4 Response
Coordination in emergencies

The overwhelming need during an emergency and in its immediate aftermath is coordinated and high-quality information. From the perspective of external organizations such as humanitarian and aid agencies this is a two-way information flow: on the one hand, delivering information and services to people affected by a disaster in an effective and coordinated manner; and on the other, collecting information from affected areas in order to coordinate supplies and assistance in order to improve fundraising efforts and flows, and to document impacts for future reference.

From the perspective of the affected people, coordination is an exchange of information among themselves and related groups such as diaspora communities. This is a fine-grained and decentralized exchange of information, taking advantage of the scope offered by new technologies, especially mobile devices.

In practice, what means of communication and information sources can people turn to in the confused and desperate situations of an emergency? This section gives some examples highlighting recent developments in technology and the ways it is used. It begins with the vital emergency response role played by Télécoms sans Frontières (TSF), one of the organizations designated as First Responder in the UN Emergency Telecoms Cluster.[56] TSF serves both the communications needs of affected populations and those of the humanitarian workers.

We then turn to developments in the use of social media during crises by affected populations. The 2004 Indian Ocean tsunami was the catalyst for the role of user-generated content (UGC) in the coverage of emergencies, as it was for so many developments we are considering in this report. Other milestones in the growth of UGC were terrorist attacks—on the London and Madrid transport systems, for example, and the Mumbai terrorist attacks in November 2008—and political events such as Kenya's disputed elections in 2008 and Iran's in June 2009. The section ends by looking at the evolving use of innovative technologies within the global policy community.

Emergency response from Télécoms Sans Frontières

The central role of communications in crises is well illustrated by the importance of Télécoms sans Frontières (TSF) to international emergency response efforts.

The organization, founded by Jean-François Cazenave and Monique Lanne-Petit in 1998, in response to their experiences as aid workers in the war-torn Balkans, has only 40 staff members and a €2 million annual budget. Yet its emergency communications support is part of almost every humanitarian response effort after a natural disaster or conflict.

This vital role is recognized in TSF's status with regard to UN and other official agencies. In 2006, it became the first nongovernmental partner of the Office for the Coordination of Humanitarian Affairs (OCHA) and the United Nations Children's Fund (UNICEF). TSF's teams are alongside officials from the United Nations Disaster Assessment and Coordination team (UNDAC) in making the earliest assessments of need in a location. It is also a partner of the European Commission's humanitarian aid department, ECHO. Several groups, including The Vodafone Foundation and the UN Foundation, support TSF.

TSF will deploy a team from one of its three bases (Pau, France; Bangkok, Thailand; and Managua, Nicaragua) aiming to reach an emergency location within 24 hours, although it can take 48 hours. The equipment for a telecommunications center can be carried on a plane in three

Credit: Télécoms Sans Frontières.

cases. This includes the workhorse BGan satellite receiver, provided by Inmarsat, and an array of phones including Global System for Mobile (GSM) mobile phones with local Subscriber Identity Module (SIM) cards.

TSF's core emergency response activities have two aspects. One is the provision of communications to the UN agencies and to NGOs providing emergency relief. As all the humanitarian workers are sharing the same facilities, TSF's telecommunication centers facilitate greater coordination of the relief effort, particularly between the United Nations and NGOs.

