination between NGOs is often perceived as difficult, if not impossible, especially when NGOs must change some of their basic operations, procedures or come to significantly depend on other NGOs for key elements of their operations. However, our research suggests that IS collaboration is perceived as easier to accomplish, less risky, and poised for success. In addition, donors also support these collaborative IS efforts as they often have the goals of increased accountability, visibility, and efficiency. Whether many of these IS joint system developments actually result in successful collaboration is beside the point (most fail). The NGOs and their donors strongly believe that the first step in collaboration is through IS.

Secondly, in traditional IS research collaborations are often contractual networks of dependent firms who are interlocked into supply chains. These contractual relations are often of mutual benefit, but can also be coercive. From our research, we find that the IS collaborations are entered into voluntarily and operate under the assumption of consensus as the decision-making parameter. While there may be some impetus from outside donor agencies to IS collaborations, the pressure to collaborate is rarely exerted between partners. The study of the unique flat-yet-pluralistic space in which information systems are developed across organizations is a valuable contribution to IS literature.

THEORETICAL BASES

Research on inter-organizational IS collaboration among humanitarian and disaster relief organizations, suggests two domains of theoretical knowledge which can provide significant insights. Firstly, the multi-organizational, multi-level nature of the industry has its own form of multi-level governance, which impacts the nature of collaboration that takes place therein. Secondly, projects play an exceedingly important role in establishing and maintaining IS collaboration within the NGO sector as a whole.

Multi-level, multi-organizational IS Governance

IS governance is defined as the authority structure that determines the ways in which IS decision rights are divided, ranging from highly centralized to highly decentralized, between corporate, divisional and business units/line managers in an organization (Brown & Magill, 1998). Thus, while mainstream IS governance research considers the division of decision rights and accountability across multiple levels of an organization, it does not fully capture the complex environment of IS collaboration activities across organizations, across borders, across levels, and across technologies.

The complex nature of international, inter-organizational IS collaboration can be viewed through the lens of multi-level, multi-organizational governance theory (Hooge & Marks, 2001, 2003; Bache & Flinders, 2004, p.39). This theoretical perspective has been applied to the IS domain by Maldonado et al. (2009) who found that it provides an explanatory framework for identifying challenges to, impetuses for and means of facilitating IS collaboration.

Multi-level, multi-organizational governance facilitates local collaboration on IS projects in two ways. Firstly, collaboration is facilitated by the link between higher levels of hierarchy where a broader strategic orientation is often found and between lower levels where the focus tends to be more operational. Secondly, this type of governance facilitates collaboration by providing local organizations with access to resources, which are typically controlled through higher levels of authority.

Role and Function of Projects in IS collaboration in Humanitarian relief

While collectively our research suggests that IS projects serve as a primary method of collaboration within humanitarian NGO collaborating bodies (see Maldonado et al., 2009; Maitland & Tapia, 2007; Maitland, et al., 2009; Saab et al., 2008), here we systematically analyze the role of projects, with particular consideration for multi-dimensional boundary spanning.

Research on temporary organizations, finds that projects do indeed play a role in establishing collaborative relations among organizations (Goodman and Goodman, 1976; Menger, 1999). These project groupings are often characterized as flexible, discontinuous and ephemeral (Meyerson, et al., 1996;). Usually, they are governed by networks of relationships and the social mechanisms of reciprocity, socialization and reputation, rather than traditional organizational hierarchies and well-established administrative routines (Powell, 1990; Jones et al., 1997). Further, Bechky (2006) argues that these temporary organizations, or projects, lead to collaboration mechanisms between traditional organizations. Bechky also argues that in situations like emergency and disaster response teams, temporary project teams play a significant role in overall collaboration through the establishment of role structures (see also Weick, 1993; Bigley and Roberts, 2001). When project teams are created across organizations, levels, and borders, the role and identity of the participant or member may be instrumental in allowing projects to form quickly. Newly formed projects may then lead to further collaboration.

