Applied Technologies in Humanitarian Assistance: Report of the 2009 Applied Technology Working Group

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Abbreviations:
GIS = geographical informational systems
ICT = information and communication technology
NGO = non-governmental organization
WG = working group
XML = Extensible Markup Language

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Abstract

Information and communication technologies, especially in the forms of mobile telecommunications, satellite imaging, and geographical information systems, promise to significantly improve the practice of humanitarian relief. A working group convened at the Humanitarian Action Summit 2009, has begun investigating the challenges to implementing these technologies in field operations, keeping in mind the ethical considerations of linking people to place, and pledging to build a community of practice among academics, practitioners, and developers.

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Background

Technology has revolutionized global communication networks, empowering individuals and communities in even the most inaccessible places. As the humanitarian community works toward improving coordination and collaboration, furthering evidence-based humanitarian practice and mounting an effective response, it will require more accurate real-time information that can be managed efficiently. This calls for a more complex and facile platform of information management to which such communication tools as mobile telecommunications, satellite imaging, and geographical information systems are well-suited. As these new technologies enter the humanitarian space, they confront the everlasting challenge of balancing utility, efficiency, and feasibility among its multiple stakeholders, especially the beneficiaries. The purpose of the new Applied Technology for Humanitarian Action Working Group (WG) is to better understand, practically, how to apply these technologies as vehicles to efficiently and effectively acquire, organize, analyze, and use large amounts of diverse information so that timely and relevant actions can fulfill the goals of humanitarian action.

The use of information and communication technology (ICT) in humanitarian assistance is diverse. Mobile technologies are used for search and rescue, communicating real-time information from the population for crisis/conflict early warning (crowdsourcing), and to communicate basic communicable disease surveillance information from remote locations. Satellite imaging and geographical information systems (GIS) serve as communications tools for donors and aid workers. Maps depicting the "who, what, where" aspect of humanitarian action can help organizations plan a response and coordinate with other agencies. Geospatial analysis tools aid humanitarian coordination through geovisualization, vulnerability estimation, and cluster, range, and gap analyses. These technologies have the potential to improve the information that humanitarian actors use to make decisions in emergencies, and ultimately, improve the quality of the response to crises.

However, what remains a challenge is the accessibility, familiarity, and hence the usability of these functions during a humanitarian emergency. While organizations increasingly are reliant on ICT, the capabilities of technology often are out of reach of the organizations working in crisis settings, as well as the populations that are most affected.

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Previous Progress

The WG on Applied Technologies convened for the first time during the 2009 Humanitarian Action Summit. Spawned from the Health Information Management WG, which has been in existence since the Summit's inception in 2006, the new WG is devoted primarily to the emerging role of mobile technologies, geospatial analysis, and satellite imagery in humanitarian crises while the parent group has chosen to focus its agenda on data collection and surveillance. In the previous Summit, the Health Information WG members recognized the growing field of data and applied technologies and their critical roles in data collection, management, and analysis. They developed several consensus points, including the need to use Extensible Markup Language (XML) tagging in database infrastructure, and the importance of incorporating mobile technologies in humanitarian responses and research. This growing need for more focused discussions about applied technologies brought about the creation of this new WG.

Issues

The WG engaged in a lengthy discussion that outlined the successes, challenges, and opportunities that surround the applications of ICT in humanitarian settings with a focus on geospatial and mobile technologies. While the gap between the capabilities of innovative technology and the practical implementation at the field level in humanitarian emergencies was a large focus of the WG, there were some notable successes, as well as a universal acknowledgement that many opportunities exist for strategic thinking on how to address this gap.

