Digital Data: Improving Situational Awareness During Complex Humanitarian Crises

By Brittany L. Card, Ziad Al Achkar and Benjamin I. Davies
For Issue #3, May 2014
Last Updated: Thursday May 08, 2014 01:17

As seen during the recent response to Typhoon Haiyan (Yolanda) in the Philippines, non-governmental organizations (NGO), military actors and academic groups are harnessing technology to improve coordination and collaboration. As new technologies and systems are employed during this response, a discussion of the strategies used to gain situational awareness could offer valuable insight for all responders during disasters. In recent years there has been an increase in research and projects relating to information and communication technologies and humanitarian operations. Part of this research is identifying unique advantages of non-classified data collection and analysis during a disaster. This paper offers an overview of the types of data that have been collected, analyzed and applied to humanitarian operations, while detailing the advantages of incorporating real-time open source data into military planning and action during a response.

In a complex humanitarian crisis, actionable and up-to-date information is required for responders to make informed decisions. Increasingly, valuable information comes from the collection and analysis of emerging digital data. The primary challenge is no longer accessing information; but instead the selection of timely information related to a specific unknown to guide decision-making. When gaps in knowledge are identified, a team can re-focus the types of information they need to collect. This process is necessary for the many types of organizations and personnel that monitor or respond to complex crises including humanitarian and human rights organizations, academic researchers, and military personnel.

In addition to directly collecting information from people on the ground, three main types of information are utilized to understand developing crises and conflicts: open source information, geospatial information and social media. Open source and geospatial information, also known as open source intelligence (OSINT) and geospatial intelligence (GEOINT), have been employed by governments, militaries, and intelligence agencies for decades. These sources of information are also used and studied by humanitarian and human rights organizations and academic researchers.

In addition to traditional data sources, the recent proliferation of social media has created an additional data stream that can provide near-real time insight into developing situations. Although governments pioneered the application of open source and geospatial information, the humanitarian industry is quickly establishing itself as a leader in understanding the utility of social media. The gains made within humanitarian research offer an exciting opportunity for both sectors to learn from each other on how to incorporate social media into current information collection processes to gain situational awareness.

Open Source Information

OSINT is differentiated from other types of intelligence because it is collected from publicly available sources. Sources of this type of information include news media, the Internet, government statements, non-governmental organization reports, maps and geospatial data, and photographs. Value is placed in the monitoring of open source information because of the belief that even public information can provide critical insight. The process of collecting and analyzing open source is rooted in the identification and combination of seemingly unimportant and often fragmented information to reveal connections and insights surrounding public statements, actions and outcomes.

Humanitarian and human rights organizations employ open source information as part of their data collection methodology in order to document and understand developing complex humanitarian crises. While conducting this data collection, organizations may monitor phenomena similar to those that are of interest to governments. These can include the movement and basing of troops, the location of vulnerable
populations, types of violence and attacks, the location and status of critical infrastructure, and the disposition of checkpoints.

It is important to note that people around the world on a daily basis read and analyze open source information. This is done by not only reading a singular article to gain a deeper understanding of an issue but also comparing multiple articles to determine the needs of a specific population. Utilizing open source is a critical part of understanding how to use all information that is immediately available to best make sense of a complex situation. As a result, the most important factors become the systems used to organize the information and the analysts interpreting the collected information.

**Geospatial Information**

GEOINT has also been increasingly employed by humanitarian and human rights organizations. This data source was originally developed for governments and their intelligence agencies to aid in the collection of unique intelligence. Pioneered by the launches of Sputnik by the Soviet Union in 1957 and Explorer I by the United States in 1958, the ability to collect geospatial information was driven by the need to secure a comparative advantage in intelligence collection. Aerial and satellite imagery have since been used at varying levels to support intelligence collection and mission operations.

Since the commercialization of this technology, organizations and researchers have increasingly used satellite imagery for humanitarian and human rights purposes. In this capacity, satellite imagery can be used to corroborate public reports or witness testimony and document the nature of critical incidents or threats to human security. For example, the Harvard Humanitarian Initiative (HHI) released *Sudan: Anatomy of a Conflict* in which researchers used open source information and satellite imagery to construct a detailed geospatial history of the conflict in Sudan. This report highlights instances of the destruction of civilian dwellings, attacks on infrastructure, and the looting of humanitarian facilities. Without the commercialization of this technology, this type of work would not have been possible in the nonprofit sector.

