SOCIAL CLOUD MEDIA AND CROWDSOURCING IN EMERGENCY MANAGEMENT: AN ANALYTICAL REVIEW OF EXERCISE24

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DEDICATION

This work is dedicated to my mother, whose sacrifices to provide for her children will always be remembered and cherished. It is also dedicated to those gracious individuals along the way, each of whom has contributed a piece to my heart and soul in all of my endeavors.
Kindness is the language which the deaf can hear and the blind can see.

-Mark Twain
ABSTRACT OF THE THESIS

by
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Master of Science in Homeland Security
San Diego State University, 2010

The numerous advancements in humanitarian assistance and disaster relief technologies over the past decade have enabled emergency planners from across the globe to improve response and recovery efforts in all types of disasters. In a post 9-11/Katrina/Indonesian-earthquake-and-tsunami world, geographic information systems with visual technologies and analytical reasoning capabilities have been at the forefront of emergency management research and theory. Advanced social cloud computing and crowdsourcing technologies were utilized in the responses to the recent earthquakes in Haiti and Mexico, as well as the Deepwater Horizon oil spill in the Gulf of Mexico. The evolution of new social networks, international partnerships, advanced communications, and multi-disciplinary collaborations have cultivated the Common Relevant Operating Picture for “fifth generation command and control”—that is, the combination of technology and organizational response.

Exercise24 was a two-day-long, international and multidisciplinary crisis simulation in which smart technologies were implemented to connect civilian and military organizations in efforts for humanitarian assistance and disaster relief. It explored how new social media components that support communication, logistics coordination, and disaster response affect mass populations and infrastructures. Traditional command and control methods are not effective for every catastrophic disaster because changes in circumstantial information and new events occur very quickly. Cloud media and crowdsourcing technologies, however, elevate and make immediate the awareness of situational changes for users. This type of knowledge management supports preparedness, mitigation, response, and recovery in disaster situations in a way that is indispensable to effective emergency management.

The purpose of this thesis is to investigate how Exercise24’s comprehensive, science-based, holistic approach is valuable to the future of emergency management. The thesis explores and analyzes the several technologies and thought processes that were implemented in Exercise24 to improve international civilian-military collaboration and coordination during a real-time crisis. Its conclusions about the effectiveness of social cloud media and crowdsourcing in disaster situations, as well as the use of these technologies for emergency management training and exercises, are drawn from observation of the simulation itself as well as the After Action Reports received from the participants. This thesis contributes to the ongoing discussion of how catastrophe training and exercises can be improved by utilizing available technologies and resources within an international, collaborative model of action.
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Finally, I would like to thank my friends and family for supporting me through my studies across the world. I would not be who I am today without them.
CHAPTER 1

INTRODUCTION

The advancements in social media technologies have contributed to on-going research and capabilities testing for humanitarian and disaster relief practices across the globe. Disaster response after the tsunami in Indonesia, Hurricane Katrina, the earthquakes in Haiti and Mexico, and the Deepwater Horizon oil spill in the Gulf of Mexico clearly demonstrate the need for a collaboration of international partnerships, advanced communications, and multi-disciplinary research in order to improve response and recovery efforts in all types of disasters. The rise of geographical information systems (GIS) and hazard/crisis response techniques, along with the desire to mitigate crisis with the participation and assistance of members of the public is strong is also of particular interest in the efforts to make disaster response and relief a more organized and effective process.¹ Research on social media use in crisis situations is beginning to emerge in the crisis informatics field. Crisis informatics investigates the socio-technical concerns and the “changing information pathways” of computer-mediated communication (CMC) and information and communication technology (ICT) use in large-scale emergency response.”²

Social networking, cloud computing, and crowdsourcing technologies are phrases that describe a spectrum of capabilities and services that could profoundly help many agencies, such as the Department of Homeland Security (DHS), in their challenge to provide an accurate, efficient, and inexpensive system of management for natural and manmade disasters. Cloud computing is best explained by what its acronym represents: a “Common,

²Ibid., 3.
Location-independent, Online, Utility that is available on-Demand.” A successful cloud computing environment for civilian-military emergency management should share resources that are multiplied across secure location-independent networks that provide information on-demand.

Contrary to what is often portrayed, local citizens are the true “first responders” in emergency situations. Until professional response personnel arrive, citizens are the first to perform rescues, administer first aid, and transport victims to hospitals. Now, with the increasingly accessible Internet, online forums have allowed people to cross geographical boundaries that normally constrain the reach of crises to share information and coordinate citizen-led efforts. Inexpensive global positioning systems (GPS) and 3D visualization enhancements have permitted even more exact location-specific information to be collected in the field and shared with others. Recent past crises foreshadowed what technologically-supported citizen communications can look like: In the July 7, 2005 London subway system bombings, commuters used their camera phones to take images of the incident, which provided hundreds of eyewitness pictures that were soon incorporated into the recovery effort. On January 12, 2010, when the 7.0 earthquake in Haiti, many people who were trapped and buried under the rubble texted their last known location to relatives to be rescued. In a future in which nearly everyone will have a GPS-enabled camera phone in their pockets or a Facebook and Twitter account, information and its easy dissemination requires testing and research to support the preparedness, mitigation, response, and recovery efforts in all disaster scenarios.

**STATEMENT OF PROBLEM**

New social software technologies offer organizations increased agility, adaptivity, interoperability, efficiency, and effectiveness. Social software can be used by civilians, non-

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5 Ibid.
governmental organizations (NGOs), and governments around the world for content creation, external collaboration, community building, and other applications. However, the ramifications of the proliferation of social media on national and international security exist for future operational challenges and obstacles as well as current traditional command and control systems of management for irregular, catastrophic, or disruptive events.

Unfortunately, organizations are ill-prepared to move forward using such technologies, because of the lack of capabilities tests and exercises, not to mention the need for updated policies and funding. Failure to adopt and understand “fifth generation command and control”—that is, the combination of technology and organizational response tools—may reduce an organization’s relative capabilities over time. Globally, social software is being used effectively by businesses, individuals, activists, criminals, and terrorists.6 Those that harness this invaluable resource are the innovative leaders of the future; it is imperative that this particular aspect of up-and-coming technologies be utilized to its fullest in the response efforts of citizens and organizations to disaster events.

While GIS technologies are increasingly used for practical disaster event applications, research focused on overall issues regarding the use of GIS, crowdsourcing, and social media in disaster analysis is lacking.7 Currently, there are inadequate tools and a lack of knowledge about the current tools for the organizational decision makers, which ultimately hampers their situational awareness and inevitably leads to preventable losses of life and infrastructural damage. It is often that during or after a disaster, we learn that what we thought would work, in fact did not, because what should have been tested beforehand was not.

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PURPOSE OF STUDY

With the numerous advancements in humanitarian assistance and disaster relief technologies, it is imperative that more funding, research, and training be incorporated into all international coordinating groups to assist them in operating effectively as one. The benefits of cloud computing include improved resource utilization—elasticity, flexibility, efficiencies, improved collaboration capabilities, improved disaster relief and recovery capabilities, and decreased maintenance and costs.\(^8\) When we prepare for disasters, we have to look at these ever-changing technologies as a resource not only for emergency managers, but for the public as well—that the public itself is a resource, not as a liability.\(^9\) By viewing citizenry on this planet as a powerful, self-organizing, and collectively intelligent force, information and communication technology can play a transformational role in humanitarian assistance and disaster relief crisis.\(^10\) Studies have shown that people are natural information seekers, and will seek information from multiple sources, relying primarily on their own social networks—friends and family—to validate and interpret information coming from formal sources, and then to calculate their own response measures, such as when they will leave and under what conditions.\(^11\)

This study is from an international capabilities perspective, whereas most studies beforehand only focused research on one event at a time, or one nation at a time. However, this is not the reality of how disasters occur; it is important to understand the complexities of catastrophic events. The disasters today are global emergencies that affect civilizations, economies, and public health around the planet. There is a need for an international approach in order that relief efforts are effective, no matter the complexity or size of an event. San

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\(^11\) Ibid., 4-5.
Diego State University’s Visualization Center, Google, and the U.S. Navy partnered to answer this call with the creation of Exercise24. The exercise tested how social media and crowdsourcing technologies could be implemented into humanitarian assistance and disaster cloud environments in an international multidisciplinary crisis simulation.

Analyzing the technologies and practices of the exercise, this paper will help investigate how Exercise24’s comprehensive, science-based, holistic approach provides valuable suggestions to the future of emergency management. It will also describe how to model a similar exercise for further research. This work is intended to bring about situational awareness and encourage entrepreneurial solutions to improve international civilian-military collaboration and coordination during a real-time crisis. Lastly, this research will contribute to breaking down the traditional distinctions between expert and non-expert, in the specific context of the creation of geographic information, since all of the traditional forms of expertise can now be acquired through the use of technology.\(^{12}\)

In addition to utilizing the sources cited, notes from the planning meetings, and the author’s observations of the simulation itself for this thesis, the author also wrote and collected After Action Reports (AAR), on behalf of San Diego State University’s Visualization Center, from the participants of Exercise24. The reports were then analyzed to obtain recommendations for improvements of future civilian/military collaborations.

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CHAPTER 2

BACKGROUND

CLOUD COMPUTING AND SOCIAL MEDIA

The success of cloud computing in the last two decades has provided several technology enhancements throughout the world and has reshaped how users access data. Increased consumer awareness and use of internet access spurred economic development in online media and commerce at a breakneck pace through 2000 and beyond. Use of the Web was propelled by the advent of commercial Internet service providers (ISPs) in the 1990s, which made online connections more widely available. This growth has continued into the present with the rise of broadband ISPs, which provide high-speed, “always-on” connections through digital service lines (DSL) offered by the major telephone companies and cable modems offered by the nation’s cable television operators.13

The existence of high-speed, always-on connections, in turn, altered how consumers related to their data sharing devices. Patterns of usage on slow-speed dial-up connections required powerful computing capacity at the machine level and only small bursts of data exchanged over the network.14 Today’s high-speed connections have given rise to detailed high-capacity sharing on a new level never seen before and which will only continue to increase in quality and size (see Figure 1). Individuals are crowdsourcing information within a matter of seconds from a multitude of smart technology devices, from anywhere in the world.

The private sector has provided a competitive research and development process to capture the three elements of cloud computing market (see Figure 2). There are several operational considerations at play: first, the cloud shifts “ownership” of software from the


14 Ibid.

user to a third-party provider, which means that software ceases to be an expensive product but rather becomes a pay-as-you-go service.\(^\text{15}\) Second, managing the cloud creates economies of scale, which means access to powerful software and applications is no longer limited to large corporations, meaning that small ventures and individuals can access the same powerful applications as global enterprise players. Third, the cloud’s acceptance has inspired thousands of developers to create specialized software for niche markets that previously proved commercially unattractive to serve.\(^\text{16}\)

The mass majority of internet users are unlikely to be aware of the term “cloud computing” even though they are utilizing the cloud environment everyday. The Pew report revealed that, while many Americans may not be familiar with the term “cloud computing,” the reality is that almost 9 in 10 American Internet users have done at least one cloud-based activity.\(^\text{17}\) Individuals who use webmail services such as Hotmail or Gmail are taking advantage of data storage capabilities managed by a network of computers, which in turn permits access to a user’s email no matter what device they have at hand.\(^\text{18}\) This is highly beneficial to the user, because the likelihood of losing data is reduced when the information is spread out over multiple platforms in different server locations. The data storage at these facilities allows the individual or organization to store more information than their personal computers or local server rooms could ever handle. As the current technologically advanced generation (in terms of the highest use of cloud computing tools) ages, the likelihood for most individuals across the globe to encounter the benefits of the cloud will only increase (see Table 1).