METHODOLOGY

We present data drawn from four case studies of two collaboration bodies. The selection of case study as a methodology for conducting this research is appropriate for three reasons. Firstly, case studies have been identified as an appropriate and important tool for the study of information and communications technologies in organizational contexts (Darke et al., 1998). Secondly, the case study is viable method for studying areas that are underdeveloped in the literature (Benbasat et al., 1987). Thirdly, the case study method is particularly well suited for studying phenomena that cannot easily be distinguished from its context.

The four cases under consideration were selected, as at the time they were the best representative sample of the forms of IS-focused collaboration bodies within the humanitarian relief sector. In addition, the chosen cases were the most active and productive, had the strongest membership, and had existed for several years. However, it is important to note that each collaboration body was established independently of the other and had its own mission, goals, funding streams, membership, and projects. It is also important to note that data from two collaboration bodies concerning four of their projects does not constitute a representative sample and cannot truly generalize to the entire sector. The data under consideration should be treated as exploratory in nature with the intent of theory building. Our two cases are;

The Information Technology for Emergency Alliance (ITEA) was a collaboration body consisting of seven agencies funded by a large foundation and a technology firm. Its goal was to improve preparedness for relief efforts of NGOs over a two-year period. ITEA had a decentralized project management structure that coordinated the implementation of its activities for its planned two-year program.

ReliefTechNet is a collaboration body of humanitarian NGOs, which was founded initially to pool requests for IT donations, but quickly took on a range of other activities including collaborative ICT efforts during disaster response and

development activities. Between 2001 and 2009 ReliefTechNet membership grew from 7 to 25. ReliefTechNet is wholly autonomous, having established itself as a non-profit organization.

Data for the two cases were collected over a period of 21 months (October 2006 through June 2008) and data sources included semi-structured interviews, direct observation, document analysis and surveys.

Nineteen telephone interviews were conducted with ReliefTechNet staff and representatives of member organizations. Twelve telephone and face-to-face interviews were conducted with ITEA representatives. More significantly, each case includes data gathered through extensive observational and participatory data collection techniques. Two researchers attended face-to-face meetings for each case. Supplementary data was collected by participation in numerous conference calls for each case.

For this study we used a form of analytic induction, a mixture of deductive and inductive approaches, for our analysis (Epstein & Martin, 2004). First, we developed a set of deductive codes based on insight we had gained from the larger research, previous studies and the core interview questions. During the coding process we also let some inductive codes emerge from the data. The inductive approach reflects frequently reported patterns used in qualitative data analysis. The process of coding was iterative and cyclical based on the framework developed by Seidel (1998).

PROJECT/CASE DATA

In this section we will discuss four IS projects, two from each collaboration body. Selecting two cases from each body enabled comparisons across the different governance arrangements of the bodies, which may have influenced the nature and degree of boundary spanning in the projects. Due to the space constraints of this publication venue, mere sketches of the four projects are provided below. A more complete presentation of the data from each project is published elsewhere.