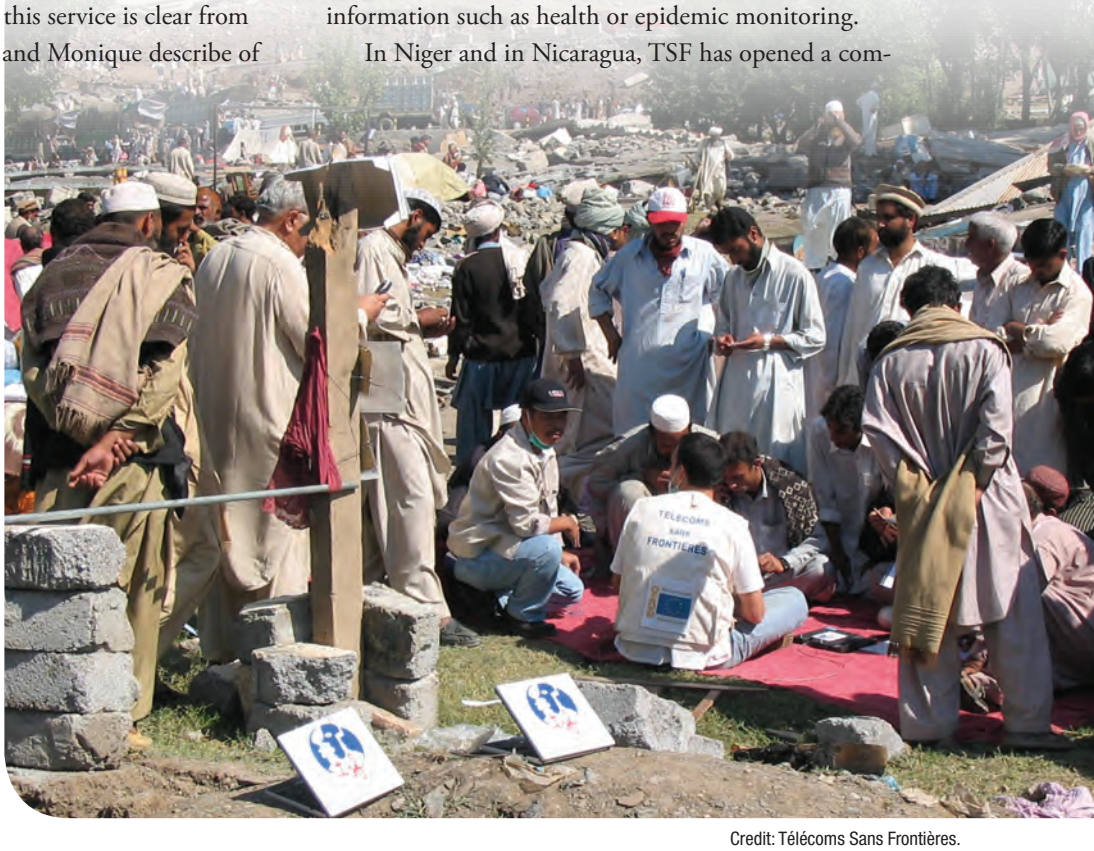
The second is providing a free phone call (at a cost of about $5 per family) to the people affected by the disaster or conflict. The human impact of this service is clear from the many examples Jean-François and Monique describe of people's lives transformed for the better—or lives saved—thanks to the ability to communicate. But the numbers tell an impressive story too: in 2008 alone, more than 5,300 families in areas affected by natural disaster or conflict could make contact. This was achieved at an average daily cost of an emergency team in the field of just under $1,158 (from 2006 to 2008).

TSF is developing three new types of longer-term activity: poverty reduction and economic development; crisis prevention; and disaster preparedness.

The innovation in *disaster preparedness* is providing training in emergency telecommunications response to technical experts—information technology or logistics officers, for example—from other NGOs. In summer 2009, TSF ran its first training course for 20 people in each of its Bangkok and Managua bases. The aim is to ensure that there is capacity in the NGO community to make emergency telecommunications operational as quickly as possible.

Turning to *early warning and prevention*, since 2006, TSF has been offering satellite communications in 12 remote and unconnected areas of Niger in order to implement an early warning system aimed at averting food crises.[57] Each site costs about $200 to install. The importance of early warning about impending food crises has been emphasized by recent economic research; there is evidence that conflict, which has trapped some African countries in poverty, is caused by the onset of food crises. TSF has installed telecommunications centers (each covering several villages) using RBGan terminals from Inmarsat and a computer connected to a small data transmitter. It has also developed (with the Université de Pau et des Pays de l'Adour) software to compress substantially the data collected, reducing running costs significantly. TSF is piloting its use in conjunction with FrontlineSMS, described in Section 5. The data forms provide real-time information to the authorities on agricultural, nutritional, and market indicators and can be adapted to deliver a range of other types of early warning information such as health or epidemic monitoring.

In Niger and in Nicaragua, TSF has opened a com-



Credit: Télécoms Sans Frontières.

> **"In each category—emergency response, preparedness, early warning/monitoring, and development—TSF sees more potential than they are able to deliver at present."**

munity communications center, funded by the IT Cup (an annual charity soccer tournament between companies in the information technology sector). These are longer-term *development* projects aimed at bridging the digital divide. They offer cheaper and more efficient shared communications to NGOs operating in each area, and the international NGOs are taking over the running costs. The centers also provide internet and email access to local people, and computer and internet courses to young people in the area to equip them better for finding work. In Dakoro in Niger, for example, more than 30 NGOs use the center, which saves them money and the time they used to spend driving six hours each way to send an email.

In each category—emergency response, preparedness, early warning/monitoring, and development—TSF sees more potential than they are able to deliver at present.

One reason the benefits of emergency communications continue to be enhanced is continuous *technological innovation.* Equipment manufacturers often now provide TSF with beta versions to test in the field—an item that works well in a crisis will work well when it goes to market.

TSF carries out its own innovation work as well, often with university partners. One example is the TSF Box, currently being rolled out. This improves the management of the telecommunications centers by managing access rights for the different organizations, prioritizing traffic, and collecting data automatically. It economizes on costs and captures the information needed to improve efficiency.

Another innovation under development is a wi-fi mesh system for deployment in emergencies. Wi-fi mesh systems interconnect a number of powerful routers to extend the range of wi-fi beyond a few feet (for a single router) to hundreds or thousands of feet. TSF aims to establish the first cyber café for refugees before long.