The new age of “social media” or Web 2.0 applications (see Table 2) and services within cloud environments continues to grow at a rampant rate. Just as with previous big end-user advancements, Web 2.0 and social media have produced a huge spike in interest and

\(^{15}\) Ibid., 7.  
\(^{16}\) Ibid.  
\(^{17}\) Wyld, “Moving to the Cloud,” 14.  
Table 1. Americans in the Cloud: Cloud Computing Activities by Different Age

<table>
<thead>
<tr>
<th>Use of Internet-Based Cloud Activity</th>
<th>18-29</th>
<th>30-49</th>
<th>50-64</th>
<th>65+</th>
<th>All Ages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use webmail services such as Hotmail, Gmail or Yahoo Mail</td>
<td>77%</td>
<td>58%</td>
<td>44%</td>
<td>27%</td>
<td>56%</td>
</tr>
<tr>
<td>Store personal photos</td>
<td>50%</td>
<td>34%</td>
<td>26%</td>
<td>19%</td>
<td>34%</td>
</tr>
<tr>
<td>Use online applications such as Google Documents or Adobe Photoshop Express</td>
<td>39%</td>
<td>28%</td>
<td>25%</td>
<td>19%</td>
<td>29%</td>
</tr>
<tr>
<td>Store personal videos</td>
<td>14%</td>
<td>6%</td>
<td>5%</td>
<td>2%</td>
<td>7%</td>
</tr>
<tr>
<td>Pay to store computer files online</td>
<td>9%</td>
<td>4%</td>
<td>5%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Back up hard drive to an online site</td>
<td>7%</td>
<td>5%</td>
<td>5%</td>
<td>4%</td>
<td>5%</td>
</tr>
</tbody>
</table>

| Have done at least one activity     | 87%   | 71%   | 59%   | 46% |
| Have done at least two activities   | 59%   | 39%   | 31%   | 21% |


Table 2. Sample of Web 2.0 “Social Media” Applications: Common Social Software Tools, by Major Function/Category

<table>
<thead>
<tr>
<th>Category</th>
<th>Example 1</th>
<th>Example 2</th>
<th>Example 3</th>
</tr>
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<tr>
<td>blogging</td>
<td>Blogger</td>
<td>Wordpress</td>
<td>TypePad</td>
</tr>
<tr>
<td>microblogging</td>
<td>Twitter</td>
<td>Pownce</td>
<td>Plurk</td>
</tr>
<tr>
<td>wikis</td>
<td>Pbwiki</td>
<td>WetPaint</td>
<td>WikiDot</td>
</tr>
<tr>
<td>social networks</td>
<td>Facebook</td>
<td>LinkedIn</td>
<td>Plaxo</td>
</tr>
<tr>
<td>bookmarking</td>
<td>Delicious</td>
<td>ma.gnolia.com</td>
<td>Fark</td>
</tr>
<tr>
<td>aggregators</td>
<td>Digg</td>
<td>StumbleUpon</td>
<td>FriendFeed</td>
</tr>
<tr>
<td>photos</td>
<td>Flickr</td>
<td>Picasa</td>
<td>Photobucket</td>
</tr>
<tr>
<td>audio/video</td>
<td>YouTube</td>
<td>Blip.tv</td>
<td>Hulu</td>
</tr>
<tr>
<td>messaging</td>
<td>Gchat</td>
<td>AIM</td>
<td>Yahoo! Messenger</td>
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<tr>
<td>Twitter applications</td>
<td>Twhirl</td>
<td>Tweetdeck</td>
<td>TwitterBerry</td>
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</tbody>
</table>

technology adoption. For example, Forrester Research reports that in 2008, 75% of the US adults online used “social tools” compared to 56% in 2007.\textsuperscript{19} The next generation of GIS technologies, within these cloud environments, will continue to be more interactive and accessible to citizens. The hope is that this will foster public participation and collaboration in the development and management of geographic databases, as well as in any decisions made based on such data.\textsuperscript{20}

Organizations that understand how social media, cloud computing, and crowdsourcing connect are likely to find themselves profitable when they consider the needs and demands of individual users within those structures. This in return gives rise to an entrepreneurial race to offer individualized services that cater to a very wide range of cloud users. The most notable of these are the product offerings of Google (Gmail, GoogleAps, GoogleDocs, and others). In exchange for the “free” services, Google collects information advertising to them (i.e., this is why one sees ads for concert tickets if something like “I love Lady Gaga” is mentioned in a Gmail message.) The collection of information is explained in the Google’s privacy policy.\textsuperscript{21}

\textbf{LESSONS LEARNED (CLOUD COMPUTING AND GOVERNMENT)}

As cloud computing and social media have contributed to the wealth of sharing information across the globe, emergency managers, NGOs, and governments alike are seeking similar information management benefits for disaster relief and humanitarian assistance. Numerous emergency managers have formed in these social networking worlds such as LinkedIn, Facebook, Myspace, YouTube, Flickr, Twitter, etc. The capabilities of GIS in cloud environments have allowed for data collection, data processing, and data sharing across the emergency management field. For emergency managers, much of the data collection and processing can be performed as part of the preparation work. Data can be


\textsuperscript{20} Liu, “The New Cartographers,” 2.

\textsuperscript{21} Ibid., 20.
imported or created to reflect what might typically be required for a responding agency to operate effectively and communicate more openly with the counterparts involved in the emergency.

When an emergency strikes, the infrastructure of the cloud environment needs to be flexible enough to work in the field and to incorporate the multiple layers of additional data that will be collected and disseminated as part of the emergency response. In such a dynamic and challenging setting, the software technologies must be easy to handle and manage for those with limited knowledge of GIS or other software technologies. An overly complex software tool that requires additional specialists to run could result in response delays or a bottleneck situation just when the need for information becomes most critical.

The potential uses of cartography and forms of GIS technologies like Google Earth have brought to the discussion the need to include not only official responders, but also members of the public. The first uses of mapping, in response to a crisis, date back to 1845, when London was reeling from a particularly virulent cholera outbreak. At its epicenter, five hundred people died in the space of ten days. By mapping the location of the infections, Dr. John Snow was able to provide evidence to local officials that the cause was not by noxious vapors, but by a local, contaminated water well. Once the well was closed, the spread of contagion rapidly abated.

First responders are not, in practice, the trained professionals who are deployed to a scene in spite of the common use of that term for said professionals; they are instead the people from local and surrounding communities who provide first aid, transport victims to hospitals in their own cars, and begin search and rescue. Figure 3 illustrates the conceptualization of changes occurring within the information area of disaster, and the pressures these changes place upon the interface. “The white arrow (A) denotes conventional management of public information as unidirectional from the formal to the informal spheres. This assumption of unilateral communication—though never accurate in practice—is the

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24 Ibid., 4.
basis for US local and federal policy designs, and is similar to other nations’ emergency management arrangements. The dark gray arrow (B) illustrates that existing peer processes of information creation and dispersion is now expedited and proliferating because of pervasive Information and Communication Technology (ICT). This, in turn, has two consequences of concern by the black arrows: these changing peer communications now spawn tactical data and human or crowd convergence information that is often of interest to the official response (C) both to leverage and control.\textsuperscript{25}

An example of crisis response and social networking in the area of disaster can be seen following 9/11, when ferry captains and others self-organized to systematically evacuate people from Manhattan Island and relay information back to the Port Authority of New

\textsuperscript{25} Ibid., 3.
York. Without the successful coordination of the ferry captains, thousands of individuals would have not been able to leave the critical areas where emergency response was most needed. Leveraging citizens as assets in Hurricane Katrina’s aftermath allowed search and rescue GIS technologies to map mortality locations throughout the city. Figure 4 shows a member of a search and rescue team standing in front of a typical destroyed house using a handheld GPS to mark the location.


The most recent advent of crowdsourcing with social media in a terrorist event occurred during the attacks on Mumbai in 2008. The events of Mumbai unfolded online in real time, and the mainstream media (and in effect the world) got a first-person, eyewitness

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26 Ibid., 4.
view of what was happening. The public was not the only one using the broadcasted media to figure out what was happening—the terrorists also used it to orchestrate their attacks and achieve the goal of creating fear in the world. “The terrorists were able to use sophisticated GPS navigation tools and detailed maps to sail from Karachi [in Pakistan] to Mumbai,” said G. Parthasarathy, an internal security expert at the Center for Policy Research in New Delhi. "Our new reality of modern life is that the public also sent text messages to relatives trapped in hotels and used the Internet to try and fight back.”

This is the dilemma of social media when dealing with manmade disasters where both the creators and the responders are using the technology. Twitter streamed information and images during the terrorist event at such a rapid pace that mainstream media simply used footage without attribution and independent fact-checking. Hearsay and assumption also played a strong role in the information flow, and to some extent, “trust but verify” was suspended in favor of speed. While rapid, first-person intelligence via these new communications is valuable, there is the very real possibility of exploiting such streams to promote misinformation, particularly if decision makers do not understand the technology well. From incidents like this, the very limited time that governments have to respond effectively in crises where social software is part of the information flow is becoming rapidly apparent.

Twitter was used by citizens in the vicinity of Bombay to call upon the public for blood donations. Figures 5 and 6 display an actual Twitter message sent while the attacks were ongoing and the “re-tweeted” response by many others, including the five “re-tweets” of the response by followers of the initial “tweet.” From the figures, it is clear that Twitter messages can assist in rescue efforts, and in this case, they played a positive role in broadcasting details on where volunteers may help out by donating blood.

29 Ibid.
30 Ibid.
In the latest efforts to utilize and organize several major mapping, visualization, and data fusion efforts through social networking was during the Deepwater Horizon oil spill in the Gulf of Mexico, which saw millions of gallons oil spilled into the ocean over a three month period. This mass effort included public, private, and military resources to help with
the clean-up efforts along the beaches of the US coast. Several oil reporting applications became available online for users in all sectors to contribute to the collaboration and coordination efforts. Figure 7 shows how CrisisCommons (a volunteer organization that is a collaborative space for organizing projects and efforts around disaster relief) built a layout for their reporting platform that was utilized during the crisis to collect valuable information.\textsuperscript{31} This figure exemplifies how multiple layers of data fusion can coexist in a space allowing responders and clean-up crews alike to disseminate the information and decide the appropriate means of action for handling their individual responses as well as whether, and how, to work in a collective manner.

\textbf{GOVERNMENT ACKNOWLEDGEMENT}

Having a picture of conditions on the ground in various areas and communicating about conditions was also a big problem. Former Department of Homeland Security

\textsuperscript{31} Andrew Turner, “Oil Reporting Platform,” Figure, www.crisiscommons.org
Secretary Chertoff testified, “During the Katrina response, our efforts were significantly hampered by a lack of information from the ground. With communication systems damaged and state and local assets compromised by the subsequent flooding, our ability to obtain precise reporting was significantly impaired.”

The US Government is beginning to understand the vulnerabilities and risks of not having reliable means to counter natural and manmade disasters. Through means of knowledge management software technologies the US has a chance of handling any type of response. Tim O’Reilly, the social technology publisher and evangelist who coined the term *Web 2.0*, stated in his Obama for President endorsement, “There are efforts already underway to build better tools for two-way communication, for government transparency, and for harnessing innovations from outside the public sector to improve the work of the public sector.”

In one of its first significant acts in January 2009, the Obama administration issued a directive calling for a more transparent, participatory, and collaborative government.

That collaborative effort was established with the introduction of Apps.gov to “enhance how the government leverages technology by enabling federal agencies to acquire and purchase cloud computing services in an efficient and effective matter” (see Figure 8).

“The General Services Administration (GSA) expects to reduce its Web management costs by more than 50 percent,” according to Martha Dorris, GSA’s acting associate administrator for the Office of Citizen Services and Communications. GSA officials also expect cloud computing to establish a foundation for a new generation of Web 2.0 and other online services. USA.gov and its Spanish-language companion site, GobiernoUSA.gov, “will move to cloud computing,” the agency said.

Another agency, the Defense Information Systems Agency (DISA) is well along in building an internal cloud in its data centers, and NASA’s

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33 Drapeau, Social Software and National Security, 4.

34 Ibid., 23.


36 Ibid.
Ames Research Center recently launched a cloud computing environment called Nebula. The National Institute of Standards and Technology has drafted a definition of cloud computing to keep implementers on the right track.\textsuperscript{37}

Not everyone is supportive of moving all of their sensitive information into a cloud computing environment where vulnerabilities are seen in securing the information and the possibility of the information being altered or tampered with. Los Angeles Police Department Sgt. Paul M. Weber shared his understandable concern in a blog post, noting, “Twitter acknowledged that hackers were able to access confidential information stored with Google.”\(^{38}\) Google’s systems were not hacked in that incident; however, the hacker obtained the password of a Twitter employee by abusing the password recovery process at a different online service. Since the Twitter employee used the same password for Google Apps, the hacker was able to use that password to log into the Twitter employee’s Google Apps account.\(^{39}\) While these concerns are understandable, Matt Glotzbach, director of product management for Google’s enterprise groups, says, “By moving to Google Apps, Los Angeles Police Department stands to save an estimated $13.8 million over five years and to free up six IT employees who’d otherwise be tending email servers.”\(^{40}\)

**INRELIEF.ORG**

The US military has been working with private and public institutions to compose humanitarian assistance and disaster relief efforts into a collaborative environment used to promote information sharing between the International Organizations (IOs), NGOs, Government Organizations (GOs), and Military groups that respond to a natural or man-made disaster. Desiring an open, low-barrier-to-entry, bandwidth-efficient solution for collaborative environments, the US Navy partnered with San Diego State University (registered NGO) to manage InRelief.org (see Figure 9) to promote better intercommunication when disasters strike. InRelief is based on Google technologies and is leased through Google, Inc.\(^{41}\) InRelief is a wholly owned enterprise that is managed by San Diego State University.


\(^{39}\) Ibid.

\(^{40}\) Ibid.

InRelief is designed to freely provide access to collaborative communication to all, based on the Oslo Guidelines established for Disaster Relief. Licenses are not required to view information, however, users may request an account to make information only available to them if they able to provide proof they are a member of an NGO, IO, government agency or military (foreign or domestic).42 The site is committed to providing a safe, free, and secure environment of collaboration for all to share information regarding logistics, medical concerns, geospatial data, and professional organizational structures, as well as many other forms of information. The website has had been successfully utilized several times with regards to hosting an interface platform of cloud technologies to be utilized by participants around the world remotely. It has implemented interactive crisis maps for the recent earthquakes in Haiti and Mexico, as well as the Deepwater Horizon oil spill in the Gulf of

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42 Ibid.
Mexico. InRelief focuses on data fusion over an interface platform capable of handling a plethora of resources to aid in disaster relief and humanitarian assistance similar to the cluster approach in Figure 10.

Figure 10. OCHA Cluster Approach to Disaster Relief. Source: OCHA. “How Are Disaster Relief Efforts Organized?” OCHA. http://www.humanitarianreform.org (accessed August 30, 2010).

InRelief stands alone in being an all-hazards approach with a holistic view of responding to complex situations wherever they may be in the world. Dr. Eric Frost, the Director of the Homeland Security Program at San Diego State University and also the head of the InRelief.org project states, “There’s no disaster tool in the world, no government tool in the world, which has that kind of capability.” The website allows users to build out their own individual or organizational website within InRelief. This allows users to join and form their own networks suitable to the specific disaster relief and recovery needs and efforts. Imagery and data sourcing can be uploaded to maps to better understand the scope of the disaster, and create a Common Operating Picture (COP), and to help determine the
appropriate approach in handling the crisis. Figure 11 is an example of the damage evaluation map based on satellite data over the Port-au-Prince area of Haiti, following the 7.0 magnitude earthquake and several aftershocks that hit the Caribbean. The map allowed for shelter locations, infrastructure damage, news reports, and more to be uploaded in real-time to help emergency managers and the public assist in the aftermath. It is a real-world example of over 120 Terabyte (TB) of data presented in a fifth generation command and control decision-support tool—and it is a tool that is still being used by government and non-government organizations, including Red Crescent and US Southern Command.

