The Economist Intelligence Unit

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Improving disaster response efforts through data

The size and frequency of natural disasters is growing at an alarming pace. In 2016 earthquakes, wildfires and other natural events caused US$210bn in global economic losses, according to a UK-based insurance broker, Aon.[1] The year 2017 may tally an even higher figure, as a series of floods, earthquakes and hurricanes struck various areas of the world.

Developing economies, especially those located closer to the equator, are expected to bear the greatest toll from extreme weather events. These countries are the most vulnerable and least equipped to withstand these types of events, as they have fewer resources to prevent damage and protect citizens who are at risk.

Data and analytics can support relief and response initiatives for communities in need. From the use of satellite images and crowd-sourced mapping tools to predict and help prepare for disasters, to on-the-ground reports from drone footage, emergency responders, governments and non-government organisations (NGOs) are adopting data analytics as a critical tool to strengthen early warning systems and aid relief efforts in the aftermath of a disastrous event.

The role of data in disaster management

A recent survey, conducted by The Economist Intelligence Unit and sponsored by SAS, explored the use of data and analytics in supporting economic and social development areas, including disaster management. The sample consisted of

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1 Aon Benfield, "2016 Annual Global Climate and Catastrophe Report," http://thoughtleadership.aonbenfield.com/Documents/20170117-ab-if-annual-climate-catastrophe-report.pdf

data scientists and professionals across the public, private and NGO sectors. One in three respondents assess data analytics as very effective in advancing disaster management development, and half expect significant improvement in strengthening early warning systems through such tools. Furthermore, 46% expect data analytics to significantly improve the delivery speed of aid and relief.

Many aid agencies now have project teams and resources dedicated to figuring out how to best apply insights from data for disaster planning and management. "Providing relief workers and government agencies with timely, relevant and reliable data is one of our most important priorities to ensure aid is distributed without cognitive bias," says Marc van den Homberg, the scientific lead for the Netherlands' Red Cross Society 510 Data Team. "Smart use of data directly benefits preparedness and response effectiveness, and ensures the people in greatest need receive help."

Although the technology and global expertise exist to gain critical insights, disjointed data gathering efforts have in the past hampered efforts to maximise the potential of these solutions. Carlos Castillo, a research professor at Barcelona's Universitat Pompeu Fabra, notes "when there are information voids it can lead to chaos in a crisis."

Lack of information can delay response times, which may bias aid distribution, with more resources going to communities where more information exists, according to Mr van den Homberg. This can leave the most vulnerable communities with insufficient support.

The good news is that progress is being made.

Big data is revolutionising disaster response

The application of data and analytics for responsive disaster management has advanced considerably in the past decade, holding promise for the future. As an example, approximately four in five survey respondents believe that over the next five years weather pattern tracking will enable better climate resilience and disaster management planning.

Other examples are drone footage and satellite mapping, which are becoming increasingly popular as tools to identify which communities are in crisis during and immediately following a disaster. Hyper-local data analytics identifying vulnerable population hotspots, such as the location of elderly communities, schools and hospitals, can shape alert and response strategies and help move at-risk populations to safety.

US agencies used mapping and geolocation data to support recovery efforts during the calamitous August-September 2017 period when Hurricanes Harvey and Irma struck Houston, Texas and the Caribbean islands, respectively, and a 7.1-magnitude earthquake hit Mexico City. The National Oceanic and Atmospheric Administration used insights from sensor data and satellite imagery to predict where the hurricanes were likely to land and co-ordinate with local first responders. Meanwhile, NASA produced maps of Mexico City and surrounding areas damaged by the earthquake to assist with response efforts.

In the corporate world, insights gained from data analytics can help companies in their own planning to mitigate the financial impact of disasters while keeping employees safe. Building data centres in less disaster-prone regions, opening satellite offices to host displaced employees and providing employee recovery assistance are a few common strategies. Some companies are also stepping up to help the communities where they operate. Airbnb, for example, has a disaster response programme that encourages hosts to list their homes for free to help evacuees in crisis.

Power of the crowd

Social media has emerged as one of the most powerful data sets for disaster recovery. "The value of social media is strongest at the onset of a disaster, when the event is not anticipated and it is diffuse in geographic terms," Mr Castillo says. In these events, social media is often the first and only information accessible, and it is provided by witnesses on-the-ground as the event unfolds.

In the aftermath of a crisis, analysis of social

media posts can be used in conjunction with other data to track response efforts, and improve preparedness for future events. The Red Cross, for example, used Facebook posts to track how and where citizens found shelter during storms and how long it took them to return home as a way to help local agencies hone their future response efforts.[2]

The challenge, however, is how to sort relevant pieces of information from the flood of posts. "Out of a million Tweets, there might be 100 with useful information for a specific purpose," Mr Castillo notes. It would be impossible for individuals to review and categorise the massive volume of Tweets. However, tools are available to automate this process, including enterprise and open-source software. One example of the latter is Artificial Intelligence for Digital Response, a free open source software platform that classifies social media messages related to disasters and humanitarian crises.

In the meantime, government agencies and NGOs should be open to the use of social media and other data tools to share information, streamline response efforts and track results—even if the data is not perfect. Mr Castillo points out that in a crisis people will get information wherever they can find it, and can be easily misled. "If you leave an information void someone else will fill it."

Mr van den Homberg advises public agencies and NGOs to increase data literacy within their organisation, invest in using data and analytics tools for disaster preparation and response, and support open data standards that will make information more easily accessible. "It is especially important to do so at the national and local level in developing countries and not only at headquarter level," he says. "So many NGOs are all doing their own data collection efforts; it can be a waste of effort if it's not shared."

Looking ahead, Mr Castillo predicts that more NGOs and government agencies will adopt data analytics in disaster response, particularly in poor communities that are increasingly vulnerable to natural hazards caused by climate change. The goal now is for these organisations to work together, develop better tools and share data as they gather it. "It will soon become a normal part of the disaster management process."

2 American Red Cross, "Data: A vital tool for disaster response," http://www.redcross.org/news/article/Data-A-vital-tool-for-disaster-response