Another route for enhancing the positive impact of access to communications would be for TSF to work with *partners who can provide services* needed by refugees or those affected by a crisis. People most often make phone calls asking for money; overseas diasporas are an important source of emergency finance. TSF has been supported by Western Union, which has a global presence and can sometimes enable families and friends to wire cash. There are obvious advantages in using mobile transactions schemes, such as the cash transfer by the M-PESA system piloted by the Irish charity Concern in 2008 during the post-election violence in Kenya (described below).[58]

Impact of social networks in Iran

User-generated content online is a potentially important source of information. This is particularly true in crises that are largely inaccessible to journalists. Social networking tools like Twitter, Facebook, YouTube, and Flickr, for example, made frontline news during the Iranian post-election protests in mid-2009 when the mainstream media was lagging far behind in reporting the escalating crisis, at least until the Iranian authorities started to limit and monitor online access. According to Matthew Eltringham, in charge of the use of User Generated Content by the BBC's news operation, they received about 20 video clips and 100 still images a day immediately after the election, although this fell sharply as the authorities cracked down on street demonstrations.[59]

However, the mainstream humanitarian and human rights community remains largely skeptical of social media. While the Iranian example shows that some suspicions are indeed well founded, the use of social media also provided critical information that would otherwise have gone unreported. Some Twitter users—@persiankiwi in particular—were vital gateways to events for the outside world.

The inability to verify (easily) a Twitter user's identity and the information s/he tweets are two important factors that explain why many in the humanitarian community see little added value in following social media. Tweets can certainly misinform and there were many such examples in Iran.

To take one of these, one assessment of Twitter use stated, "several people tweeted that 700,000 people had gathered at the Ghoba mosque in Tehran. Several people re-tweeted it and even posted the news on their blogs. Meanwhile mainstream international media estimated the number of protesters was between 3,000-5,000 people."[60] This becomes particularly problematic when such Tweets are re-tweeted.[61] One study noted that one in four tweets on Iran was a re-tweet. It is also worth noting that Twitter's use *within* Iran was nearly zero and that most of the traffic was in English, not Farsi.[62]

Although usage of Twitter inside Iran is extremely low,

the small minority of Twitter users in the country made active use of the social network to report events. Despite the number of retweets, 51.3% of all tweets on 11 June 2009 (the day before the election) with the hashtag #iranelection came from Iran, with only 27% coming from outside the country and 21.6% not including a location.[63] The number of Iran-based tweets decreased during the following days but still the majority of #iranelection tweets during the first few days of the crisis came out of Iran itself, a handful giving vital eyewitness reports on the escalating unrest. In the meantime, the mainstream media was prevented—in fact censored—from reporting on early developments.

Twitter therefore amplified the voices of a minority who were not representative of Iran's population. The few Iranians living in Iran and using Twitter were generally young and affluent. Many Iranian Twitter users who were actively (re-)tweeting were actually based in the United States, which is also where many of their Twitter 'followers' (readers) were based.[64]

Twitter, unlike other social media platforms, is also quasi-censorship proof. Twitter applications like Twhirl, Tweetie, and Tweetdeck do not need the website twitter.com to operate. Furthermore, tweets, pictures on Flickr, and YouTube videos can all be tagged as related to Iran, which makes it easier to find and copy the items "faster than any government could delete them."[65] The government would have had to ban all access to the Internet to impose a full digital blockade on the country, and it did indeed limit access at certain times. But doing so "might have risked shutting down vital government and economic services as well."[66]

Credit: Flickr/Faramarz

Credit: twitter.com

Some have suggested that the regime permitted access to Twitter and Facebook so they could track dissident activities. In addition, as with other uses of social media, there is an issue about the reliability of tweets coming out of Iran. A number of online activists created Twitspam, "a social-networking site that encourages users to identify and block malicious 'tweeters' on Twitter," which hosted an interactive Web page where users discussed possible 'Iranian agents' operating online.[67] Twitspam users would flag Twitter accounts that posted spam (i.e., multiple comments of the same sort), obviously sought to entrap Twitter users who were tweeting from Iran, or clearly tried to spread misinformation. If users were not completely sure, they would flag the account as suspected.

Nevertheless, crowdsourced validation might not be appropriate in all types of crisis. In his review of the role of social networking in the Iran situation, James Carafano notes, "An effective crisis communication must be credible, understandable, and actionable. Under great stress and limited time, as well as limited information, it is unrealistic to hold that negotiated online interactions are an effective mechanism for determining factual and dependable information."[68] This review also described Ushahidi's development of Swift River, designed to validate crowdsourced crisis

> **"An effective crisis communication must be credible, understandable, and actionable."**

Social media, citizen journalism, and the Mumbai terrorist attacks

Terrorist attacks on 27 November 2008 in the railway station, two luxury hotels, a tourist café, and a Jewish center in the city of Mumbai involved many international visitors. The death toll after 60 hours of terror was 195, including both residents and international visitors. A large global audience, many worried about colleagues, friends, or family members, was in the city.

In a situation of this kind, the overwhelmingly important response comes from the police and army. But the attacks in Mumbai meant there was intense demand on all means of communication: news channels, telephone calls, online news including citizen journalism (or 'user-generated content') and, importantly, social networks, especially Twitter.