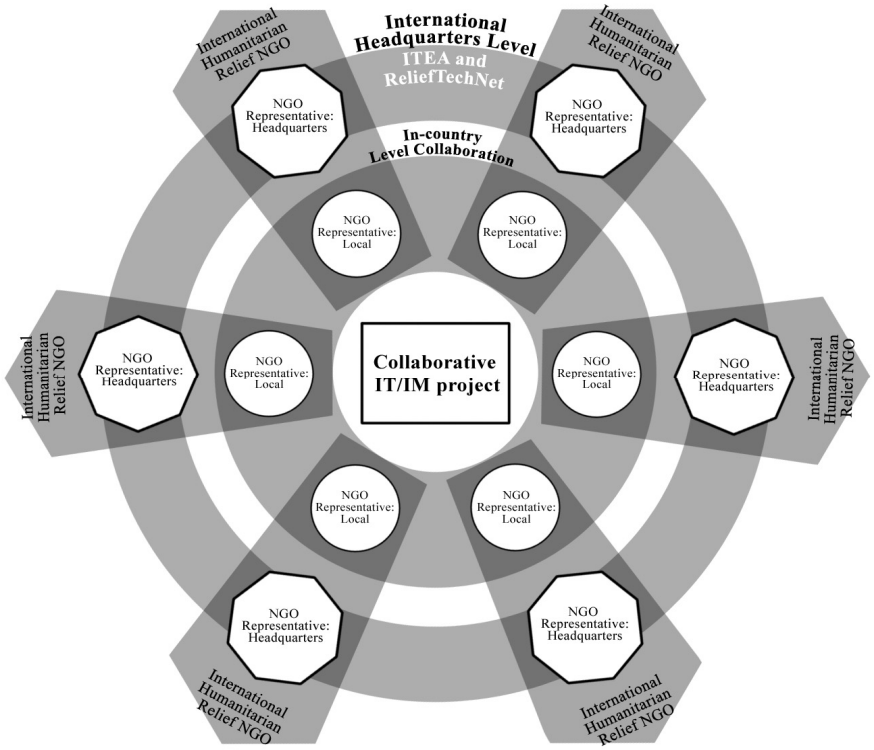

Figure 1: Collaborating Bodies and their Projects

Within each of the four project discussions we will focus on the four touch points where collaboration happens across organizations, borders, hierarchies/levels and technologies. We end each project section with a discussion of the success or failure of the overall project and the forms of collaboration it engendered. Here we present a limited number of projects as exemplars, intended to represent the diversity of projects, rather than an exhaustive account, which space limitations preclude.

The relationship of a project to the collaboration body and its members is illustrated in Figure 1. The outside ring represents the headquarters level collaboration body of ITEA and ReliefTechNet. The inner ring represents the regional, local and field sub- collaboration bodies. In all cases under discussion, the headquarters level collaborating body played a role in the project. In Figure 1 each of the spokes represents one of the NGO member organizations. The collaborative IS project was placed at the center of this diagram to represent its central role in facilitating collaboration in each of these collaboration bodies. Figure 1 is meant to be a static diagram of the overall collaboration body environment.

Below in figure 2 we zoom in to one slice of the original diagram to highlight the dynamic aspects of the collaboration. In figure 2 below we illustrate the four forms of collaboration, across organizations, borders, hierarchies/levels and technologies.

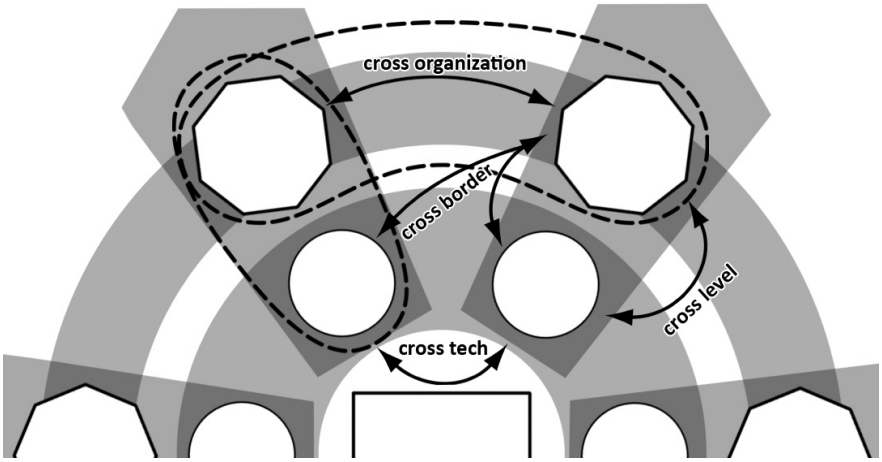

Figure 2: Boundary Spanning and Collaboration Mechanisms in Collaboration Body Projects

PROJECT 1: NERC

Hurricane Stan (2005) gave rise to the National Emergency Response Collaborative (NERC) project. NERC brought together six of the seven ITEA organizations and the National Body for Collaboration on Disasters (CNCD in Spanish) of a Central American country. The NERC platform was developed as an online tool for emergency-related content management. Access to the NERC platform was restricted to people associated with the project which acted as a repository of documents (i.e. geographical presence, emergency procedures, resource etc.) from each ITEA agency and their field partners.