Objectives

The objectives outlined before the Summit convened were to:

1. Discuss the use of applied technologies in humanitarian actions with a focus on mobile technologies and GIS and their roles in field operations, multi-level decision-making, and timely impact on humanitarian operations;
2. Examine these gaps between technology advances and field implementation, and develop practical strategies to address those gaps;
3. Investigate the means by which efficient data communication management via mobile communications and geo-referenced data can lead to improved humanitarian outcomes and subsequent policy decisions;
4. Discuss the future potential applications of new information communication technologies and GIS platforms for humanitarian assistance; and
5. Foster synergistic partnerships between academia, the NGO community, UN and government agencies, and developers of mobile technologies and geospatial platforms.

Findings

Preliminary discussions by the WG centered around three broad topics of interest: (1) practical implementation of technology in the field; (2) ethical implications; and (3) potential areas of policy and advocacy.

Issues surrounding implementation ranged from field organizational capacity with regard to human and financial resources, to the accessibility and flexibility of available technologies for field-ready applications, to the process of standardization that must occur to allow the exchange of information between interested parties. While successes with regards to technological advancement were quickly identified by the WG, examples of operational success in implementation were more scarce. Ushahidi (©2008, ushahidi.com), a platform and mapping tool created for crowdsourcing crisis information, was a notable and high profile exception. Ushahidi enables the public to communicate crisis information via SMS text messaging, e-mail, or Web entry, and create crisis maps for public use. Not surprisingly, the founders of Ushahidi have technical, not humanitarian backgrounds. As technology continues to develop, so will innovative applications for humanitarian assistance. And, as humanitarian actors increasingly are interested in applied technologies in the drive to improve the quality of humanitarian action, these successes only will be realized if the capabilities of technology are made accessible and practical for use in crisis settings. Many of the opportunities identified by the WG dealt with the translation of technological capabilities into a useful format for humanitarian workers: standardizing geo-referenced labels to facilitate mapping, creating technical guides for practitioners that outline what technology may be used to best accomplish specific field activities, and developing a process for implementing technology into humanitarian activities.

In any setting in which personal identifying information carries significant responsibility, there are ethical implications that must be considered when proceeding with the implementation of ICT during humanitarian emergencies. This concern is heightened especially when essential health and population data are linked to a geographical location. Populations that already are highly vulnerable must be protected from indiscriminate and insecure data collection and management as well as exploitive data mining situations in which organizations extract information and do not involve the communities in the analysis and use of the end product. Would the positive deviance model, which assumes that community problems can be solved with solutions that already exist within the community, work in the setting of humanitarian emergencies to address this issue?

Lastly, the WG expressed interest in establishing a community of practice comprised of like-minded people from different organizations with a common interest. The WG envisioned such a community of practice to define standards and the way forward through a substantive vision of the opportunities and challenges in applying ICT to humanitarian assistance. Developing the community of practice will have implications for both practitioners and policy-makers. As the use of innovative ICT becomes more commonplace in crisis settings, the interoperability of the technology as well as the need to standardize data collected will become even more critical. The community of practice can play a crucial role in linking academic research, technological advancements, and the needs of field operations (Figure 1). Policy will be made at the organizational, national, and international levels to deal with these ethical questions and the requirements for field implementation.

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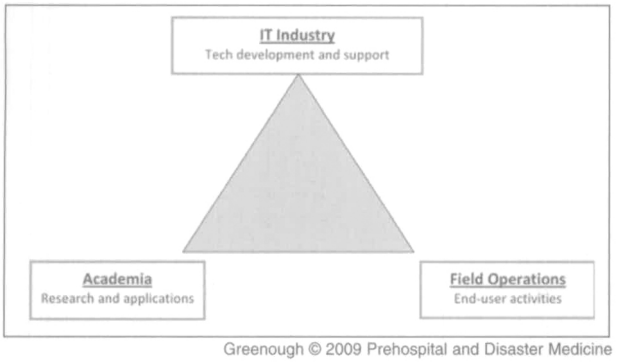


Figure 1—Community of practice for ICT in humanitarian emergencies

Conclusions

Consensus of the WG was that the humanitarian ICT field must find concrete, integrated solutions to operational problems that occur at the field level while addressing ethical concerns about the possible exploitive/extractive nature of data collection.