These sources of information fed each other—people repeated what they had heard on the news—and Mumbai marked an important step in the use of online material by traditional broadcast organizations. The many means of communication meant that any information, both accurate and not, circulated widely.

This was a major and dramatic news story, with plentiful pictures. A large increase in traffic affected many media, especially the online media.

For example, Google trends revealed that the number of web searches for terms such as 'Mumbai terror' was more than 100 times the recent norm. Photos and videos were posted to sites such as Flickr and You Tube.

In another example, an analysis of traffic to bbc.com, the BBC's internationally focused website, showed the number of daily visitors to the site reached more than 2.2 million, a bit short of the 2.5 million peak for the U.S. election night earlier in the month. Outside of the United States (where it was the Thanksgiving holiday) the peak for 27 and 28 November (the day of the attacks and the day after) was higher than for 5 November (U.S. election night). Traffic to the site from within India itself rose by 136%, and there were large increases in traffic from Canada, Australia, and Germany.

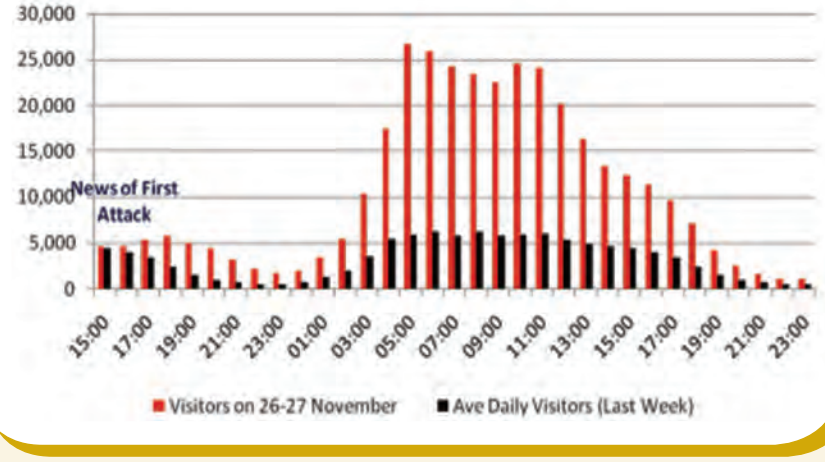
Mobile networks also showed jumps in activity, according to data provided by some of the operators covering Mumbai. Voice traffic rose by 4 to 5% compared with the normal level for the day of the week, with considerable network congestion, due perhaps to the communications needs of the security services. SMS traffic for the operators for which we have figures jumped by up to one-third compared to normal.

Twitter, the 'microblogging' site, came to prominence outside technology circles for the first time during the Mumbai attacks. At the height of the events, there was more than one tweet per second tagged #mumbai. Social media blogger Gaurav Mishtra, monitoring the events live as they occurred, wrote, "Now the volume of tweets on the Mumbai terrorist attacks is so high that I can't keep up!"[69] Mainstream news organizations were monitoring tweets and posting them as eyewitness comments to make the events vivid for visitors to their websites.

But the risks in user-generated material were also apparent. Some speculation that turned out to be incorrect was widely circulated in this way.