The Visualization Center of SDSU continually integrates the “best of breed” technologies and provides them to the US Department of Homeland Security (DHS), Department of Defense (DOD), GeoCommons, CrisisCommons, American Red Cross, and more. Due to the success of InRelief and the capabilities it offers to the world, the US Navy and emergency managers alike looked to San Diego State University’s Visualization Center
and the managers of InRelief to cultivate an exercise scenario that would test the social media capabilities in a way that was unlike traditional command and control protocols previously used in disaster relief and humanitarian assistance efforts. This is where Exercise24 was born.

**EXERCISE24**

Exercise24 (X24) was a two-day-long, international and multidisciplinary crisis simulation in which smart technologies were implemented to connect civilian and military organizations in efforts for humanitarian assistance and disaster relief. It explored how new social media components that support communication, logistics coordination, and disaster response affect mass populations and infrastructures. The idea was to see how national and international authorities, organizations, and citizens would react to such an event in Southern California utilizing these smart technologies.

The idea of X24 was constructed by George Bressler, adjunct facility at SDSU. His mission had two basic outlooks. The first is that X24 is a comprehensive science-based holistic approach to emergency management which includes all-hazards, through all disciplines, that may occur at anytime. Secondly, the exercise was open-minded to new solutions and technologies and did not limit new ideas because “it is the way we have always done it.” Members of the InRelief and X24 teams understood that command and control is evolving into social networks, trusted partnerships, communication, collaboration, and the inclusion of non-traditional groups. Understanding knowledge management inside a cloud computing environment provides users a way of recognizing patterns of failure or success in communications during a crisis environment.

A number of entities have been working on one approach to improving communication between the Federal agencies and outside organizations by attempting to connect all the portals into one single location, thus reducing the confusion and necessity for users to check multiple sites to find potentially relevant data. X24 takes the approach of integrating data, resources, tasking, and situational awareness information into a larger knowledge space, thus greatly reducing or eliminating the separate channels of data, aid requests, and offers of assistance, all of which increases the lead agency’s ability to respond as quickly as possible, and with many resources, to the disaster or aid event.
InRelief provided the technology to support knowledge transfer of visual analytics that were facilitated by interactive visual interfaces. The technology to support these types of transfer had to offer its users the ability to effectively interpret knowledge structures produced by collaborators. The visual analytics integration included social media aggregation, smart phones, manned and unmanned air systems, and all other information and imagery collection nodes for rapid threat/damage assessment of any significant event, as well as situations that may evolve into a significant event.

The new archetype that X24 proposes is, instead of putting all this data into a DHS- or DOD-specific portal solution, the DHS simply breaks down the information and shares the data with the lead Federal agency and other users groups via gadgets/widgets (small browser based applications), Really Simple Syndication (RSS) feeds, Atom feeds, and Common Alerting Protocol (CAP) formatted data feeds, or through Keyhole Markup Language (KML) links/channels. The sharing of content allows for an improved integration of DHS capabilities and allows for the development of DHS comprehensive terminology with United States Agency for International Development (USAID) and Federal Emergency Management Agency (FEMA) functions, as well as to the United Nations key actors (see Figure 12).

The social fusion cloud enables visual analytics as a service to rapidly converge politically, socially, and geographically dispersed experts at the onset of an incident. X24 allowed participants to test the performance of duties, tasks, or operations very similar to the way they would be performed in a real emergency through a “no-fault” environment. It is important that these technologies like these implemented into X24 are tested before a disaster—not just after—to determine which communication channels and interfaces can achieve success in a real life crisis.

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43 George Bressler, interview by Chris Max, August 6, 2010.
Figure 12. OCHA key actors in disaster response. Source: OCHA. “How Are Disaster Relief Efforts Organized?” OCHA. http://www.humanitarianreform.org (accessed August 30, 2010).
CHAPTER 3

METHODOLOGY

The purpose of this chapter is to describe the methodology associated with researching the technologies and capabilities of various social media elements in the type of knowledge management that supports preparedness, mitigation, response, and recovery in disaster situations in a way that is indispensable to effective emergency management.

DESIGN OF INVESTIGATION

The method of this thesis is qualitative research. The research was conducted in order to determine how Exercise24’s comprehensive, science-based, holistic approach is valuable to the future of emergency management. The thesis explores and analyzes the several technologies and thought processes that were implemented in Exercise24 to improve international civilian-military collaboration and coordination during a real-time crisis. This research also draws from the Rayport and Heyword model, (see Figure 13) which puts forth eight fundamental elements that this paper believes are vital to enabling the cloud concept to not just exist, but to grow to its fullest potential in an exercise scenario.

These elements are as follows:

1. *Universal connectivity*—users must have near-ubiquitous access to the Internet.
2. *Open access*—users must have fair, non-discriminatory access to the Internet.
3. *Reliability*—the cloud must function at levels equal to or better than current stand-alone systems.
4. *Interoperability and user choice*—users must be able to move among cloud platforms.
5. *Security*—users’ data must be safe.
6. *Privacy*—users’ right to their data must be clearly defined and protected.
7. *Economic value*—the cloud must deliver tangible savings and benefits.
8. *Sustainability*—the cloud must raise energy efficiency and reduce ecological impact.\(^4^4\)

The advantages and disadvantages in the X24 model as well as the reliability that end-users were able to engage as part of the three objectives set by X24 were also taken into consideration. In order to answer these research goals, the author opted to view this exercise as a continued effort to determine the track and model needed for advancements in emergency management with cloud computing technologies. The scenario objectives of X24 are listed below:

**Scenario:** The scenario of an earthquake off the coast of Huntington Beach, California, USA generates a tsunami event in Baja, and a catastrophic subsurface and surface oil spill. A series of inland aftershocks result in reports of deaths and injuries, damage to the All American Canal, roadways, power lines, and other key resources and critical infrastructures in Southern California, USA and Northern Baja California, Mexico. A series of aftershocks, fires, loss of power, displaced populations, disease concerns, and other challenges continue throughout the exercise to facilitate participant objectives.\(^4^5\)

**Objective One:** Utilization of computing cloud to rapidly converge geographically dispersed global experts at the onset of a simulated international incident, deploy a foundation of guidance in concert with community leaders in a manner that empowers community members through education and smart technologies to support mitigation, response,

\(^4^4\) Wyld, “Moving to the Cloud,” 11.

\(^4^5\) Bressler, interview.
recovery, and a resumption of societal normalcy at a level of functioning and order of magnitude higher than existed before.46

**Objective Two:** Leverage smart phones, ultra-lights (United States), and unmanned air systems (Mexico) for rapid threat/damage assessment of a simulated seismic event that generates a significant oil spill off the coast of Southern California and Northern Baja California, as well as damage to critical infrastructure inland that necessitates mass sheltering of displaced community members.47

**Objective Three:** Leverage the power of NGOs, faith-based groups, rapidly responding government and corporate groups, international groups, social networking communities (as occurred in Haiti), and other resilient networks to locate and nationally send aid to Southern California and Baja California.48

**PARTICIPANTS OF EXERCISE 24**

The demographics of the primary sample population in this study consisted of subjects who were directed to a Web-based survey on InRelief after having participated and registered as a member of X24. In order to effectively delineate the subjects considered in the survey, the general population was excluded from the survey and only users with verified InRelief accounts and emergency management experience were able to participate in the After Action Reports (AAR). An unclassified list of participants by organizational name only is located in Appendix A.

**DATA COLLECTION**

The data collection process occurred over the course of several months between August and October of 2010. The data collection process continued until enough AARs were obtained to provide a solid subject population for the study; the AARs were evaluated based on response-based criteria provided by the author. Certain subjects completed the survey based on their organization’s overall perspective on the issue. Over 10,000 subjects participated September 24-26th of 2010, directly or indirectly by searching and visiting the

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46 Ibid.
47 Ibid.
48 Ibid.
InRelief.org website to learn more about X24. The data, in addition to being drawn from the subject population, is also drawn from the author’s participation and observation as one of several leaders for the X24 team. The aim for the information collected will be to contribute to the ongoing discussion of how catastrophe training and exercises can be improved by utilizing available technologies and resources within an international, collaborative model of action.

**TOOLS & TECHNOLOGIES**

The following tools and technologies were utilized by participates in X24 as a means of collaboration, communication, logistics, and response for the exercise. The reason for utilizing these tools and technologies was to implement an easily accessible “Wiki” of applications at a low or no-cost value available to the majority of the world without social, economical, political, or organizational boundaries. The ‘Dashboard’ of applications is provided in Figure 14.

**EXERCISE CONTROL**

To avoid confusion in the event of a real emergency the X24 team inside the Visualization Center at SDSUs campus were responsible for delivering all injects (updated scenario feeds) to the registered participants of the exercise. Individual injects were displayed on the X24 Sahana Map, the SAFER smart phone application, and sent to participant email addresses as they occur. A scrolling list of injects were also posted on the InRelief website. Non-registered participants and observers could view injects from the map and scrolling list via the X24 public areas. There were no hidden injects and all injects included the statement “This is an exercise and not an actual event. If an actual event occurs, all registered participants will be notified ‘This Is Not An Inject’…All exercise activities are complete. X24 participants and observers should contact their respective commands for further instructions. The VizCenter team will begin support of response efforts…This Is Not An Inject.” Several media presses were released before the exercise and Twitter agreed to put out an advance message to alert social network users that any apocalyptic-sounding tweets are part of a test, not a real disaster. Each tweet included the words “Test. Not real,” and included links to the X24 and InRelief Web sites.
Data Analysis

The data collected typically consists of situational awareness information, such as what roads were passable, maps of the area, weather data, and video/photo imagery of areas, as well as logistics data, such as what transport capabilities exist in the area, what materials/supplies were currently being shipped and when/where it would arrive. The gadgets or widgets used by X24’s Dashboard used technologies that were made available for crowdsourcing via RSS, Atom, KML, and other feeds that could be readily disseminated into
other commonly used websites as InRelief. The knowledge sharing through open source publishing allowed users from the public to copy and redistribute the predestinated X24 Day 1 Injects (see Appendix B) and Day 2 Injects (see Appendix C) over cloud technologies such as Facebook, Twitter, and Global Talk. Social media companies like BuzzMgr then collected and tracked the progression of data related to X24 by individual Internet Protocol (IP) addresses from across the globe and gained an international overview of effectiveness of disseminating information through different means of social media.

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49 Ibid.
CHAPTER 4

RESULTS

Exercise24 acted as an emergency management information system (EMIS), system that supported and integrated all phases of emergency management and response into a multitude of simulated, real-life crisis situations. Emergency planners were able to actively engage different types of technologies and knowledge management interfaces to display and analyze the spatial relationships among possible event locations, shelters and other emergency management facilities and resources, transportation routes, and populations at risk. Participants acknowledged that response time and real-time data are important elements for an effective cloud EMIS, which enables emergency operators to accurately evaluate and quickly implement emergency response plans so as to reduce the risk to the affected population.50

Exercise24’s Digital Ecosystem (see Figure 15) provided a combination of free social software with inexpensive mobile devices and donated computers to empower people to self-organize information-sharing networks that are not bound by federal, state, local, or other structural constraints. The use of social software on simple cell phones, computers, or personal digital assistants that incorporates geographical information is becoming ubiquitous. Internationally, empowerment through these tools and technologies have many opportunities for promoting collaboration and coordination during a global crisis, as well as offering security, building trust, and developing accountability.

This chapter provides a conclusive analysis of the several technologies and thought processes that were implemented in Exercise24 to challenge the readily available and cost-effective platforms currently available in a cloud computing environment for emergency

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management. Addressing and testing the capabilities of multiple social media and crowdsourcing platforms in a unified incident provides a wealth of information regarding the viability of resources and options for all phases of a crisis. These benefits include the ability to:

- Assess the adequacy of current procedures and policies
- Increase general awareness of proficiencies and deficiencies
- Assess the allocation of resources and manpower
- Clarify roles and responsibilities
- Improve individual performance
- Motivate collaborative partnerships
- Build confidence
- Evaluate the communication between participant groups
- Prepare for similar exercises or trainings in the future
- Encourage future entrepreneurial partnerships
- Determine overlaps and gaps in planning\textsuperscript{51}

\textsuperscript{51} Bressler, interview.
The technologies presented were collected to achieve a common operating picture for easily available resources and interfaces familiar to the majority of the world’s cloud computing societies. Organizations were able to “Propose a Technology” (see Figure 16) through the InRelief.org website to have participants test its potential, or so that the organization could assess their own capabilities testing within the InRelief cloud computing platform. The technologies were categorized into subcategories based on the type of tools they represent. This study only highlights the tools and technologies collected from the data in the After Action Reports.

