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House Homeland Security Committee
Subcommittee on Emergency Preparedness, Response, and Communications
Hearing on "Emergency MGMT 2.0: How Social Media & New Tech Are Transforming Preparedness, Response, & Recovery"
June 4, 2013

Chairman Brooks, Ranking Member Payne, and Members of the Subcommittee:

Thank you for your interest in the importance of Internet-based technology in disaster preparedness, response, and recovery. My name is Matthew Stepka, and I am honored to appear before you on behalf of Google. As Vice President of Technology for Social Impact, I lead our efforts to develop technologies to help address global challenges, including our Crisis Response initiatives.

In the first half of this year alone, millions of people around the world have been affected by natural disasters in places like Iran, China, Australia, Japan, Indonesia, and Myanmar. Here at home, just two weeks ago, we witnessed the devastating power of tornadoes raging across Oklahoma. Our hearts go out to all of the individuals affected by these disasters.

When emergencies like these arise, people turn to the Internet for information. Google wants to help ensure that the right information is there in their time of need. So we build tools to collect and share emergency information, and we support first responders in using technology to help improve and save lives.

Google Crisis Response has been responding to natural disasters since Hurricane Katrina in 2005, making information such as storm paths, shelter locations, evacuation orders or zones, and donation opportunities easily accessible. More recently, Hurricane Sandy catalyzed a broader awareness of how the Internet can play a critical role in crisis response. As that storm approached and then struck the east coast last fall, our team at Google put everyday tools like Google Search and Google Maps to use, sharing emergency weather updates, maps of the storm path, shelters, and evacuation zones, and many other kinds of information across our services. For those of us with loved ones affected by the storm, being able to follow updates of that crisis online in near real time was invaluable.

During a disaster, our Crisis Response team follows the lead of emergency relief organizations,

government agencies, and first responders with the goal of supporting them with services that make it easier to get people the actionable emergency information they need when they need it most. The types of activities we might initiate include:

- organizing emergency alerts, news updates, and missing person information, and making this information visible through our web properties;
- building tools that enable better communication and collaboration among crisis responders and those affected by the crisis;
- providing updated satellite imagery and maps of affected areas to illustrate infrastructure damage and help relief organizations navigate disaster zones;
- donating to charitable organizations that are providing direct relief on the ground.

Each time, we learn more about how governments, organizations, and companies can maximize the potential of the Internet to assist in disaster preparedness and relief by providing access to actionable information. We believe that applying the lessons of our continual learning in this area can improve the use of technology in crisis response.

Observations and Best Practices

1. People want to find critical information through familiar technology.

We know that during disasters, people look online to learn how to stay safe and we want to ensure that the right information is there in their time of need. In the wake of the earthquake in Sendai, Japan, two years ago, we saw a massive spike in search queries coming from Hawaii for information about a tsunami. Unfortunately, the immediate results were not providing all the information those users needed because authoritative sources did not share that information in easily discoverable ways. So last year we launched a product called Public Alerts to make authoritative emergency information easier for our users to find. Through partnerships with government agencies and other authoritative information providers, we are able to collate critical alerting information and provide instructions for how to prepare for severe weather conditions and other events such as wildfires and earthquakes.

In incorporating public alert data from authoritative, trusted sources into Google Search, Google Maps, and other Google properties, we hope to simplify the process of finding critical emergency information. In order to provide the most relevant alerts to our users, the alert you see (if any) may depend on what alerts are active at a given location, their severity, your search query, your default location settings, or your device location.

Four days before Hurricane Sandy hit the East Coast, we began providing an alert for users who

typed terms like "Sandy," "hurricane," or "high wind" into our search box. An official National Weather Service warning appeared with a link to more information, including maps, news, contextual information, and steps people could take to keep themselves safe. To scale this initiative, we are currently working with official U.S. agencies, such as the National Weather Service and the Geological Survey, to show relevant alerts to Google users, and we welcome partnerships with other agencies — domestic and international — who publish authoritative alerts.

We also developed an application called Crisis Map that uses our Maps technology to help people find information before, during, and after major emergency events. We use Crisis Map to provide authoritative information such as evacuation routes, hurricane tracks, disaster-related satellite imagery, and emergency alerts, by compiling it from multiple data sources. People no longer have to search across many websites for different pieces of relevant information because Crisis Map makes all of the data available in one central place and allows both agencies and individuals to create their own rich mashups of crisis data.