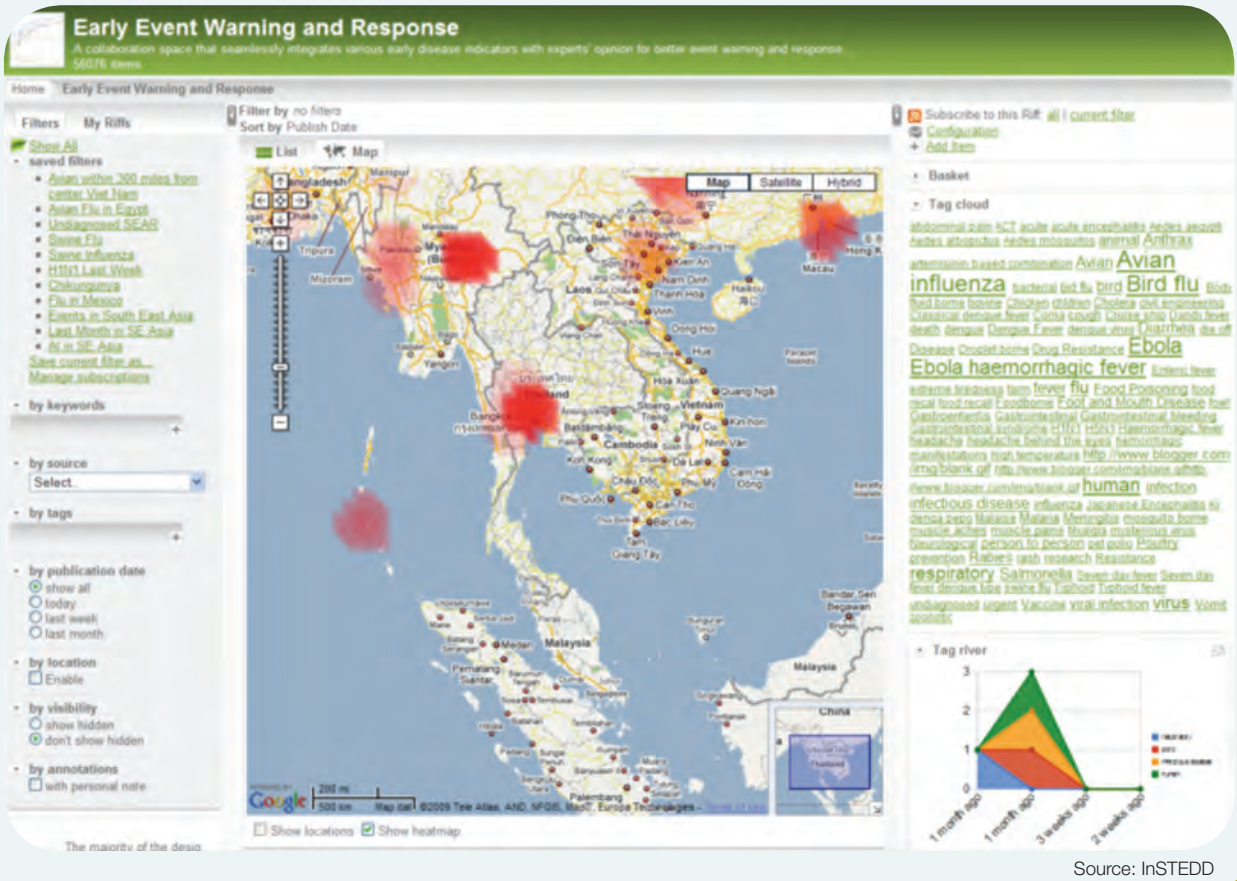
The head of the BBC's news hub for user-generated content, Matthew Eltringham, says "We wouldn't consider any of it legitimate information without checking. We try to identify individuals to do so; but Twitter is like Chinese whispers." He says, however, that social media such as Twitter, Facebook, and Orkut are increasingly important sources.

Daily visitors to bbc.com in November 2008



Source: BBC

Screenshot of Riff



Source: InSTEDD

information. Tweets can be tagged as #iranelection, but so can pictures on Flickr, footage on Ushahidi, blog posts, SMS, and online media. Swift River will exploit the wealth of these tags produced by individuals to cross check information across different media.

Global Systems for Coordination and Response

The information flows needed for effective emergency response can be either 'bottom-up' within the affected community, as in the examples of social media discussed above, or 'top-down', serving the humanitarian community. We turn next to some innovations in the latter category.

Global Disaster Alert and Coordination System (GDACS)

A number of global systems for coordination and response have been developed over the years. One of the most sophisticated is the European Commission's Joint Research Centre's (JRC) Global Disaster Alert and Coordination System (GDACS).[70]

GDACS combines existing disaster information management systems. Early information is expected to be uncertain and can be updated as better information becomes available. GDACS sends out alerts on natural disasters in near real-time and provides tools to help response coordination, including media monitoring, map catalogues, and an on-site coordination center.

The system produces near real-time automatic situation reports based on statistical modeling, rapid situation reports from the field, an online discussion forum for emergency responders, integration with established news services, and mapping products based on post-disaster satellite imagery.[71] The system can estimate the humanitarian impact of a natural disaster in near real-time and calculate within minutes the approximate financial aid that will be needed for the relief efforts. GDACS is activated the moment a disaster is forecast or has occurred and remains active until the end of the relief phase. The platform has been used to detect floods in Vietnam, fires in Nigeria, and internally displaced person camps in Sri Lanka.

Innovative Support to Emergencies, Diseases and Disasters (InSTEDD)

A new platform, which focuses on public health but can be applied to other types of emergency, is Riff, launched by the non-profit group Innovative Support to Emergencies, Diseases and Disasters (InSTEDD). InSTEDD was launched by Larry Brilliant in 2006 in a talk at the high-profile Technology, Entertainment, Design (TED) conference. InSTEDD seeks to leverage open source technology to improve information flow and cross-sector collaboration and to make collective action more effective.[72] The team's Evolve platform combines data exploration, integration, search, and inferencing for crisis detection, prediction, and response.

According to InSTEDD, a number of organizations are using Riff to explore its applicability to humanitarian crisis reporting and conflict early warning. For example, one organization recently trained Riff's integrated machine learning engine to identify hate speech and other potential indicators of geopolitical deterioration in news reports.

In the public health domain, Riff helps synthesize health-related event indicators from a wide variety of information sources (formal and informal). Its automatic classification includes seven syndromes, ten transmission modes, more than 100 infectious diseases, 180 microorganisms, 140 symptoms, and more than 50 chemicals.

In spring 2009, InSTEDD piloted Riff in the Mekong Basin in Southeast Asia to understand and more effectively track multiple data streams (both specialized alerts and generic sources such as news reports and Twitter) for earlier disease detection. This has made it much easier to track, manage, and detect outbreaks and the evolution of diseases in the region and impacts related to them. The pilot helped to improve the user experience of Riff including the analytics and visualization.