![Propose a Technology Form](https://sites.google.com/a/inrelief.org/24/propose-technology)

**Figure 16. InRelief.org propose a technology. Source: InRelief. “Propose a Technology” InRelief. https://sites.google.com/a/inrelief.org/24/propose-technology (accessed Sept. 4, 2010).**

**VIDEO AND VIDEO CONFERENCING**

Video conferencing is a real-time and interactive tool used by a wide range of individuals for a variety of business, personal, and educational goals. It allows people to communicate via audio, video and computer technology across time zones and locations through a live connection that provides full-motion video images and high-quality audio. X24 used VSEE and UStream during the initial trainings and during the two-day exercise.
Participants were able to view PowerPoint presentations broadcasted over the video conferencing software. UStream made the trainings available on InRelief after the secessions to allow users not present at the meetings to access the data at a later date. This was very beneficial to the international users who were asleep on the opposite end of the globe. VSEE and UStream video conferencing technologies delivered real-time injects (see Figure 17) and provided international users a means of virtually visualizing the presenters in the Visualization Center at SDSU.

![Figure 17. Day 2: Example of X24 inject. Source: InRelief.](https://sites.google.com/a/inrelief.org/24)


While the video conferencing capabilities were easily disseminated across the web, participants often dealt with signal and noise complications. The signal was likely due to the individual’s personal computer; meanwhile the noise component was often caused by additional participants in the Visualization Center carrying on side conversations. At times this was seen as time consuming and a major distraction from the exercise elements. A preventative measure in future exercises is to have pre-established leaders of an exercise completely separated from the general public. The use of real-time translators for presenters
also complicated the listeners’ ability to effectively hear and often prevented both languages from being understood over the speakerphone.

The benefits of video conferencing are numerous despite the minor complications during X24. Video conferencing saves travel time and money, it urges participants to reach decisions that may not come as easily in a face-to-face meeting, and it gives participants the chance to see others’ body language and facial expressions, which are important factors for a sales or a board meeting. DeafLink, Inc., also a participating member of X24, incorporated video alerts to distribute test warning messages to those with hearing impairments (see Figure 18). Including individuals with disabilities is crucial to understanding the needs of a community during an emergency response.

![Video Alert](http://deaflink.http.internapcdn.net/deaflink/html/site1/16.44.57alert.html)


**Virtual Chat**

As chat applications have migrated to multiple platforms and morphed to include different speaker-audience relationships (one-to-one; one-to-many; many-to-many; known-to-known; known-to-unknown; unknown-to-unknown), they continue to figure centrally in our evolving computer-mediated interactions. As more people adopt and maintain a digital presence, these ever-advancing forms of chat-based environments draw attention not only because of the synchronous and lightweight interactions they support, but also for the new
information relationships they produce and the manner in which the media is adapted to suit technological constraints and social conditions.\textsuperscript{52}

X24 offered a unique real-time chat-based software problem called “Global Talk” during the trainings and the main exercise for account users of InRelief. Global Talk’s software was able to translate chat room environments into the user’s native language without having to access additional software programs. This prevented delay or distraction when the information needed to be immediate and clear (see Figure 19). The exercise offered nine languages as a trial, with more languages to be added in the future. While the accuracy of the program runs at about 80% efficiency in translating user’s chats, that means there is another 20% of information that is not understood. However, Global Talk takes the next line of defense and allows participants to select the text of another user and highlight the text as an incorrect translation. This then allows for another user to correct the text or suggest the original author to rephrase their message. The most common reason for messages not correctly translating is the original author is using “slang” terminology or words that do not translate from one language to another.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Global_Talk.png}
\caption{Screen shot of Global Talk application. Source: InRelief. “Global Talk.” InRelief. https://sites.google.com/a/inrelief.org/24 (accessed Sept. 24, 2010).}
\end{figure}

\textsuperscript{52} Starbird, “Chatter on The Red,” 1.
Overall, the language translation tool could be improved and should likely be used by only a few individuals at one time to effectively communicate information in Esperanto. Due to time constraints, translation accuracy and the availability of a translator during a disaster is unlikely. Several AARs suggested the creation of a mobile application Wiki that could be implemented to communicate the essence of the information being discussed across language barriers. This ontology would have the ability to deliver the essence of the communication with high accuracy, thereby improving response efficacy.

GeoChat, another open source communication technology, allowed team members to interact and maintain shared geospatial awareness of who is doing what and where—over any device, on any platform, over any network. X24 participants tested the system for SMS, email, and on the surface of a map in a web browser. Many complications occurred during the testing of GeoChat, i.e. backlogged text, interfaces not responding, and incorrect SMS messages being sent to users. Respondents (including the author) suggest further testing be done by the company before releasing this application again in a future exercise to work out the kinks in this highly potential software. For reasons unknown to the author, the GeoChat technologies had previous successes in the Haiti earthquake but appeared limited in X24.

**MOBILE APPLICATIONS**

DefenCall was the only open-source cell phone application utilized during X24. The application serviced as a personal emergency response solution for smart phones. Currently, the application is only available through download at the Apple’s Itunes store and is limited only to iPhones. The purpose of the application was to send SMS and email alerts to notify participant’s first responders and X24 Visualization Center of personal emergency situations or disasters from strategic locations around the San Diego County (per their team assignment). The feedback from AAR included comments on the ease of use and accessibility of the application, the rapid sending/receiving of alerts, and the ability to send alerts via multiple communication devices, (i.e. cell phone, computers, land lines) and multiple mediums, (i.e. email, text, voice) at once. The testing of this application was limited to iPhone users and recommendations to encompass all types of smart phone technologies in future events are encouraged. Overall, the application proved to be a valuable asset in
completing the goal of effectively disseminating information from X24 team members to participants and vice versa.

**Cartography**

The emergence of the Geospatial Web and particularly Web Mapping 2.0 has led to increases in geobrowsing activities (e.g., browsing through Google Maps or Google Earth). Web maps can function as an interface or index of additional information in a way that facilitates the up-to-date, dynamic, and interactive presentation and dissemination of geospatial data to many more users at a minimal cost. Web maps also allow users to explore and find answers to location-specific questions as opposed to mainstream media’s broad reporting. Google Maps, Sahana, and OpenStreetMap were used for geotagging—a process of tagging images and injects from X24 to various open layers, in the form of geospatial metadata, where users can find a variety of location-specific information. By making it possible to integrate different types of data from diverse sources, collaborative post-disaster efforts were able to strengthen analytical capabilities and decision making for disaster response.\(^5\) The current architecture for these programs uses remote user profiles and allows dissemination of post-disaster damage maps without any major constraints. Collaboration gives emergency management organizations a pool of expertise far larger than one organization itself can provide.\(^5\)

Sahana offered X24 a multitude of software programs including web based collaboration tools that addressed common coordination problems during a disaster. These include finding missing people, managing aid, managing volunteers, and tracking camps effectively between Government groups, NGOs, and the victims themselves. From the Haiti earthquake to the Pakistan floods, Sahana has had several successes in utilizing their software programs during a real-time disaster. The following figures (see Figures 20, 21, 22, 23, and 24) demonstrate the different capabilities offered by Sahana during X24:

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\(^{54}\) Maiyo, “Collaborative Post-disaster Damage Mapping,” 225.

Figure 21. Screen capture of Location Registry. Software tracks data on all important places to the disaster response, such as temporary shelters and medical facilities. Source: Sahana. “OpenStreetMaps and Walking Papers.” Lecture, San Diego State University, San Diego, CA, September 7, 2010.
People Finder, Location Registry, and Request Management by Sahana all proved to be valuable tools during X24. The ease and simplicity of the programs meant they were highly accepted and utilized by participants. OpenStreetMaps, another successful tool for X24, provided a Wiki-style map of any location in the world that users could edit. Walking papers allowed users the ability to select an area on a map (see Figure 23) where OpenStreetMap’s software had coded the data and permitted users to easily create coded maps for printing (see Figure 24). Once the walking papers had been updated with written data, participants digitally scanned their map into the cloud software of OpenStreetMap. The software allowed layered data to be complied digitally for other users who were remote so that they could gain knowledge of the situations on the ground. After a major disaster, situational awareness is key in determining which roads are accessible, what buildings have suffered critical infrastructure damage, or where the nearest shelter is located.

The data produced by Sahana and OpenStreetMaps provided several solutions to problems brought about by major disasters, both during the event itself, and in the immediate aftermath. As reported by the US National Research Council, “data and tools should be essential parts of all aspects of emergency management—from planning for future events,
through response and recovery, to the mitigation of future events... Yet they are rarely recognized as such, because society consistently fails to invest sufficiently in preparing for future events, however inevitable they may be."55 While these tools were beneficial to the survey respondents who had utilized it, only a few X24 participants tested the technologies firsthand due to time constraints of the exercise.


REMOTE IMAGERY

As emergency crews undertake rescue operations in a disaster site, they are mobile and cannot always rely on wired connections for information and decision support from a real-time GIS-based intelligence emergency response system. Handheld Unmanned Vehicles (UAV) however can be deployed by UAV teams to assist in remote imagery data collection. During X24, RP Flight Systems deployed various remotely operated and autonomous systems that included a Spectra UVA (see Figure 25), a tri-copter craft, and a remotely operated ground vehicle. The Spectra airframe complies with the emerging FAA standard of 2 kilograms (4.4lbs) weight parameters for maximum flexibility and can be

outfitted to operate in many environments, including water landings and the ability to fly in inclement weather.\footnote{57 RP Flight Systems, “Spectra” (lecture, San Diego State University, San Diego, CA, September 25, 2010).}

The Spectra flying wing platform has been designed specifically to loft high-resolution imaging equipment with visible and near infrared spectrums, along with onboard streaming video sources. The imagery provided an aerial view of affected infrastructure, real-time video of event progression, and the cost and safety benefits of having it unmanned.\footnote{58 Ibid.}

NEOS, LTD and its technology enterprise partners, Team Mosquito, also fielded a UAV with an integrated ultra-light aircraft system, “Mosquito” (see Figure 26) that acquired, processed, and published very high resolution video and image intelligence during X24. This form of actionable intelligence was delivered in a timely, flexible, and affordable manner. The tactical image and situational video information provided geo-spatial data related to surface features, down to a few centimeters in detail, that could be scientifically measured.
and compared over time (and in real time) to document conditions, impacts, and changes from the inject scenarios. The Mosquito intelligence solution ensured that the end-user had complete control over all aspects of data flow including flight planning, automated data acquisition, automated processing, publication, and integration with other GIS information. The cost benefits compared to the US Military’s Drone are exponential in savings with the same high-quality remote imaging available.

**SOCIAL MEDIA**

With over 500+ million active users with a Facebook account and another 100+ million followers on Twitter, it is clear why X24 team members decided to select these two social media outlets to track the flow of data being disseminated across the globe. Over 90% of the participants acknowledged to having either a Facebook or Twitter account. Injects were communicated over both social media components by BuzzMgr. BuzzMgr’s purpose was to uncover patterns of public use of social media as people learned about X24 and when

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59 NEOS, “Team Mosquito: Increasing Dynamic Intelligence” (lecture, San Diego State University, San Diego, CA, September 25, 2010).

60 Ibid.

61 Bressler, interview.

62 Ibid.
they shared the disaster information. The study included tracking public perception about the gravity of the event, quality of response, info sharing, and expectations. BuzzMgr was responsible for sending requested injects and those from the X24 team over Facebook and Twitter (see Appendix D). After tracking the information, BuzzMgr gives the response a “Buzz Rating” which quantifies volume and impact of conversations. Appendix E highlights the BuzzMgr Executive Summary from Exercise 24 and demonstrates the data presented in their findings. Figure 27 illustrates how data is collected and analyzed by BuzzMgr in this organizational chart of data collection.

Social media is an immense tool for reaching out to a large audience around the world. However, respondents of X24 in their After-Action Survey (see Appendix F) found that the amount of unverifiable information in a real-time crisis is generally overwhelming within social media channels. In addition, users felt there was a lot of interesting information, but the social media aspect was un-actionable. In other words, some participants felt their

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63 Kathleen Hessert, “BuzzMgr” (lecture, San Diego State University, San Diego, CA, September 24, 2010).
organizational protocols would not allow them to move forward based solely on civilians “tweetin” or “facebooking” alone. The author also identified complications with the Twitter website during X24 (see Figure 28). The “overcapacity” non-functioning failures were previously unknown, but are common on a daily basis for a number of individuals. This study does not believe the exercise had any direct relation to the system failures reported.


There will need to be a considerable amount of research on ways to improve the perceived credibility of messages from the public to responders and vise versa. 65% of respondents felt social media originating from a general member of the public is likely to be inaccurate. This study suggests reliability in social media will need to originate from the accounts of X24, or similar emergency management agencies pushing the message outward while cautiously handling any reports coming inward.

Overall, injects being relayed over social media components generated over 10,000 hits to the X24 website during the two-day exercise. The Buzz Rating and Google Analytics report (see Appendix G) from the InRelief website provided sufficient proof that the injects released over Twitter and Facebook created situational awareness to the public, which resulted in a multiplier effect across the globe that sent users to the X24 webpage at
InRelief.org. The following highlights were provided by both reports and the X24 Executive Summary (see Appendix H):

- 84% of the visitors to the Exercise24 websites were first time visitors, not return or long-time users.
- The overall “Bounce Rate” (the percentage of single-page visits or visits in which the person visited only the home page) was very small – 1.27%.
- Referrals from other sites (excluding inrelief.org related sites) accounted for 74% of the visitors to the Exercise24 websites. Significantly, referrals from CNN’s website accounted for 50.5% of the non-inrelief.org related visitors, suggesting that traditional media still has an important role in humanitarian assistance and disaster response.
- Website visitors were located in 79 different countries, spoke 33 different languages, and were located on every continent of the planet (except Antarctica).
- Visitors reached the Exercise24 websites using mobile devices as well as personal computers.
- The BuzzMgr snapshot report indicates that visitors to the websites stayed long enough to develop opinions regarding the conduct of the exercise.