ITEA attempted to resolve information management issues in their field offices in a Central American country by using a web-based portal, which would enable the organizations to share information. However, the field office personnel lacked the organizational processes and time necessary to post information. Also, the lead agency, which was based in the UK, advocated for the portal to be developed in the open source platform Plone. However, the Internet Service Providers (ISP's) in the base country were unable to support Plone. While this hurdle was overcome by using a European ISP, it added time and complexity to the project.

NERC	
Across organizations	This project facilitated collaboration across six NGOs, members of the ITEA initiative. This project also drew in non-ITEA NGO members form the local country, as well as the local government.
Across borders	The project was focused in a single Central American country. All headquarters level ITEA members crossed borders to participate in the project.
Across levels	The NERC project was funded and initiated at the headquarters level across 7 large NGOs and was implemented by the same NGOs within and between the county offices (a lower level of within-organization hierarchies).
Across technologies	Plone was established as the underlying technology for the NERC web portal. Only one of the NGOs had expertise in this area, and only at the headquarters level.

Table 1: Project NERC

PROJECT 2: Field-Level Chapters

During its first few years as a collaboration body, the member representatives of ReliefTechNet came to strongly believe that working only at the headquarters level of their organizations was only semi-effective and that they needed to replicate their success at the field level. ReliefTechNet Chapters were created to address the ICT centric issues related to effectiveness in inter-organizational collaboration. In 2007, ReliefTechNet-HQ established four pilot smaller, local-regional chapters, that we call 'ReliefTechNet-Chapters', in India, Sri Lanka, East Africa and Indonesia.

ReliefTechNet-HQ provided structural guidelines for ReliefTechNet-Chapters formation. Each Chapter adopted the agenda set forth by ReliefTechNet-HQ and the ReliefTechNet-Chapter advisors for their initial meetings

Field-Level Chapters	
Across organizations	Chapters were formed in each region/country with field-level members from the original 23 member NGOs of ReliefTechNet. Consequently, new members such as regional/local NGOs (outside of ReliefTechNet membership) were invited to join the Chapter.
Across borders	While each chapter operated in a region/country they often had a very diverse membership drawn across cultures, languages and borders. All Chapters were managed as a single, large project from the headquarters level, giving the project multi-national characteristics.
Across levels	While each individual NGO operated at many levels, a Chapters project operated principally at two levels, the headquarters level and the field level.
Across technologies	While each NGO managed their own technologies and systems, they all had common needs, like the need for access to low cost and reliable connectivity.

Table 2: Project Chapters

PROJECT 3: IT_Emergency_Website

In 2006 the ITEA headquarters level collaboration body decided to fund a project set out to address two perceived needs of ICT professionals working in emergency response:

1. A "knowledge base" or central repository for the sharing of technical information about various types of emergency-appropriate hardware, software and telecommunications solutions.
2. An "emergency response center" or space dedicated to specific emergencies as they arise, where IS professionals can share technical information about IS activities and availability of services in the affected area.

TheIT_Emergency_Website project attempted to tackle the broader issue of information sharing. The collaboration body identified a project to develop a portal through which the agencies could share information. It quickly became obvious that the portal would not be widely used by the members, in part because they lacked the organizational processes for releasing information and time to post it, particularly during the period of a disaster response. Also, other information sources were being used by organizations that would compete with the portal. The IT_Emergency_Website project did not get the kind of adoption that was necessary for its long-term success as it may have misunderstood the requirements of its target user group. For example, the "emergency response center" members wanted to be candid about their emergency response work and challenges but did not want potentially sensitive information available in such a public forum. In recognition of member feedback, the decision was made to fold the ER centers into the ITEA intranet, to which access was limited to members only.