Specifically, the main issues identified by the Applied Technologies WG are:

1. *Accessibility and Implementation*—Humanitarian aid organizations often do not believe that GIS or mobile technologies are feasible or affordable for deployment in the field in a remote or crisis situation. Other organizations are interested in the potential benefits of these technologies, but they continue to seek scarce resources or balance limited resources to familiarize themselves with the available technologies so that they can make organizational decisions on their utility in field operations. The WG could facilitate the dialogue that must occur between developers who design client-based applied technologies and their unique humanitarian clients who require simple to use, affordable, and easy to deploy tools in austere conditions. A method to categorize the various currently available technology tools should be made available to humanitarian organizations so that they can best choose the software package that serves their needs;
2. *Standardization*—As GIS and mobile technologies have evolved during recent years, often separate developers have adopted their own methods of tagging and formatting data. The creation of standards for developers would improve cross-platform collaboration and enhance information sharing. The WG endorsed efforts by developers in the GIS and mobile technologies communities to create unifying standards and guiding principles such as the adoption of XML and KML standards that have facilitated improved communication between different software platforms. Also, the move toward online applications, rather than desktop-based applications was endorsed by the WG;
3. *Open Source*—the WG will define open-source software as a guiding principle to enhance collaboration between developers; and
4. *Ethical Implications*—The WG pledges to investigate the role of applied technologies and their ethical implications in both field operations and research during a humanitarian crisis; the WG will seek a proactive role in creating a dialogue on the ethics of geo-referenced personal data and its utilization and secure management.

Recommendations

The WG, composed of representatives from NGOs, academic institutions, governmental, and international agencies, agreed to use the Summit platform and its access to research resources within academia, to address the ongoing challenges and opportunities of humanitarian ICT that the UN, NGOs, and governments do not have the time, resources, or mandates to address.

In order to promote information communication using mobile technologies and geographical information systems, the WG members will pursue a series of opportunities to facilitate their implementation at the field level.

Suggested Strategies

The Applied Technologies WG identified several suggested strategies to tackle the most significant issues listed above.

First, the WG will create a wiki to continue this dialogue in an online conversation. The Applied Technologies WG suggests that this Website also could act as an online directory of available GIS and mobile technologies that may be useful to humanitarian groups for crisis response and research. Initially, the wiki will describe the discussions and suggestions that evolved during the Summit, and evolve over time to categorically list lessons learned and eventually best practices.

The WG will serve as the network frame upon which five subgroups can coalesce, communicate, and develop actionable plans. The five subgroups, created by WG members, will investigate the most prominent issues facing applied technologies, specifically focusing on:

1. *Implementation*—The development of minimal technical guidelines to help humanitarian organizations use GIS and mobile technology tools and the creation of an online directory of technology tools;
2. *Standardization*—The creation of standard tags and formats for geo-spatial data for GIS applications;
3. *Open-Sourcing*—The impetus to encourage the IT developer community to use open-source versus proprietary software platforms;
4. *Community of Interest*—The creation of an entity dedicated to engaging with other developers and humanitarian aid organizations to foster collaboration and information sharing, to reduce redundancies by avoiding parallel development, and to direct software and technology development toward client's needs; and
5. *Ethical Considerations*—The scholarly examination of ethical issues unique to the use of mobile and geospatial technologies in vulnerable populations and the thoughtful investigation of the implications of applied technologies for ethical review board applications involving humanitarian research.

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Geographical informational systems and mobile technologies are playing an increasingly important role in humanitarian actions. These technologies have the potential to allow for more precise and efficient use of staff and resources, and can improve collaboration and coordination among aid organizations, governments, and the United Nations. The newly formed Applied Technologies WG aims to bring these stakeholders together with developers to create the most useful and feasible tools for the aid worker in the field. The above-mentioned strategies represent the foundations and first steps of this collaboration.

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