As Hurricane Sandy approached landfall, we launched a general Crisis Map with several Sandy-related layers, including current and forecasted storm locations and information about cloud and wind conditions courtesy of NOAA's National Hurricane Center, and Public Alerts featuring emergency information like evacuation routes. We also launched a Crisis Map specific to New York City, featuring evacuation zone data from the NYC Datamine, information about open shelters, and footage from live webcams. Throughout the recovery period, our Crisis Maps had 15 million unique visits, with 10-20% of the visits coming through mobile phones and 80% of the traffic being referred through third parties — meaning that the maps were either shared by users or embedded in other sites.

2. Crowdsourcing can enhance both quality and timeliness of critical information.

Do local filling stations have gasoline? On this kind of question, authoritative sources often may not have as extensive intelligence on the ground as individuals do. Anyone can use Google's mapping tools — on our servers, or their own — to create their own maps and even host their content and data in a scalable way. In addition, by enabling user generated content in Crisis Maps during Hurricane Sandy, we were able to share better updates than those we got from only official sources.

While some organizations contacted us with their data for our Hurricane Sandy Crisis Map, other map curators and data providers created their own crowdsourced maps to address challenges they identified locally. For example, Dr. Wansoo Im mobilized a group of student volunteers to call local gas stations in New Jersey to see whether or not they were open and check if gas was available. Within a few days, they had data from more than 1,000 different stations. After doing some additional research online, they put the information into a KML layer (a machine readable and crawlable format used to describe geographic information) and continued to update it through

mobile devices and edits on desktop. The KML layer was fed into Crisis Map automatically and through user commenting, people were able to correct and update the gas layers when they became out of date. The Department of Energy ended up referencing information from this map for people who dialed their call centers.

We also designed our Person Finder tool to empower individuals in the wake of emergencies. Person Finder is a web application that allows people to post and search for the status of relatives or friends affected by a disaster. By using an open data standard, the tool lets press agencies, non-governmental agencies, and others contribute to the database and receive updates. Websites can choose to embed Person Finder as a gadget on their own pages. Because it is open source software, any developer can create her own instance of Person Finder after a disaster and help us improve the product.

Before, those seeking missing loved ones had to sift through multiple websites, posting the same inquiries over and over, hoping that the person in question happened to register with one of these websites. After the earthquake in Haiti, for example, we noticed there were 14 separate missing persons databases spontaneously set up by different groups, including non-governmental organizations, newspapers and volunteers. They were all running on different infrastructure, were not integrated, and all had different amounts of data that, if coordinated, could have comprised all missing persons records.

To make this process more effective and efficient, while continuing to leverage the power of crowdsourced information, our team built Person Finder to act as a central database, pulling the feeds from all 14 databases and allowing users to search across all their records. Person Finder accepts information in a common machine-readable format called PFIF (People Finder Interchange Format), which was created by Hurricane Katrina volunteers in 2005 and allows press agencies, NGOs, and others to sync their own data sources to Person Finder.

Our team worked around the clock to build and launch Person Finder in less than 72 hours during the early days of the crisis in Haiti. We have now made this resource available in more than 40 languages. The product is purposefully simple, fast, and easy to use. More importantly, it is backed by an open programmatic interface, or API. This means that different sites can update missing persons lists automatically using the common format. Because of this, The New York Times, CNN, NPR, and a number of other websites quickly integrated Person Finder, increasing its reach and resulting in a more complete list of missing persons.

We have since launched Person Finder for a number of emergencies, both natural and man-made. For example, within an hour after bombs went off in Boston two months ago, we initiated an instance of Person Finder to help people locate loved ones or let family and friends know they were alright. In total, we hosted thousands of records after the tragedy. In all these emergencies, we have found that crowdsourced information has been crucial to provide individuals updates

about their loved ones.

3. Emergency information should be available online in open formats and with open licenses before a disaster.

To be easily integrated and disseminated in the event of a crisis, emergency information must be readily available — in open formats, open licensing structures, and already online — in advance of a disaster. Otherwise there can be delays in getting information out. Each extra step — uploading, emailing, downloading, publishing, or putting on a site — can keep critical information from getting to people in a timely manner.