IT_Emergency_Website	
Across organizations	The seven member NGOs of ITEA participated in the decision to create the IT_Emergency Website. Once the Website was folded into the private Intranet, it proved to be a more useful tool across organizations.
Across borders	This project operated at the headquarters level. While the members originated in many nations, this was not a significant aspect of this project.
Across levels	Each member of ITEA was a representative of a large International NGO (INGO). Often, the home organizations hierarchy acted as a barrier to sharing information. This was somewhat ameliorated when the website became internal only.
Across technologies	Although this project was web based, issues of data sharing standards were experienced. Each member organization contributed data to the website in different and incompatible forms. Finding and establishing standards became essential to the success of this project.

Table 3: Project Website

Subsequently, adoption increased rapidly and the discussions became much richer and more useful. ITEA reports that member support for the enhanced intranet was high, and emphasizes that much of this enhancement stems from the content of this website.

PROJECT 4: VSAT

Limited availability of telecommunications infrastructure in remote areas, prior to the disaster and potentially damaged infrastructure as a result of the disaster, place a significant burden on the efforts of field workers to share information with headquarters or other relief agencies. With no alternatives in place, NGOs frequently use very expensive satellite infrastructure through VSAT (Very Short Aperture Terminals). One possible means for NGOs to lower the costs of VSAT deployment is to bundle forces and cooperate to deploy VSAT technology. A collaborative deployment approach based on a collective agreement with a satellite provider, which through increased business opportunities by ReliefTechNet members, could provide attractive prices.

VSAT	
Across organizations	The VSAT project is operational across 10 out of the 23 ReliefTechNet member NGOs. The master contract was negotiated by the project leaders across these 10 organizations and made available to all other ReliefTechNet members.
Across borders	The VSAT project is only partially about collective bundling of technology purchases. It is also about negotiating the rights to establish a VSAT in a region/country.
Across levels	Initially, the VSAT project was primarily operational at the headquarters level. However, once the VSAT sites were established, it was the field offices were the predominant users, which adds a cross level element to this project.
Across technologies	The VSAT project was primarily a collective technology investment. Each member NGO who participated in the contract agreed to make use of a particular vendor and its technology.

Table 4: Project VSAT

DISCUSSION

As shown in Table 5 below, the above projects demonstrate variance in the degree and implications for boundary spanning. With regards to crossing organizational boundaries, the cases demonstrate that the number of organizations involved in these projects varied due in part to the overall number involved in the collaboration bodies. Another important factor was the degree to which participation was expected as part of collaboration body membership. Hence the ITEA projects included most (if not all) members, while the ReliefTechNet projects did not include such high levels of participation. In the latter, participation was based on individual organizational needs and interests. Interestingly, the two earlier projects ultimately enabled new local organizations to join the collaborative project. Conversely, the two later projects, while open to members, were closed to new organizations. These differences exist despite the relatively open nature of ReliefTechNet, as compared to ITEA.

Cross case comparison	**Project 1 NERC**	**Project 2 Chapters**	**Project 3 Website/portal**	**Project 4 VSAT**
Across organizations	Expanded participation	Expanded participation	Closed participation	Closed participation
Across borders	Crossed	Crossed extensive	Crossed	Crossed extensive
Across levels	Full span	Full span	Limited span	Limited span
Across technologies	Problem required immediate resolution	No problem (as of yet)	Ongoing problem	Problem required immediate resolution

Table 5: Project Comparison

All projects involved crossing national boundaries, although they varied somewhat in their international breadth. Projects 1 and 3 which involved primarily international headquarters, were only moderately diverse in their international representation, and in the case of Project 1, included a single country in the local dimension. These are juxtaposed with Projects 2 and 4, which when viewed as headquarters-level projects had extensive international coverage. For both projects, crossing national boundaries required headquarters staff to deal with many national contexts defined not only by language and culture but also by differing regulatory environments.

Next we consider the extent to which the projects spanned hierarchies. We find that two of the four projects spanned the full hierarchy between headquarters and local offices. Projects 3 and 4 did have to contend with hierarchy, but were mainly limited to the hierarchy of the headquarters offices. While we find that the other three did bridge the headquarters/field office divide, the VSAT project did so in a slightly different way than Projects 1 and 2. Projects 1 and 2 made headquarters resources available to local organizations, however, this did not reach the local level.