The combination of these facts indicates that the exercise generated a considerable amount of “first-time” visitors to the X24 websites. The low “bounce rate” indicates that visitors to the X24 website found the information being presented interesting. The widespread home locations of visitors to the X24 website indicates that this is a worldwide concern, not a just a US concern. Finally, comments on the BuzzMgr snapshot reports indicate that while the exercise left some visitors dissatisfied, they were interested enough to provide suggestions for improvement in the process.64

**INRELIEF.ORG**

The InRelief.org website hosted the cloud computing platform for the X24 event. The site was easily accessible to all users and offered a Wiki of tools and support applications to carry out aspects of the Rayport and Heyword model to reach the fullest potential in an exercise scenario for cloud computing. This Wiki of tools was known as the X24 Dashboard (see Figure 29). The Dashboard included private and public reporting options and allows

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64 Ibid.
registered participants access to: Google Calendar, Google Docs, Google Groups, Google Mail/Chat, and aggregated mainstream social media.

The secure, unmonitored private domain, 25GB of email storage, unlimited online real-time collaborative documents, multi-lingual chat translations, and online shared calendars with SMS notifications provided by InRelief created an optimal EMIS solution for participants of X24. The operational agility and resilience, rapid response, scalability, security, cost-effectiveness, and network availability demonstrated above sets a high precedent for using cloud solutions for humanitarian assistance and disaster relief, as well as for future training and exercises used to as preparation for such disaster response and relief efforts.

Figure 30 is a glimpse of the Global Aid Management system offered by InRelief as part of the X24 application. Virtual aid is a new and open area for research and development. These tools utilized Google spreadsheets in the cloud computing environment so that organizations could provide the following information:
Figure 30. Screen capture of global aid management application. Source: InRelief. “Global Aid Management.” InRelief. https://sites.google.com/a/inrelief.org/24 (accessed Sept. 24, 2010).

1. Aid Offered (Pull Logistics)
   - Resource, personnel, aid available to the community in need.
   - Name of Organization offering aid.
   - Point of Contact for aid offered.
   - Point of Contact email and phone number.
   - Location of resources, personnel, and aid.
   - Notional method of travel, shipment, and estimated duration of travel.

2. Aid On the Way (Push Logistics)
   - Resource, personnel, aid responding to the community in need.
   - Name of Organization sending aid.
   - Point of Contact for aid.
   - Point of Contact email and phone number.
   - Method of travel, shipment, and estimated time of arrival.

3. Red Cross ("We Have, We Need")
• Red Cross will explore posting requests for aid in an openly viewable spreadsheet where only Red Cross can input information.65

The application was successfully implemented and contributed to a new method of collaboration for the coordination of moving fabricated items from across the globe to areas in need of disaster relief, on behalf of the American Red Cross- San Diego division. The ease of the application allowed users to see how applications like Global Aid Management can change the outcome of a disaster in a positive way with tools and technologies located on most personal computers.

**DISCUSSION OF THE FINDINGS**

Overall, the responses received from participants in Exercise24 were optimistic and viewed social media is a valuable and powerful information tool in the future of emergency management. Participants were able to participate in new topics of discussion for how catastrophe training and exercises can be improved by utilizing available technologies and resources within an international, collaborative model of action. This research determined patterns in the AARs that contribute to a general consensus on improvements for X24 or similar social media exercises in the near future. These findings include:

• Social media is a valuable and powerful information and dissemination tool, but also has potential as a distractive force if data is not managed, analyzed, and acted upon in a methodical, planned manner.

• A hybrid of formal structure response capabilities combined with crowd sourced and informal self-activating capabilities appear to be the best sense of balance for disaster management and response.

• In the pre-exercise and exercise it was clear that training and practice using the technologies and common operational standards are necessary. When these new technologies failed to work, participants reverted to more familiar technologies—in this case email, texting and cell phones.

• Sidebar conversations were highly beneficial, but knowledge dissemination was limited to participants located within these private clouds.

• Groups within the exercise desired a degree of anonymity and separation from other participants and observers of X24. The main reasons for this is their comfort

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65 Bressler, interview.
levels or experience with exercises or groups wishing to experiment in private groups on information not pertaining to the general group exercise.

- Certain applications in video conferencing and chat (i.e. Global Talk and VSee) did not respond as efficiently in web browsers like Internet Explorer.
- The social media application GeoChat has several complications with sending and receiving user requests.
- There was confusion and a need for clarification about who the Point of Contact (POC) was for the various social media applications that were used during the exercise.
- Participants experienced with similar exercise trainings believed that the X24 injects were inclined to serve as an introduction to exercise environments instead of an actual, serious trial exercise, as per their expectations. Conversely, those less experienced with the social media or exercise environment tended to favor the visualization and informational approach of the disseminated injects.
- Participants often felt overwhelmed by the number of injects implemented in the short time frame of X24. However, individuals expected the data being pushed to be tremendously overwhelming, particularly because the exercise did not portray a complete end-to-end response and recovery due to simulation constraints.
- There was an inconsistency regarding the number of preferred chat platforms for participants to use as many felt they were redundant and somewhat overwhelming. On the flipside, users acknowledged that while in a crisis, information should be replicated in a variety of locations since people may be using various social media tools to communicate and gather information. Several suggestions included a “one platform” tool that aggregates the relevant discussions together.

As more applications and operating systems move into the cloud, and as big technology companies compete to provide them, customers stand to benefit from greater savings.66 The cost of collaboration, particularly for global companies, declines as colleagues share resources in the cloud. It is simply more efficient to treat software, development platforms, and applications as “services” that users “rent” rather than “products” they have to build and maintain on their own. Individuals are already benefiting from free, ad-supported, cloud-based services like Facebook and Gmail.

When individuals move into the clouds of social media, they are offered an array of applications to customize their individual needs. This applies to senior government officials, major mainstream media figures, and famous athletes and movie stars, which creates a

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powerful multiplier effect in spreading communications for humanitarian assistance and disaster relief. NGOs can raise millions of dollars for victims of a major disaster simply by having donors send a SMS text message from their smart phone device. This is likely to continue into the near future as disasters often impede the ability of citizens of an affected region to rebuild purely using their own financial resources.

There is no question that X24 was a great success as a social media awareness campaign in moving the global emergency management community toward a fifth generation command and control system. X24 was the beginning of an international, collaborative effort to engage participants in the capabilities of utilizing social media as a common tool of trade; understanding its uses is essential for educating communities around the world in emergency preparedness and response. The many elements that will need to be incorporated into future exercises were able to be determined through the analysis of X24. The evolution of future facilitated exercises will likely include articulated objectives within a more serious game mode, as well as a focus on the urgency of identifying and responding to mission critical gaps that only arise in rigorous exercises or real world events.
CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Agencies are inevitably stretched thin during a natural disaster or manmade emergency, especially one that threatens a large community with the loss of life and property. Agencies have limited staff and limited abilities to acquire and synthesize the geographic information that is vital to effective response. On the other hand, X24 and its cloud computing technologies equip the average citizen with the power of observation, and then empower them with the ability to register those observations, transmit that information through the cloud computing tools, and to finally synthesize the information into readily understood situational awareness models.

The objective of this thesis was to identify how X24’s comprehensive, science-based, holistic approach is valuable to the future of emergency management. Having a clear understanding of the technologies and capabilities of social media when integrated into a cloud environment like InRelief.org, allows support in mitigation, preparedness, response, and recovery. To accomplish these objectives and address the research questions at hand, the following was undertaken: qualitative research, direct observation as an X24 analyst, collection of AARs from participating X24 members, and a literature review.

LIMITATIONS OF THE STUDY

The limitations in this particular research and its conclusions can largely be attributed to the fact that the majority of the After Actions Reports received were from individuals within the County of San Diego. Probable reasons for this include that the primary location was the Visualization Center at SDSU in San Diego, California and possibly because the AARs were only available in English. This research is also potentially biased based on the perceptions arising out of the author’s participation as an administrative leader in X24.

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SIGNIFICANCE OF THE STUDY

As one individual wrote in her AAR report, “I had never realized or thought of the possibility that cloud computing could have [an effect] on a disaster scenario, but after this I can see the advantages of using this system and resources. It is a great tool that needs to be used to its potential.” The significance of this paper is that it demonstrates the importance of: establishing a shared knowledge set at various levels to work across boundaries; planning and negotiating future activities; and communicating during operations in order to resolve unanticipated problems. This study encourages finding the solutions that best meet current post-disaster challenges, and has come to believe that employing off-the-shelf social media services in conjunction with non-proprietary tools, in order to meet the demands of an EMIS cloud, is necessary for effective disaster management and response.

Analysis of the components of the collaborative relationships that develop the framework that in turn facilitates the interpersonal interactions across agency, intergovernmental, and intersectional boundaries is critical for the future of emergency management solutions in fifth generation command and control. The research points to a need for a new wave of professionals at various levels, to work across boundaries, plan and negotiate future activities, and communicate during operations to resolve unanticipated problems when it comes to humanitarian assistance and disaster response.68 Continuing virtual and open no-fault environments is required to limit errors over time and increase scalability, reliability, and quality control in future models of action.

RECOMMENDATIONS FOR FUTURE STUDY

Despite the lack of After Action Reports reported after X24, the author feels the quality and depth of responses from participants were sufficient in determining future recommendations for real-life response mechanisms as well as simulation trainings. With the number of participants in the InRelief.org project, several ideas were brought to light and warrant future study and consideration:

- When dealing with national security, a host of factors encourage “stovepiped” communications that make interagency coloration difficult. Extraordinary changes

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in law, organization, and processes will need to be actualized in order to clarify roles and responsibilities and improve relations in a crowdsourcing environment.

- There will be significant legal questions raised and precedents set by governmental use of cloud computing, and legislation addressing both IT and business needs and consumer fears and protections will need to be a major focus for future research.

- Pre-existing contracts and plans between federal (and possibly state) agencies should exist prior to disaster events. These contracts should clearly state requirements regarding the imagery, its collection time/processing, and delivery expectations. The need for such contracts is not a new concept for disaster event planning, but these may not be pursued for a variety of reasons.

- Security, accountability, privacy, and other concerns often drive national security institutions to limit the use of open tools such as social software, whether on the open web or behind government information system firewalls. Information security concerns are very serious and must be addressed, but understanding our restrictions may diminish our ability to effectively communicate as well.

- During the training session, a number of participants used Skype to collaborate. They naturally turned this into a Social Media Emergency Operations Center (EOC) for volunteer technical communities. This type of activity was found to be necessary to best capitalize on the crowdsourcing.

- With the vast amount of acronyms in emergency management, it is important to clarify which letters mean what. It would also be beneficial if all players, if participants would utilize the same symbols for mapping.

- Information about who the participants are and what they bring to the exercise should be collected well before the exercise date, as well as information regarding how can their tool or service can be combined with others to create innovative solutions. This will enable better collaboration.

- The realism and utility of exercises could be enhanced through the inclusion of "affecteds" in addition to "responders". Past experience has demonstrated that the persons on the ground who are affected by the disaster are the catalyst that drives social media takeoff immediately after the event. This has typically involved use of a wiki as a coordinating force, which by its very nature allows for expansion, rectification and the ability to branch-off as the response progresses.

- Social media can tend to lead to mass hysteria and the free flow of misinformation, and potentially disinformation. This can be minimized if organizations that are distributing accurate information (i.e. Red Cross) are sure to label and site their information. This will help to ensure the general public’s trust and reliance on information that comes from credible sources, and will encourage the public to access these sources first.
CONCLUSIONS

The “democratization of technology,” which brought about open and inexpensive cloud computing technologies, has given individuals caught in the midst of an emergency situation the ability to decide their own course of action through crowdsourcing readily available information. Citizens no longer have to be empty vessels waiting to receive unidirectional news from a government press release, the 6:00PM network news, or the morning edition of USA Today. Instead, they serve as information gatherers and receivers, as direct links between the multitude of resources that need to be utilized during and after a natural or manmade emergency situation.

It is important that information sharing in a crisis occurs between individuals within government, between government employees and communities of interest, between researchers and government data, between the government and its citizens, and between governments of different countries. There are only a few existing tools, policies, and trainings on the potentials of social media in emergency management. The challenge for future research is to ensure that planning measures are universally designed for all, are useful in the community, and promote equal access, dignity, choice, and security in response and recovery.
REFERENCES


Turner, Andrew. “Oil Reporting Platform.” Figure, crisiscommons.org (accessed September 5, 2010).