**Social Media**

The increased use of information communication technology has made social media platforms, like Twitter, Facebook, and YouTube, sources for near-real time information about developing situations. The only prerequisites for using social media are fluency with the functionality of the platform and the ability to analyze the data with confidence. These platforms are employed by many different types of users: civilians, armed actors, media outlets, and government agencies, all providing unique perspectives, and sometimes promoting specific agendas.

Humanitarian researchers have been working to develop insights into what social media can reveal and how it can be harnessed to provide actionable information during emergencies. An example of this work is "#Westgate Tweets: A Detailed Study in Information Forensics," which was completed by the Qatar Computing Research Institute’s (QCRI) Director of Social Innovation, Dr. Patrick Meier, and two QCRI Research Assistants. The study categorized and analyzed the authors, content, and frequency of tweets from the hour leading up to and the first two hours of the attack on the Westgate Mall in Nairobi, Kenya.

Employing a different technology, HHI’s *Sudan: Anatomy of a Conflict* used YouTube videos that documented the conflict in Sudan. These videos, filmed by a Sudanese military film crew, provided insight into critical battles that took place in a non-permissive area, often within a week of the battles occurring. The videos revealed information about the units involved in certain actions, structures of command and control, and the military material used during different engagements. HHI’s analysts cross-corroborated the information gathered from the videos with satellite imagery to analyze the operations. In one case, HHI imagery analysts identified helicopters on an airstrip matching those in videos of a nearby battle. The proliferation of video sharing and camera phones has allowed videos from the ground to be compiled and quickly posted. Increasingly analysts can use anything posted publicly online to improve situational awareness. Suddenly, seemingly irrelevant information like pictures taken by civilians or a short promotional video about improvements to a neighborhood can become essential data during an emergency.

The military has also incorporated humanitarian-led efforts into their operations. Following the 2010 Haiti Earthquake, efforts quickly began to create an Ushahidi crisis map by compiling and mapping all relevant tweets, SMS and other social media. This effort was complemented by OpenStreetMap who crowdsourced a detailed roadmap of Haiti. The US Marine Corps sought to integrate the data produced by the map into their operational response. In an email, a US Marine assisting the 22nd Marine Expeditionary Unit from the USS Bataan wrote, "It is YOUR data and YOUR work that is putting aid and assistance directly on the target and saving lives. Our big gap right now is locating NGOs and where they are working. Your site is helping with that. Keep up the good work!! You are making the biggest difference of anything I have seen out there in the open source world."
Final Thoughts

Social media platforms share information at a much more rapid pace and higher volume than traditional data sources. This makes social media a very attractive primary information source. Valuing one data source over another raises significant risks associated with ignoring competing or contradictory sources that contain relevant and sometimes critical insight. Instead, multiple data streams must be integrated to build robust situational awareness.

By developing strong and confident staff to monitor and compare all available sources of information these activities can, without question, inform and improve decision-making. Recent humanitarian experiences have proven that to ensure the proper use of this information to benefit vulnerable populations, all responders engaging this type of data collection must aim for a multi-sourced approach.

There are also tangible advantages in incorporating these data gathering activities into operational planning and assessment activities of maritime staffs. Open source data and social media are inherently unclassified information, so they can be gathered and shared openly to inform decision-making across a multi-sector response. This information can also benefit operational planning teams working across the different event horizons as they are able to access this unclassified information. The constant stream and availability of this type of data can make it ideal for answering specific questions or offering insight at all levels of an operation.

The successes associated with much of this work in the humanitarian sector have also been characterized by collaborative problem solving, whether through online communities or small groups of specialists. However, collaboration must also occur across sectors. Humanitarian organizations and the military are in a unique position to foster civil-military partnerships, working groups and research projects to share expertise and experiences in order to develop more refined and efficient data collection systems. Though significant cultural, doctrinal and operational differences exists between these two communities, the ability of NGO and military actors to adopt best practices pioneered outside their communities will improve responses to disaster.

The views expressed in this paper are those of the authors and are for the purpose of peer review and discussion.

Brittany Card is the Data Analysis Coordinator for the Signal Program on Human Security and Technology at the Harvard Humanitarian Initiative. She previously served as Data Analysis Coordinator for the Satellite Sentinel Project.

Ziad Al Achkar is a former Data Analysis Coordinator for the Signal Program. Achkar is currently pursuing his Masters at the School of Diplomacy & International Relations at Seton Hall University where he focuses on International Security and International Law.

Benjamin Davies is the Deputy Director of the Signal Program. He was also formerly the Deputy Director of the Satellite Sentinel Project.


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