Credit: Allie Caulfield

> **"The growing availability of sophisticated aerial images helps speed emergency response and has the potential to contribute to better early warnings—perhaps even to pre-empt crises."**

What is particularly novel about Riff is its integration of several capabilities, including a data aggregation and gathering module; an automated feature extraction, data classification, and tagging module; a human input, hypotheses generation, and testing module; and a predictions and alerts output and field confirmation and feedback modules. This makes it very flexible. For example, the data aggregation and gathering module enables the user to collect or extract information from a range of different sources such as SMS, RSS feeds, email lists, existing databases, and online documents. The human input and review module allows users to collaborate by commenting, tagging, and ranking sets of related evidence, for example.

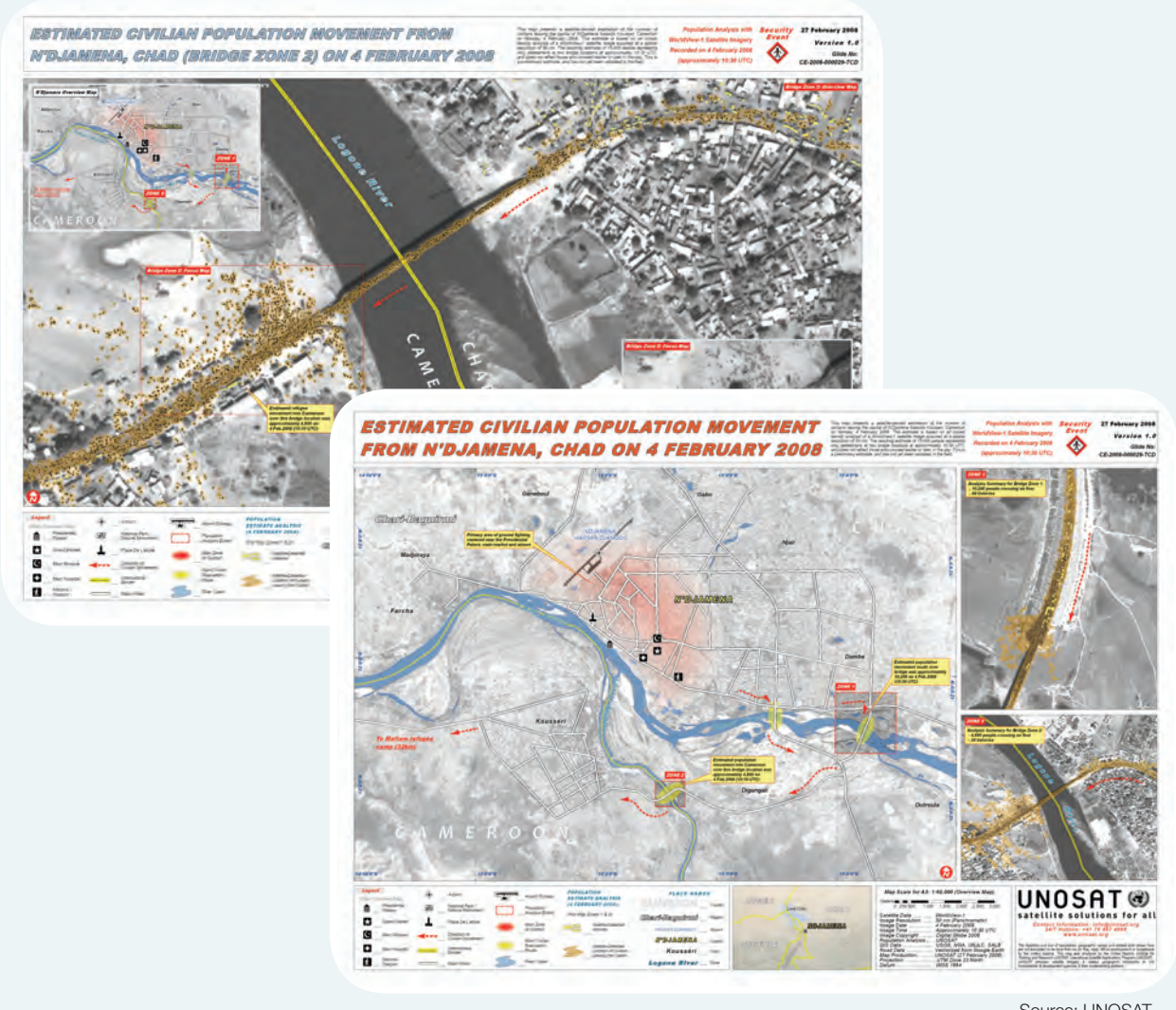
Satellite Imagery and unmanned aerial vehicles (UAVs)

The final example of a technology increasingly used for disaster response is that provided from overhead. Images from satellites and unmanned aerial vehicles (UAVs) are increasingly being used to monitor the impact of crises and natural disasters. The growing availability of sophisticated aerial images helps speed emergency response and has the potential to contribute to better early warnings—perhaps even to pre-empt crises. This is especially true for crises that occur in geographically remote or politically inaccessible locations.