APPENDIX A

UNCLASSIFIED LIST OF ORGANIZATIONS
PARTICIPATING IN EXERCISE24
A3 Technologies, Inc.
Advanced Solution and Product Provider for Emergency Control, Ltd.
American Red Cross
Amy Fadida Consulting
Arizona Department of Health Services
ASIA Project
AskRisk.com
Barona Resort & Casino
Boss Safety Products
BuzzMgr
California Emergency Management Agency
California Department of Public Health
California Office of Border Health
Campo Indian Tribe
Carnegie Mellon Silicon Valley
Center for Disease Control
Center for Technology and National Security Policy
Christ Lutheran Church, San Diego
City of San Diego
City of Plano
City of Tijuana
County of San Diego: Health & Human Services Agency
County of San Diego: Office of Emergency Services
CrisisCommons
Cubic Applications, Inc.
Deaf Link, Inc.
Defentect Group, Inc.
DEL REY Systems & Technology, Inc.
Depiction, Inc.
Facebook, Inc.
Foothills Christian Church, San Diego
Futron Corporation
Geosemble Technologies, Inc.
Global Energy Network Institute
Global Readiness Solutions, LLC
Golden Acorn Casino
Google
Hughes Electronics Corporation, LLC
Humanity Road, Inc.
Hunter Whitney & Associates, Inc.
Incident.com
Inmarsat, PLC.
Innovative Support to Emergencies Diseases and Disasters (InSTEDD)
IReadySystems
JC Environmental Company, Inc.
Jamul Indian Village Tribe
Koomerang, Inc.
LifeGivingForce, LLC
LifeSavingAdvice
Los Coyotes Indian Tribe
MapAction
Maxin Consulting
Mexican Navy
Michigan State University
National Defense University
National Institute for Urban Search and Rescue
Near Earth Observation Systems, Ltd.
Nimbus Water Solutions
Nordic Geospatial Consulting
North American Aerospace Defense Command
Omega Systems, Inc.
Pacific Disaster Center
Pacific-Tier Communications
Pakistan Army
Pangea Foundation
Peace Lutheran Church
Pennsylvania State University
Philippine Institute of Volcanology and Seismology
PreCare, Inc.
Project Wildlife
Purdue University
R House Health & Safety
Reachback.org
St. Andrew’s Lutheran Church, San Diego
St. Brigid Parish, San Diego
Sahana Software Foundation
San Diego Red
San Diego State University
San Jose Water Company
San Ysabel Gaming Commission
SeaWorld
Seismic Warning Systems, Inc.
Sindh Supreme Court
SkylMD, Inc.
SMART Technologies
Sofcoast
Somali American Health Care Foundation
Southern California Coastal Ocean Observing System
Stanley Black & Decker, Inc.
STAR-TIDES
Synergy Strike Force
The Efiaa Group
Triggerfinger Software, Inc.
True System Designers (TRUSYS)
Twitter, Inc.
United Nations OCHA Columbia
United Nations Secretariat
United States Army
United States Coast Guard
United States Department of Defense
United States Department of Homeland Security
United States Department of Housing and Urban Development
United States Department of Veterans Affairs
United States European Command
United States House of Representatives
United States Marine Corps
United States Navy
University of California, San Diego
University of Louisiana, Lafayette
Velocidi
Western University
White Canvas Group, LLC
APPENDIX B

DAY 1: INJECTS FOR EXERCISE24
<table>
<thead>
<tr>
<th>T</th>
<th>F</th>
<th>S</th>
<th>BLOCK/DECAMET.</th>
<th>Title</th>
<th>Secondary Points</th>
<th>LAT/LON</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>MTVC issues a tsunami warning for the coast of the Canada, United States and Mexico. Further warnings issued in Northeast facing coasts of Mexico. General warning issued to Pacific Basin.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Submarine and underwater seismic activity triggered by the 69 second M 8.1, San Andreas Fault earthquake. The San Andreas Fault and the San Andreas block.</td>
<td></td>
<td>(34^\circ 26.35'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Eruptive activity of Six Point. Reports of very large pyroclastic flows and ash dispersal in the area.</td>
<td></td>
<td>(34^\circ 26.35'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Initial tsunami wave reaches Los Angeles, Long Beach harbor. Surge mesh large and extends toward the coast.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Initial tsunami wave reaches San Diego harbor. Surge mesh large and extends to the 50 meter elevation.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Tsunami wave reaches Los Angeles. Surge mesh large and extends to the 50 meter elevation.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Tsunami wave reaches Long Beach. Surge mesh large and extends to the 50 meter elevation.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>S</td>
<td>DELTA METER: Title</td>
<td></td>
<td>Secondary Points</td>
<td>LAT/LON</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>(a) Lifting-cooling mechanism on the Strombolian craters. Manganite deposit on the floor of the summit. Significant ash deposits cannot be seen in the remaining of the volume.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>(b) Lifting-cooling mechanism on the Strombolian craters. Manganite deposit on the floor of the summit. Significant ash deposits cannot be seen in the remaining of the volume.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
<td>(c) Lifting-cooling mechanism on the Strombolian craters. Manganite deposit on the floor of the summit. Significant ash deposits cannot be seen in the remaining of the volume.</td>
<td></td>
<td>(34^\circ 25.10'W/119^\circ 23.34'W)</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0:00</td>
<td>10 minute 32R8 flight initial traversal noted.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0:00</td>
<td>South meta report numerous supports personal trauma and trapped persons.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0:00</td>
<td>North meta report no damage in LA-AB Harris, flooding and small craft damage in Wilmington, East Beach and Huntington Beach.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0:08</td>
<td>Cracked support column and broken window reported at Matthew Memorial Hospital.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>0:19</td>
<td>Top floor of the hospital on the lower floors, patients and employees trapped.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:23</td>
<td>Low-lying areas are flooded, unoccupied homes and businesses damaged or destroyed. Highway 136, D Street, S. and S. do not operate due to various breaches in San Diego County.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:23</td>
<td>Social Media and Emergency communications report San Onofre Nuclear Power Plant partial evacuation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:23</td>
<td>Social Media reports of high-rise and vehicles reported at 1300 Pacifica. Pedestrians and businesses damaged or destroyed, persons warned and in safety, and Highway 1/2/405/101 affected.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:23</td>
<td>In San Diego Tidewater, sandbagging areas are handled, boats, bay front houses and businesses damaged or destroyed, and Highway 1/2/405/101 affected.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00</td>
<td>General bitten</td>
<td>1457-1458</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>------</td>
<td>-------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:00</td>
<td>Social media reports trawlers circulate overawed by incoming gale.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1:05</td>
<td>Social media reports minor flooding and a small craft damaged in fill of Beachy and Washington Harbor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00</td>
<td>Social media reports minor flooding and a small craft damaged in fill of Beachy and Washington Harbor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3:00</td>
<td>Social media reports minor flooding and a small craft damaged in fill of Beachy and Washington Harbor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4:00</td>
<td>Social media reports minor flooding and a small craft damaged in fill of Beachy and Washington Harbor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5:00</td>
<td>Social media reports minor flooding and a small craft damaged in fill of Beachy and Washington Harbor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6:00</td>
<td>Social media reports minor flooding and a small craft damaged in fill of Beachy and Washington Harbor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The table above is a partial summary of events reported on the given page. The time stamps indicate the timing of these events.
APPENDIX C

DAY 2: INJECTS FOR EXERCISE24
<table>
<thead>
<tr>
<th>T</th>
<th>F</th>
<th>E</th>
<th>23 BLOE/GCOA</th>
<th>Time</th>
<th>Primary Injects</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
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Lat/Long:
- 31°33′25.52″N/118°01′40.06″W
- 31°45′41.85″N/117°19′11.4″W
- 31°35′3.16″N/118°02′5.19″W
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<tr>
<th>T</th>
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<th>25 BLOECHA</th>
<th>Time</th>
<th>Secondary Injects</th>
<th>Lat/Long</th>
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<tr>
<td>X</td>
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<td>0:01  State disaster relief agencies and CA Nat’l Guard dispatched to affected areas. (Slide 4)</td>
<td>34° 3’13.53&quot;N/118°14’34.04&quot;W</td>
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<td>X</td>
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<td>X</td>
<td>0:01  US Military, FEMA, and other Federal Emergency Agencies authorized to dispatch assessment teams to affected areas. (Slide 5)</td>
<td>38°53’51.20&quot;N/77°2’11.63&quot;W</td>
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<td>X</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>0:01  Mexican Military, Civil, and Relief Agencies mobilized to affected areas. (Slide 6 &amp; 7)</td>
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<td>X</td>
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<td>0:20  Metropolitan Water District (MWD) authorities report water deliveries from Colorado River have stopped. (Slide 14)</td>
<td>32°40’38.75&quot;N/117°2’40.21&quot;W</td>
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<td>X</td>
<td>X</td>
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<td>0:30  Social media reports oil slick reported entering Buena Vista Lagoon. Reports of sixty injured and dead corrobors in Imperial Beach, CA and Playas de Tijuana, BC. (Slide 18)</td>
<td>32°31’12.85&quot;N/117°7’26.55&quot;W</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>0:45  Social media reports of West Lilac Road-Interstate 15 overcrossing collapses onto I-15. (Slide 19)</td>
<td>33°18’0.90&quot;N/117°9’0.17&quot;W</td>
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<td>X</td>
<td>X</td>
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<td>1:45  Social media and police communications report wild fire on east side of I-15. Subsequent reports that fire jumped freeway to west side of I-15. Police closed Freeway. (Slide 25)</td>
<td>32°26’29.75&quot;N/117°8’13.35&quot;W</td>
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<td>X</td>
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<td>X</td>
<td>2:00  Cell phone reports of holes developed on north end of I-805 bridge, above Friars Road on the north side of Mission Valley. (Slide 32)</td>
<td>32°46’23.52&quot;N/117°7’59&quot;</td>
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<tr>
<td>Time</td>
<td>Location</td>
<td>Event Description</td>
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<td>0:00</td>
<td>14°39'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Mayors in Report on aggregate of 3,000 dead, 27,600 injured, and 550,600 homeless. (Slide 9)</td>
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<td>0:15</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Mayors of Mexico City, Tijuana, Rosarito, and Ensenada, Mexico report 750 dead, 5,000 injured, and 500,000 homeless. (Slide 30)</td>
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<td>0:15</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Tribal Leaders for the Hopi Valley Reservation report 20 dead, 245 injured, and 300 homeless. (Slide 11)</td>
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<td>0:15</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Imperial Irrigation District report breaches and leaking sections of the American Canal will require 90 days to repair. (Slide 11)</td>
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<td>1:00</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Social Media reports from various Imperial Valley farmers that the loss of irrigation water for their crops. (Slide 20)</td>
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<td>1:00</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Mexican Aid workers report 150 US soldiers wounded with severe flu and intestinal illness.</td>
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<tr>
<td>1:15</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Social media reports of six oil-covered dead dolphins washed ashore, Laguna Beach, California. Additional reports of 10 dolphins in distress seen offshore Oceanside Harbor. (Slide 12)</td>
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<td>1:50</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Social media flooded with messages from persons suffering panic attacks.</td>
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<td>1:50</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Social Media reports total power outage on Hopi Valley reservation. Water supplies are dwindling, and evacuation of 1,200 families expected. (Slide 26)</td>
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<td>2:10</td>
<td>12°40'50.90&quot;N/115°22'50.06&quot;W</td>
<td>Social Media reports Bombay Beach completely destroyed. Retaining dikes breached and half of town flooded. Survivors camped out near Highway 111, but are in &quot;bad shape&quot;. (Slide 33)</td>
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<td>0:15</td>
<td>Social media reports of loss of power in Westmont, Bradley, Hesperia, and parts of Calexico, Imperial, and El Centro. (Slide 12)</td>
<td>33°21'38&quot;N/117°07'10&quot;W, 33°25'44&quot;N/117°31'14&quot;W, 33°43'52&quot;N/117°31'14&quot;W, 33°44'11&quot;N/117°21'15&quot;W, 33°44'11&quot;N/117°21'15&quot;W</td>
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<td>0:20</td>
<td>CBP agents report &quot;extensive numbers of persons&quot; trying to cross into US from Mexico at San Diego and Calexico Ports of Entry. (Slide 15)</td>
<td>33°21'38&quot;N/117°07'10&quot;W, 33°25'44&quot;N/117°31'14&quot;W, 33°43'52&quot;N/117°31'14&quot;W, 33°44'11&quot;N/117°21'15&quot;W, 33°44'11&quot;N/117°21'15&quot;W</td>
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<td>0:25</td>
<td>Mexican Civil Authorities report sheltering 3,000 US College Students in Ensenada. (Slide 16)</td>
<td>33°21'38&quot;N/117°07'10&quot;W, 33°25'44&quot;N/117°31'14&quot;W, 33°43'52&quot;N/117°31'14&quot;W, 33°44'11&quot;N/117°21'15&quot;W, 33°44'11&quot;N/117°21'15&quot;W</td>
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<td>0:25</td>
<td>WMF authorities report a two day supply of water in Southern California Reservoirs. (Slide 17)</td>
<td>33°21'38&quot;N/117°07'10&quot;W, 33°25'44&quot;N/117°31'14&quot;W, 33°43'52&quot;N/117°31'14&quot;W, 33°44'11&quot;N/117°21'15&quot;W, 33°44'11&quot;N/117°21'15&quot;W</td>
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<td>1:10</td>
<td>Stricken Pilgrim end loss of power shut down sewage treatment plants in Calexico. (Slide 21)</td>
<td>33°21'38&quot;N/117°07'10&quot;W, 33°25'44&quot;N/117°31'14&quot;W, 33°43'52&quot;N/117°31'14&quot;W, 33°44'11&quot;N/117°21'15&quot;W, 33°44'11&quot;N/117°21'15&quot;W</td>
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<td>1:10</td>
<td>Social Networks report many (1,000+) people in Mexico with severe flu and intestinal illness.</td>
<td>33°21'38&quot;N/117°07'10&quot;W, 33°25'44&quot;N/117°31'14&quot;W, 33°43'52&quot;N/117°31'14&quot;W, 33°44'11&quot;N/117°21'15&quot;W, 33°44'11&quot;N/117°21'15&quot;W</td>
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<td>1:26</td>
<td>Social Media reports five dead and twelve injured harbor seals in La Jolla, CA. (Slide 23)</td>
<td>32°52'51.88&quot;N/117°16'4&quot;W, 32°52'51.88&quot;N/117°16'4&quot;W, 32°52'51.88&quot;N/117°16'4&quot;W, 32°52'51.88&quot;N/117°16'4&quot;W, 32°52'51.88&quot;N/117°16'4&quot;W</td>
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<td>1:55</td>
<td>Social media reports large fires and explosions from fire on east side of I-15. Onsite observers report that fire is being fed from a natural gas pipeline. (Slide 29)</td>
<td>33°25'59.04&quot;N/117°56'2&quot;W, 33°25'59.04&quot;N/117°56'2&quot;W, 33°25'59.04&quot;N/117°56'2&quot;W, 33°25'59.04&quot;N/117°56'2&quot;W, 33°25'59.04&quot;N/117°56'2&quot;W</td>
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<td>1:55</td>
<td>Tweets from Heber report &quot;so much water on power or water.&quot; (Slide 29)</td>
<td>32°52'52.32&quot;N/117°31'4&quot;W, 32°52'52.32&quot;N/117°31'4&quot;W, 32°52'52.32&quot;N/117°31'4&quot;W, 32°52'52.32&quot;N/117°31'4&quot;W, 32°52'52.32&quot;N/117°31'4&quot;W</td>
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<td>2:20</td>
<td>Social Media from Calipatria report total power loss, municipal water supply, many destroyed buildings, and injured people. (Slide 36)</td>
<td>33°21'38&quot;N/117°07'10&quot;W, 33°25'44&quot;N/117°31'14&quot;W, 33°43'52&quot;N/117°31'14&quot;W, 33°44'11&quot;N/117°21'15&quot;W, 33°44'11&quot;N/117°21'15&quot;W</td>
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<td>0:20</td>
<td>News media reports</td>
<td>350,000 nonconforming shelters in L.A., Orange, and San Diego Counties. (Slide 10)</td>
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<td>0:25</td>
<td>Social media reports</td>
<td>Bodies (human and animal) washing ashore at Laguna Beach, Dana Point, La Jolla, and Del Mar.</td>
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<td>0:30</td>
<td>Social media report</td>
<td>Temperature reports in high 80's to low 90's along coasts and low 100's in Imperial Valley. (Temperatures similar in Arizona.)</td>
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<td>0:30</td>
<td>Social media report</td>
<td>Ongoing flooding of stores for water and food in El Centro.</td>
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<td>1:00</td>
<td>US Red Cross officials report</td>
<td>Sheltering 100 Mexican Nationals.</td>
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<tr>
<td>1:20</td>
<td>US Red Cross officials report</td>
<td>Outbreak of flu and intestinal illness among sheltered Mexican Nationals.</td>
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<td>1:45</td>
<td>Reports of severe dehydration</td>
<td>Occurring among sick US College Students in Mexico.</td>
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<td>1:50</td>
<td>Freighter Captain reports</td>
<td>Two-mile long slick of dead fish, mid- Gulf of California. (Slide 27)</td>
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<td>2:00</td>
<td>Social Media reports</td>
<td>Food rotting near corner S. Dery and W. Imperial Highway, LA. (Slide 28)</td>
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<td>2:00</td>
<td>Freeways in north and east out of affected area closed due to persons fleeing. Service stations report fuel out and food status and social media reports of looting among some service stations. (Slide 31)</td>
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<td>2:25</td>
<td>Truckers report</td>
<td>Eastbound I-8 blocked by rock fall in Jegr-Pah Pass. (Slide 35)</td>
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APPENDIX D