Finally, we consider the issue of crossing technologies and formats. Crossing technologies was an issue in Projects 1, 3 and 4. In Projects 1 and 4 the team had to come to a decision quickly and hence a standard technology was chosen quickly to

move the project forward. However, differing data standards in Project 3, known to present a greater problem for collaboration due to their relationship with organizational processes (Maitland et al., 2009), posed an ongoing problem. In Project 2, the issue of technology had yet to arise as it did not in the first instance involve technology. However, as chapters begin to undertake projects these issues may arise.

There appears to be an interesting relationship between crossing hierarchies and technologies. First the project with the most significant technology problem was the one that had the most limited span of hierarchy. In the one hierarchy-spanning project with technology issues, these issues were resolved largely due to the power provided by higher levels of hierarchy. Hence, the lack of resolution of the technology issues in Project 3 could be explained by a lack of hierarchy spanning. However, Project 4 also pooled resources but was able to overcome technical issues. Furthermore, in Project 4 the technology issues were resolved at headquarters, and hence were not resolved by the application of power. However, it may be possible that by making Internet connectivity cheaper in remote areas would eventually benefit those at lower levels in the hierarchy to whom the higher levels of the hierarchy feel responsible. Thus, it appears there is a relationship between the resolution of technical problems and ability to apply power within a hierarchy, that is, whether the solution to the problem requires a vertical (power)-based solution or a horizontal (collective)-based solution.

These findings suggest, all else being equal, hierarchical relations help overcome technical barriers to collaboration.

Our findings suggest that collaboration projects that funnel resources from higher to lower levels of the hierarchy will likely have to deal with the implications of multi-level governance. These can be contrasted with projects, such as Projects 3 and 4, which focus mainly on one level of organizational hierarchy. This research also suggests that collaboration efforts at higher levels of the organizational hierarchy may facilitate collaboration at lower levels, improving collaboration with partners at multiple organizational levels.

CONCLUSIONS

After such major disasters as the South East Asian Tsunami, Hurricane Katrina and the Pakistan, Haitian and Chilean Earthquakes, the providers of humanitarian and disaster relief identified response problems as, in part, informational problems. Simultaneously, the donors and leaders of NGOs also demanded increased levels of accountability in terms of dollars spent, services provided and goods delivered. This problem was simultaneously defined at both the headquarters and country level, suggesting a multi-organizational, multi-level informational problem.

Consequently, collaboration bodies were created across large NGOs which focused on the topic of addressing informational problems in the humanitarian and disaster response sector. We believe that collaborative multi-level, multi-organizational projects will dominate the initiatives in the humanitarian and disaster information management sector in the future.

In our examination of collaboration bodies, collaboration activities frequently took place through project-related activities. Our findings suggest that collaboration bodies, or at least those encountered in our research, attempt to address collaboration issues through projects undertaken by their members (either the entire set or more likely a subset). Collaborative projects help to develop trust and bilateral relations among members, while at the same time building systems and processes that foster further collaboration.

The development of information systems for humanitarian relief is increasingly being undertaken in multi-level, multi-organizational contexts. Despite this trend, little is known about the mechanisms of coordination of information systems project processes and outcomes. While such initiatives may face resistance in the for-profit sector, as competitive pressures create challenges for collaborative systems, in the non-profit sector there is a great incentive for collaborative systems. The particularity of the emergency and relief sector is that although NGOs may compete for donor dollars and to offer more efficient and effective help to beneficiaries, there is a common benefit for all agencies when help is delivered.

Our research suggests that this study is a significant departure from previous IS research in that it is concerned with a multi-level, multi-organizational context. While such forms are common in the humanitarian relief context, they differ from the single organization systems typically found in the private sector. Further, as compared to prescriptions for IS governance for organizations with business units involved in joint ventures, which recommends a highly decentralized arrangement (Sambamurthy & Zmud 1999), here there exists evidence that centralization, at least to some degree, provides an important incentive, namely resources. The transfer of resources from higher to lower levels is key factor in multi-level governance for IS as these resources help local organizations overcome resource constraints to collaboration.

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