UN Operational Satellite Applications Program UNOSAT

The mission of the United Nation's Operational Satellite Applications Program (UNOSAT) is "to deliver integrated satellite-based solutions for human security, peace and

UNOSAT Refugee Movement Satelite Images



Source: UNOSAT

socio-economic development." Established in 2000, it provides satellite images and analysis to relief and development organizations and comprises UN fieldworkers, satellite imagery experts, geographers, geologists, development experts, database programmers, and internet communication specialists.[73] For example, it analyzed satellite imagery during Sri Lanka's military attack in April 2009 to assess the impact of civilians trapped in no-fire zones. UNOSAT works closely with UN member states and organizations like the International Federation of the Red Cross and Red Crescent Societies (IFRC), Médecins Sans Frontières (MSF), and Télécoms Sans Frontières (TSF), responding to requests for assistance from organizations such as these. UNOSAT also has a telephone hotline to the UN Office for the Coordination of Human Affairs in New York to provide immediate mapping services.

UNOSAT acquires and processes satellite data and has produced over 1,000 analyses since 2000. The number of crises it covers annually grew from 3 in 2003 to 47 in 2007.

In 2003, UNOSAT created a humanitarian rapid mapping service that has been activated over 120 times by relief and coordination agencies. The service consists of rapid acquisition and processing of satellite imagery and data for the creation of maps and other spatial data to help coordinate emergency response and humanitarian relief efforts.

UNOSAT has also developed a wide network of field-based contacts, which is important for adding social context to the analysis. In one case in the Democratic Republic of Congo (DRC), UNOSAT received early warning that a specific village was going to be attacked. The team was able to reroute a satellite ahead of the offensive to capture evidence of the attack. This is not an isolated example: *UNOSAT is getting more frequent early warnings as a result of working closely with field-based organizations. Whether geospatial*

technologies can eventually go beyond early warning to serve as a deterrent mechanism remains to be seen.[74]

American Association for the Advancement of Science (AAAS)

The AAAS's Geospatial Technologies and Human Rights Project uses satellite imagery to monitor and document human rights abuses. The project has completed a number of case studies ranging from Chad and Sudan to Lebanon and Sri Lanka. The AAAS team documented past attacks by Sudanese-backed militias in Darfur. In Lebanon, it used satellite imagery to assess damage to civilian infrastructure to determine whether this destruction was deliberate or the result of 'collateral damage.' In Sri Lanka, the project responded to international concerns over the targeting of civilians and provided corroborating evidence taken from satellite imagery and analysis. AAAS is currently developing methods for tracking ongoing attacks in the Sudan and Chad.

Unmanned Aerial Vehicles (UAVs) for Crisis Response

The use of UAVs or 'drones' has the distinct advantage of being able to produce cheaper and much higher-resolution aerial imagery than satellites. Nor are UAVs hampered by cloud cover. The use of UAVs for information collection during and after humanitarian crises is likely to increase significantly over the next three years, if the appropriate regulation for their use is developed.

The Information Technology for Humanitarian Assistance, Cooperation and Action (ITHACA), a partnership between the World Food Programme and the Polytechnic University of Torino, Italy, has developed two fully operational UAV prototypes.

The aim of the ITHACA UAV project is to develop and construct remotely controlled mini aircraft that will capture the visual data needed to plan emergency and relief food aid. The project therefore aims to support disaster management through rapid mapping early in the impact stage.[75] The drones fly autonomously except for takeoff and landing. They are easily transportable on normal aircraft and require two operators. The operators can create a flight plan on a preloaded map and upload them during the flight.

For its part, the JRC has developed a prototype UAV in partnership with TerraPan Labs and University College, London. The UAV project, the Low-Cost Unmanned Imaging System (LOUIS) is intended to be—as the name implies—a cheap and portable system to support post-

UNOSAT images at work

The speed at which satellite images can be made available makes an important contribution to the effectiveness of relief efforts. For example, in the cases of Cyclone Nargis in Burma in 2008 and in Sri Lanka during the military attacks in 2009, UNOSAT provided satellite imagery and analysis within 24 hours.

A compelling example of UNOSAT's work is its monitoring and assessment of population movement along the Chad–Cameroon border in February 2008. Thanks to very high-resolution (VHR) satellite imagery, a combination of manual and automated analysis allowed the UNOSAT team to estimate the population crossing the bridge in the image. This analysis was particularly important to inform UN field-based agencies in Cameroon of the number of refugees to expect in their camps in the coming days. This shows that VHR satellite imagery can act as an important early warning indicator to estimate large-scale population movements.