BUZZMGR SOCIAL MEDIA INJECTS FOR EXERCISE24
Exercise 24 Social Media Injects

The social media injects below will be released in social media during Exercise 24. Participants and volunteers are advised to either duplicate the messages below or edit the message while including similar details. The injects below are organized by agencies working with Exercise 24. Please also refer to the social media protocol when sending out messaging.

The numbers at the end of the social media injects will be used to signify the connection between the official inject and social media inject. Please refer to the "Exercise 24 Draft Inject" document on the Exercise 24 page. The first number at the end of the social media injects represents which stage the social media inject will appear, while the last number(s) are the specific cell row(s) of the inject.

Part 1

Mexican Response Organizations

#X24 ES UN SIMULACRO: NO REAL Info de tsunami del este y hasta el oeste en Baja por San Andreas eleno. Enviar rocate http://bit.ly/Exer24 Stage 1 Call roca 20 20


#X24 ES UN SIMULACRO: NO REAL Patrulla de mancha de aceite de CA costa informes sobre daños a la plataforma petrolera! http://bit.ly/Exer24 2-12

#X24 ES UN SIMULACRO: NO REAL La misma ola que golpeó LA acaba de estrellarse en la bahía de SD! http://bit.ly/Exer24 2-14


#X24 ES UN SIMULACRO: NO REAL ¡Gran ola golpea Todos les Santos! Ora por su seguridad! http://bit.ly/Exer24 2-16


#X24 ES UN SIMULACRO: NO REAL TV dijo que gran ola se dirigió hacia la costa! Todo el mundo fuera! http://bit.ly/Exer24 3-0


#X24 ES UN SIMULACRO: NO REAL Colapso el centro de los distritos de negocios, atrapando a miles bajo los residuos. http://bit.ly/Exer24 4-10


#X24 ES UN SIMULACRO: NO REAL Deslizamientos de tierras costera edificios colapso y atrapada a la gente! http://bit.ly/Exer24 4-12


#X24 ES UN SIMULACRO: NO REAL Además de Halcón informe Rd, nuevas grietas AAC este de Orchard Rd en el lado mexicano! http://bit.ly/Exer24 4-19

#X24 ES UN SIMULACRO: NO REAL Fuego! Los edificios se derrumbaron en el fuego de Herber y Calexico! http://bit.ly/Exer24 4-23

#X24 ES UN SIMULACRO: NO REAL Facebook Feed de noticias volviendo loco. Terremoto debe ser enorme! http://bit.ly/Exer24 5-12

#X24 ES UN SIMULACRO: NO REAL ¡En Facebook, deslizamientos de tierra en Tijuana! ¡Oren por los afectados! http://bit.ly/Exer24 5-12

#X24 ES UN SIMULACRO: NO REAL informes de cerca de 3000 atrapados http://bit.ly/Exer24 fronterizas mexicanas cerca o más allá 5-15

Coast Guard/National Guard

#X24 IS A TEST, NOT REAL [link] CNN.com Earthquake strikes coast of Southern and Baja California http://bit.ly/Exer24 1

#X24 IS A TEST, NOT REAL Earthquake! Coronado Bridge has broken! No way off the island! http://bit.ly/Exer24 1-2-7

#X24 IS A TEST, NOT REAL Earthquake! Coronado Bridge has snapped! People in the water! http://bit.ly/Exer24 1-2-7

#X24 IS A TEST, NOT REAL Reports of tsunami warning firm E then W in Baja due to San Andreas quake. Send rescue ASAP! http://bit.ly/Exer24 1-20-28


#X24 IS A TEST, NOT REAL Patrol off CA coast; reports oil slick after damage to oil rig! Another one?? http://bit.ly/Exer24 2-12


#X24 ES UN SIMULACRO: NO REAL ¡Ola acaba de golpear el puerto de LA! ¡Innumerables personas en peligro! http://bit.ly/Exer24 2-10

#X24 IS A TEST, NOT REAL Same wave that hit LA just crashed into SD bay! Water 1 km inland! http://bit.ly/Exer24 2-14

#X24 IS A TEST, NOT REAL 2 massive aftershocks follow main after San Andreas quake! Destruction unknown, but rising! http://bit.ly/Exer24 2-20-28 (San Andreas and resulting aftershocks occur @ 0:19:4-15, keep in mind)

#X24 IS A TEST, NOT REAL Local reports confirm earthquake 5 min ago. What magnitude?? It is everything OK?? http://bit.ly/Exer24 3-8

#X24 IS A TEST, NOT REAL TT: hundreds trapped under rubble in CA quake. #CNN report victims' tweet plea for help http://bit.ly/Exer24 4-8

#X24 IS A TEST, NOT REAL TV said large wave headed toward coastline! Everyone get out! http://bit.ly/Exer24 3-9


#X24 IS A TEST, NOT REAL Severe flooding in Catalina Island and boats breaking loose! How will they get off island?? http://bit.ly/Exer24 3-10

#X24 IS A TEST, NOT REAL Cali offshore oil well reporting rapid loss of pressure, does this mean another oil spill? http://bit.ly/Exer24 3-11


#X24 IS A TEST, NOT REAL RT @CNN: 30 min after Palos Verde quake, LA harbor bracing 4 flash flood. (How much damage?) http://bit.ly/Exer24 3-13-16 3-13-16


#X24 IS A TEST, NOT REAL Told highway 98 bridge over New River N of Mexico Airport completely gone! Cars in river! http://bit.ly/Exer24 3-25 (this is technically false, but inject said info came off phone calls, so this is a “hearsay” message)

#X24 IS A TEST, NOT REAL Reports frm famer: AAC complete break, flooding all the way 2 CA-98! Whole farm underwater! http://bit.ly/Exer24 3-28

#X24 IS A TEST, NOT REAL Heard hospitals are full or damaged. Where do the affected go? http://bit.ly/Exer24 4-7, 8

#X24 IS A TEST, NOT REAL SD and LA downtown business districts collapse, trapping thousands under rubble! http://bit.ly/Exer24 4-8


#X24 IS A TEST, NOT REAL Balboa H reports cracked windows & supports Patients quickly evac, increase demand on system! http://bit.ly/Exer24 4-10

#X24 IS A TEST, NOT REAL More bad news! Scripps H collapses on self, most inside trapped! Must be a rescue priority! http://bit.ly/Exer24 4-11


#X24 IS A TEST, NOT REAL Highway 1 cut off, stranding over 1000 ppl attempting to evacuate low younds! No timely rescue! http://bit.ly/Exe24 4-10

#X24 IS A TEST, NOT REAL In addition to Hawk Rd reports, new AAC breaches reported east of Orchard Rd, Mexican side! http://bit.ly/Exe24 4-22

#X24 IS A TEST, NOT REAL Birch/Bowker St down over ACC. Path blocked, waters rising. Evac area! http://bit.ly/Exe24 4-26

#X24 IS A TEST, NOT REAL Truckers report that 1-8 south of In-koh-pah is completely blocked off from mudslides! http://bit.ly/Exe24 4-27


#X24 IS A TEST, NOT REAL Refugees gathering in public areas, Red Cross where do we send them? http://bit.ly/Exe24 5-8, 11


#X24 IS A TEST, NOT REAL What should we do if people need help? Have no training! http://bit.ly/Exe24 Inject 5-8, 11


#X24 IS A TEST, NOT REAL Infrastructure looks like a mess! Can emergency responders even get to those in need? http://bit.ly/Exe24 5-23


Red Cross Chapters

#X24 IS A TEST, NOT REAL [El] Centro Earthquake strikes West of Southern and Baja California http://bit.ly/Exer24 1

#X24 IS A TEST, NOT REAL We share the same fate with our Mexican counterparts! Do not forget them! http://bit.ly/Exer24 2-16, 10

#X24 IS A TEST, NOT REAL 2 massive aftershocks follow mins after San Andreas quake! Destruction unknown, but rising! http://bit.ly/Exer24 2-20-28 (San Andreas and resulting aftershocks occur @ 0:13 0:16, keep in mind)


#X24 IS A TEST, NOT REAL Same wave that hit LA just crashed into SD bay! Water a km inland! http://bit.ly/Exer24 2-14


#X24 ES UN SIMULACRO: NO REAL ¡Gran ola golpeó Todos los Santos! Ora por su seguridad! http://bit.ly/Exer24 2-16


#X24 IS A TEST, NOT REAL TV said large wave headed toward coastline! Everyone get out! http://bit.ly/Exer24 3-9


#X24 IS A TEST, NOT REAL Flights frm Calexico grounded! Safe place 2 b during quake = the air, but tarmac is flooded. http://bit.ly/Exer24 3-26, 27

#X24 IS A TEST, NOT REAL Ferris rep is that AAA's complete break, flooding in CA-80. Whole farm underwater! http://bit.ly/Exer24 3-28

#X24 IS A TEST, NOT REAL Heard hospitals are full or damaged. Where do the affected go?! http://bit.ly/Exer24 4-7, 8

#X24 IS A TEST, NOT REAL News showing thousands in street wounded! How is this happening? They need help! http://bit.ly/Exer24 4-8

#X24 IS A TEST, NOT REAL SD and LA downtown business districts collapse, trapping thousands under rubble! http://bit.ly/Exer24 4-8


#X24 IS A TEST, NOT REAL Balboa H report cracked windows & supports! Patients quickly evac, increase demand on system! http://bit.ly/Exer24 4-10

#X24 IS A TEST, NOT REAL CNN reports that OC healthcare system 60% operational. Thousands injured need assistance http://bit.ly/Exer24 4-10, 11

#X24 IS A TEST, NOT REAL More had news! Scripps H collapses on self, most inside trapped! Must h rescue priority! http://bit.ly/Exer24 4-11


#X24 IS A TEST, NOT REAL TV reports that ppl in Playas de Rosarito far worse: some washed out 2 sea! Who helps them? http://bit.ly/Exer24 4-15

#X24 ES UN SIMULACRO: NO REAL ¡La gente saca a la mar! ¡Casas destruidas! ¡Caminos inundados! http://bit.ly/Exer24 4-15

#X24 IS A TEST, NOT REAL Highway 1 cut off, stranding over 1000 ppl attempting 2 evacuate low grounds! No heli rescue? http://bit.ly/Exer24 4-15

#X24 IS A TEST, NOT REAL Flights grounded @ Imperial County Airport due to cracks in taxi and runway. http://bit.ly/Exer24 4-20-21

#X24 ES UN SIMULACRO: NO REAL ¡Fuego! Los edificios se derrumbaron en el fuego de Herber y Calexico! http://bit.ly/Exer24 4-20

#X24 IS A TEST, NOT REAL Refugees gathering in public areas, Red Cross where do we send them? 