To respond to some recent crises, Google had to gather emergency information from government websites in non-structured and difficult to automate formats — such as text and PDF — and then translate them into open standards. When we set up our Hurricane Sandy Crisis Map, we had to spend time copying and pasting information about public hazards from a PDF. After we did so, the data quickly became obsolete, and we had to ask for an updated version. Generally, email attachments can take a few days to process and upload and need to be reloaded and integrated for each update, while open data feeds like KML only take minutes to integrate and can be updated automatically in near real-time. We are also often hindered by unclear licensing of data. While some datasets are clearly in the public domain, many essential ones are not clearly attributed or licensed, making them difficult to use.

Data providers that have their information clearly licensed, in standard data formats, and that provide live feeds — including the Common Alerting Protocol (an international standard for publishing and sharing alerts that is used by NOAA, FEMA's iPAWS, and USGS) for Public Alerts, or GeoRSS (an open standard for encoding location information) and/or KML for Crisis Map — can update their information automatically. As a result, open alert data is usually available in Google tools within seconds of its being published.

We advocate using an open and common standard in order for everyone to have a consistent way to automatically receive and share alerting information, to publish alerts securely using open web formats like Atom and RSS (XML-based languages used for web feeds), and to create useful visualizations of content.

How Governments Can Support Technology Efforts in Crisis Response

Information dissemination in an emergency depends on several factors: open and interoperable formats for emergency data, timely release of such data, and location awareness. Without these, it is extremely difficult to get the right emergency information to the right people at the right time.

The ability of the Internet to assist in crises depends on both companies and governments

improving how they share information. Using divergent standards slows collaboration and response time, while speedy and open access enables users to easily share information and accelerates relief efforts.

To pursue some of the projects we've described, Google had to gather emergency information from government, NGO and sometimes corporate websites in arcane formats or bare HTML and then translate them into open standards. Sometimes the information was spread across numerous websites; other times, the licensing status of the data was not readily apparent. Even today, some important data is not even online at all, but in someone's spreadsheet on a personal computer.

Government can help by ensuring that important information important is available in open, interoperable formats. For that reason, we commend the White House for the recent Executive Order requiring that data generated by the federal government be made available in machine-readable formats by default, as well as steps Congress has taken to increase access to government data. State governments also play an important role — the Florida Division of Emergency Management, for example, has been a leader in publishing preparedness data. We hope that agencies with emergency information in particular begin adopting these standards as soon as possible, so more people can access that information easily and speedily.

With better open and interoperable alerting systems, private actors could interact with government systems to display alerts or maps tailored to geography, vulnerability, and situation. Information providers like Google have the ability to contextualize alerts by providing related news and other relevant information, as well as linking these to sharing platforms and other social experiences that are critical for empowering individuals and enabling better decision making. They also can do so in an open manner so any other Internet company or emergency organization can use or build on it. Public alerting systems must continue to evolve in ways that leverage the capabilities of modern digital networks to distribute vital, machine-readable information in crisis situations.

With more open data we could display more consistent and more actionable alerts, covering things like power outages and road closures when there are floods, for example. In some cases, a mobile alert — targeted specifically to those who may be directly impacted — may help increase their chances of getting to safety. Today, the Commercial Mobile Alerting System (CMAS) can push mobile alerts that specifically target users who are in the predicted path of a tornado or storm, and Google can also provide location specific information to supplement these alerts. In the future, mobile devices may enable additional types of alerts, such as ones with location specific evacuation instructions and shelter information. This type of information is particularly valuable for densely populated areas where there may be limited resources spread out across the region.

We are committed to continue working with various stakeholders to think of more ways to make the appropriate emergency information available when and where people need it, including making emergency alerts more useful and accessible to those who may be affected by disasters.

Conclusion

I would like to conclude by thanking Chairman Brooks, Ranking Member Payne, the members of the House Subcommittee on Emergency Preparedness, Response, and Communications, and other Members of Congress who have taken an interest in technology and crisis response. Affordable, high-speed Internet access, open data, and open standards are minimum requirements for a government to be considered "tech ready" ahead of a disaster. By ensuring that people are able to search and find emergency information online ahead of time, governments can reduce the amount of time it takes communicate with people when they need help most.

We still have a long way to go, but we look forward to working alongside emergency relief organizations and governments to help people find the information they are looking for and improve the use of Internet-based technologies in disaster preparedness, relief, and recovery.