In Sri Lanka, UNOSAT provided independent evidence that the Sri Lankan army had continued to shell civilians in no-fire zones despite claims by the government that military hostilities had ceased. As in many other cases, the use of satellite imagery in this instance was invaluable since areas of Sri Lanka were completely inaccessible to journalists and independent observers. This example also demonstrates that UNOSAT is not just a technical unit but can provide direct and independent evidence to the UN Secretary-General upon request. While the Sri Lankan Ambassador to the UN claimed the imagery was fabricated, this outlandish accusation served to strengthen UNOSAT's credibility.

"The use of UAVs for information collection during and after humanitarian crises is likely to increase significantly over the next three years, if the appropriate regulation for their use is developed."

UAVs being tested for humanitarian response

Source: Development Seed

> **"Satellites and UAVs are relatively new technologies that are likely to be increasingly accessible to a larger professional audience. Costs of satellite and aerial imagery are expected to decrease."**

disaster relief operations and logistics. LOUIS can be assembled in less than three minutes and is geared to use by beginners who do not have experience in flying UAVs. The JRC's specific interest in UAVs is in the potential of such an inexpensive—in fact, disposable—tool for collecting data that can be integrated in near-real time into the analytical impact models that the Centre runs. The team expects to pilot the UAV in the field in the near future.

A week-long exercise to test UAVs for crisis response—the first of its kind—took place in California in August 2009. The exercise combined the use of UAVs with SMS, VHR image processing, and open source GIS applications and was held at Camp Roberts in California. The exercise focused on two scenarios—stability operations in Afghanistan and planning for a natural disaster in Central America. Participants included geographers, software developers, and crisis mapping experts. They developed a novel approach to information collection by using UAVs, SMS, low-bandwidth satellite connections, and high-resolution satellite imagery of Afghanistan.

For example, they integrated Open Street Map's new Walking Papers application and combined this with the images taken by UAVs. Walking Papers works by enabling a user to download any part of a map to a printable file, which includes a bar code. Users can then annotate the hard copy map with a pen or pencil when they are out in the field. They can then scan the annotated map and upload the new data online. This provides a method of mapping field data even when Global Positioning System (GPS) units are not available and network connections are down. It also enables local people to point out spots on the paper map.

Satellites and UAVs are relatively new technologies that are likely to be increasingly accessible to a larger professional audience. Costs of satellite and aerial imagery are expected to decrease. UAVs are becoming smaller and easier to use. Charting flight paths is as simple as using a mouse to click

and drag path on a computer screen.

The technologies do face obstacles. In the case of satellites, cloud cover continues to present problems and while radar satellites can circumvent this, radar imagery is more difficult to interpret. And membership in the International Charter[76] is restricted to major national space agencies, which excludes some important field-based NGOs.

In the case of UAVs, the lack of an agreed regulatory framework limits their potential. Humanitarian organizations do not know where, when, and under what conditions the transport and use of UAVs is permissible. Insurance companies remain reluctant to cover use of UAVs. Furthermore, low-cost UAVs have very short endurance times, often less than 30 minutes. They must be flown to a specific point of interest and quickly collect imagery from as many angles as possible.

In addition, as UAVs have to date been used primarily for military purposes they carry a negative connotation. *Changing this perception will continue to be a challenge.* That said, the same was also true of satellite imagery in the past. Satellites were typically associated with the Cold War but Google Earth has greatly helped to demystify satellite imagery.

Conclusions

Emergency response can be enhanced by information flows, both within and from the affected population and gathered by external agencies. *But the effective collection and use of information does not just depend on technological innovation.* The technologies need to be widely adopted and used properly.

Credit: Télécoms Sans Frontières.

> **“Information will make its greatest contribution to emergency relief—and therefore saving lives—if the advantages of ‘bottom-up’ and ‘top-down’ information sources can be combined.”**

The positive impact of access to communications on people affected by a disaster or conflict is beyond doubt. Beyond the immediate humanitarian impact, demonstrated by the importance of TSF’s emergency response, *it is the people concerned who themselves have the most detailed and immediate information needed for humanitarian agencies to deliver an effective response.*

Innovative social media offer tools that enable this information to be shared with humanitarian and aid agencies, and with more traditional media organizations that play such an important role in focusing the world’s attention on areas of need. *While they make available information that would not have emerged otherwise, they pose a serious challenge in terms of authentication. Validation is a fundamental issue in the further use of social media in situations of conflict and disaster.*

Other new technologies, both the online tools and satellite and aerial imagery described in this section, overcome the problem of authentication. The technologies are rapidly becoming less expensive and more widely available. *The regulatory framework must evolve to allow the use of these tools as necessary.* The tradeoff for greater reliability is that the information gathered is restricted to the humanitarian agencies.

Agencies should consider what information to share with the people they aim to help, and how to do so effectively. *The humanitarian community needs to make rapid progress in developing techniques and tools for communication with those they aim to help.* If they do not, other, less reliable and objective information, will likely fill the vacuum.

Information will make its greatest contribution to emergency relief—and therefore saving lives—if the advantages of ‘bottom-up’ and ‘top-down’ information sources can be combined.

Credit DataDyne