#X24 IS A TEST, NOT REAL Heart hospitals damaged/overwhelmed. Where do injured go? How do they 

#X24 IS A TEST, NOT REAL What should we do if people need help? Have no training! 

#X24 IS A TEST, NOT REAL RT Red Cross Valencia Park shelter is full! Please go to Skyline shelter! 

#X24 IS A TEST, NOT REAL UN SÚNDAZCO: NO REAL Informes del terremoto en Tijuana, casas enteras nivelado Red Cross 

#X24 IS A TEST, NOT REAL UN SÚNDAZCO: NO REAL [Vi en Facebook, deslizamientos de tierra en Tijuana! ¡Cen por los 

#X24 IS A TEST, NOT REAL Reports of close to 3000 trapped near or past Mexican border, half US 
Evac. @Peta http://bit.ly/Exer24 5-16

#X24 IS A TEST, NOT REAL Informe de seguimiento: el drenaje barcos daños aguas en Todos 

#X24 IS A TEST, NOT REAL News reports that bridges on I-5 collapsed & Amer. Canal is flooding rd, ppl 

#X24 IS A TEST, NOT REAL UN SÚNDAZCO: NO REAL [Gente atrapada en casas en Tijuana] todavía necesita de 

#X24 IS A TEST, NOT REAL Reports of additional hundreds still trapped in Tijuana rubble! Who is 

#X24 IS A TEST, NOT REAL Infrastructure looks like a mess! Can emergency responders even get to 

#X24 IS A TEST, NOT REAL CBP reports flood along hwy 7, prevents travel b/t US & Mex! Affect those 


#X24 IS A TEST, NOT REAL Those wounded in Cal quake/flood lack adequate medical help, getting 

Other First Responders
#X24 IS A TEST, NOT REAL [[link] CNN.com Earthquake strikes coast of Southern and Baja California 

#X24 IS A TEST, NOT REAL Earthquake! Coronado Bridge has broken! No way off the island! 
#X24 IS A TEST, NOT REAL Earthquake! Coronado Bridge has snapped! People in the water!


#X24 IS A TEST, NOT REAL Reports of tsunami coming from E then W in Baja due 2 San Andreas quake. Send rescue ASAP! http://bit.ly/Exer24 1-20-28


#X24 IS A TEST, NOT REAL Huge wave just hit LA harbor! Countless people unaccounted for!


#X24 IS A TEST, NOT REAL Same wave that hit LA just crashed into SD bay! Water a km inland!

#X24 IS A TEST, NOT REAL 2 massive aftershocks follow minutes after San Andreas quake! Destruction unknown, but rising! http://bit.ly/Exer24 2-20-28 (San Andreas and resulting aftershocks occur @ 0:13-3:15, keep in mind)


#X24 IS A TEST, NOT REAL TV said large wave headed toward coastline! Everyone get out!

#X24 ES UN SIMULACRO: NO REAL ¡Playas inundaciones en Playas de Tijuana! ¿Están todos bien?

#X24 IS A TEST, NOT REAL Severe flooding in Catalina Island and boats breaking loose! How will they get off Island?? http://bit.ly/Exer24 3-10

#X24 IS A TEST, NOT REAL Carls offshore oil well reporting rapid loss of pressure, does this mean another oil spill? http://bit.ly/Exer24 3-11

#X24 IS A TEST, NOT REAL Authorities chase surfers off beach as more aftershocks cause large waves.

#X24 IS A TEST, NOT REAL RT @CNN: 30 min after Palos Verde quake, LA harbor bracing 4 flash flood. (How much damage?) http://bit.ly/Exer24 3-13-15

#X24 IS A TEST, NOT REAL Whole neighborhoods leveled, flooding throughout CA! Need help! People hurt!


#X24 IS A TEST, NOT REAL Told highway 86 bridge over New River N of Calexico Airport completely gone! Cars in river! http://bit.ly/Exer24 3-25 (this is technically false, but inject said info came off phone calls, so this is a “hearsay” message)

#X24 IS A TEST, NOT REAL Flights out of Calexico grounded! Safe place 2 b during quake = the air, but tarmac is flooded. http://bit.ly/Exer24 3-26, 27

#X24 IS A TEST, NOT REAL Farmer reports that AAC complete break, flooding all the way to CA-86! Whole farm underwater! http://bit.ly/Exer24 3-28

#X24 IS A TEST, NOT REAL Heard hospitals are full or damaged. Where do the affected go?! http://bit.ly/Exer24 4-7, 8

#X24 IS A TEST, NOT REAL News showing thousands in streets wounded! How is this happening? They need help! http://bit.ly/Exer24 4-8

#X24 IS A TEST, NOT REAL SD and LA downtown business districts collapse, trapping thousands under rubble! http://bit.ly/Exer24 4-8

#X24 IS A TEST, NOT REAL Scared victim calls 4 help waiting 1hr but no one arrived. Plea goes out again 2 fire dept. http://bit.ly/Exer24 4-8


#X24 IS A TEST, NOT REAL Balboa H reports cracked windows & supports! Patients quickly evac, increase demand on system http://bit.ly/Exer24 4-10


#X24 IS A TEST, NOT REAL TV report that ppl in Playas de Rosarito far worse: some washed out 2 sea! Who helps them?! http://bit.ly/Exer24 4-15
#X24 ES UN SINULACRO: NO REAL ¡La gente saca a la mar! ¡Casas destruidas! ¡Caminos inundados!  

#X24 IS A TEST, NOT REAL Hwy 1 cut off, stranding over 1000 ppl attempting 2 evacuate low grounds!  

#X24 IS A TEST, NOT REAL Flights grounded @ Imperial County Airport due to cracks in taxi and runway.  http://bit.ly/Exer24  4-20-21

#X24 IS A TEST, NOT REAL In addition to Hawk Rd reports, new AAC breaches reported east of Orchard Rd, Mexican side!  http://bit.ly/Exer24  4-22

#X24 ES UN SINULACRO: NO REAL ¡Fuego! Los edificios se derrumbaron en el fuego de Herber y Calexico!  http://bit.ly/Exer24  4-23

#X24 IS A TEST, NOT REAL Buildings all over Herber collapsed, some on fire! Need help!  

#X24 IS A TEST, NOT REAL Birch/Bowker St down over ACC. Path blocked, waters rising. Evac area!  

#X24 IS A TEST, NOT REAL Truckers report that I-8 south of In-lah-pah is completely blocked off from muddiers!  http://bit.ly/Exer24  4-27


#X24 IS A TEST, NOT REAL Frantic people unable to reach 0111 Lines busy, who to contact? How?  


#X24 IS A TEST, NOT REAL Reports of close to 3000 trapped near or past Mexican border. half US Expats  http://bit.ly/Exer24  5-15


#X24 IS A TEST, NOT REAL Infrastructure looks like a mess! Can emergency responders even get to those in need? http://bit.ly/Exer24  5-23


Part 2

Mexican Response Organizations

#X24 IS A TEST, NOT REAL CA Gov declared State Emergency after earthquake! Click for more information: http://bit.ly/Exer24 1-2-7

#X24 IS A TEST, NOT REAL Pres Obama declared a Federal Emergency after the earthquakes in CA! Click for more info: http://bit.ly/Exer24 1-3-11

#X24 ES UN SIMULACRO: NO REAL El Gob. declaró estado de emergencia tras el terremoto de Baja! Haga clic para más info: http://bit.ly/Exer24 1-12


#X24 IS A TEST, NOT REAL Initial estimates: 700 dead, 5,000 injured, and 200,000 homeless in Mexico. http://bit.ly/Exer24 3-8-10


Coast Guard/National Guard

#X24 IS A TEST, NOT REAL CA Gov declared State Emergency after earthquake! Click for more information: http://bit.ly/Exer24 1-2-7

#X24 IS A TEST, NOT REAL Pres Obama has declared a Federal Emergency after the earthquakes in CA! Click for more info: http://bit.ly/Exer24 1-3-11

#X24 IS A TEST, NOT REAL News reports of more tar balls and oil globs on So Cal and Baja beaches http://bit.ly/Exer24 1-16
#X24 IS A TEST, NOT REAL Another aftershock! Strong one on Palos Verde Fault, takes out more buildings! http://bit.ly/Exe24 1-17

#X24 IS A TEST, NOT REAL Saw US Coast Guard ships in waters off Cali coast. Finally some help. So many people need it http://bit.ly/Exe24 2-2-7

#X24 IS A TEST, NOT REAL Whooosh, is this right? CA Water Dist reports water delivery from Colorado River has stopped?? http://bit.ly/Exe24 2-14

#X24 IS A TEST, NOT REAL News reports of oil appearing at or near Elvina Vista Lagoon, many dead animals on shore! http://bit.ly/Exe24 2-16

#X24 IS A TEST, NOT REAL Lilac Rd overpass collapses onto I-15! Need recovery teams to remove wreckage! http://bit.ly/Exe24 2-17

#X24 IS A TEST, NOT REAL Aerial video shows wildfires spreading, both sides of I-15! http://bit.ly/Exe24 2-18

#X24 IS A TEST, NOT REAL I-805 bridge near Mission Valley has weak points/holes appearing! Avoid if possible! http://bit.ly/Exe24 2-19

#X24 IS A TEST, NOT REAL Initial estimates: 1,300 dead, 27,000 injured, and 560,000 homeless in southern California http://bit.ly/Exe24 3-2-7

#X24 IS A TEST, NOT REAL Initial estimates: 766 dead, 5,000 injured, and 220,000 homeless in Mexico! http://bit.ly/Exe24 3-8-10


#X24 IS A TEST, NOT REAL More animals wash up on shore covered in oil. This time, it’s 6 dolphins – all dead. http://bit.ly/Exe24 3-16


#X24 IS A TEST, NOT REAL Retaining dikes @ Bombay broken, half city flooded. Survivors camped @ CA-111, in bad shape. http://bit.ly/Exe24 3-19

#X24 IS A TEST, NOT REAL CBP: "Excessive # of persons" cross into US from Mexico @ San Diego & Calexico Ports of Entry. http://bit.ly/Exe24 4-8-10


#X24 IS A TEST, NOT REAL Large explosion just N of Rainbow! Fires moving rapidly around I-15!  
http://bit.ly/Exer24  4-17


Red Cross Chapters

#X24 IS A TEST, NOT REAL CA Gov declared State Emergency after earthquakes! Click for more information:  http://bit.ly/Exer24  1-2-7

#X24 IS A TEST, NOT REAL Pres Obama has declared a Federal Emergency after the earthquakes in CA! Click for more info:  http://bit.ly/Exer24  1-6-11

#X24 IS A TEST, NOT REAL Oh good, FEMA is in town. Hope they're doing a better job than last time!  http://bit.ly/Exer24  2-8-11

#X24 IS A TEST, NOT REAL Saw FEMA agents, but only assessment, no aid teams! Where are the shelters, food and water??  http://bit.ly/Exer24  2-8-11

#X24 IS A TEST, NOT REAL Woah, is this right? CA Water Dist reports water delivery from Colorado River has stopped??  http://bit.ly/Exer24  2-14

#X24 IS A TEST, NOT REAL Initial estimates: 1,300 dead, 27,000 injured, and 550,000 homeless in southern California  http://bit.ly/Exer24  3-2-7

#X24 IS A TEST, NOT REAL Initial estimates: 700 dead, 5,000 injured, and 200,000 homeless in Mexico.  http://bit.ly/Exer24  3-8-10


#X24 IS A TEST, NOT REAL Imperial County Irrigation reports an estimated 90 days to repair the All American Canal.  http://bit.ly/Exer24  3-12-13


#X24 IS A TEST, NOT REAL Aid shelters & mobile hospital units overrun w/ ppl having panic attacks, taking up resources  http://bit.ly/Exer24  3-17

#X24 IS A TEST, NOT REAL Widespread loss of power in Westmorland (insert: Brawley, Heber, Holtville, parts of Calexico, Imperial, and El Centro). When should they expect power?

#X24 IS A TEST, NOT REAL CBP: “Excessive # of persons” cross into US from Mexico @ San Diego & Calexico Ports of Entry http://bit.ly/Exer24 4-4-10


#X24 IS A TEST, NOT REAL Municipalities in So Cal report 2 day supply of water in reservoirs.


#X24 IS A TEST, NOT REAL All electronics dead in Harbor. No power/water. pol stranded from floods, need supplies ASAP! http://bit.ly/Exer24 4-18


#X24 IS A TEST, NOT REAL High temperatures in Mexico and along inland CA causing dwindling water reserves to dive. http://bit.ly/Exer24 5-3-10

#X24 IS A TEST, NOT REAL RT Red Cross sheltering 400 Mexican nationals near border in Calexico.


Other Response Organizations


#X24 IS A TEST, NOT REAL Pres Obama has declared a Federal Emergency after the earthquakes in CA! Click for more info: http://bit.ly/Exer24 1-9-11

#X24 IS A TEST, NOT REAL News reports of more tar balls and oil globs on So Cal and Baja beaches

#X24 IS A TEST, NOT REAL Another aftershock! Strong one on Palos Verde Fault, takes out more buildings! http://bit.ly/Exer24 1-17
# Exercise 24

**NOT REAL** Saw US Coast Guard ships in waters off CA coast. Finally, some help. So many people need it.


**NOT REAL** Oh, good, FEMA is in town. Hope they're doing better job than last time!

[Link](http://bit.ly/Exer24-2-8-11)

**NOT REAL** Saw FEMA agents, but only assessment, no aid teams! Where are the shelters, food & water??


**NOT REAL** Woah, is this right? CA Water Dist reports water delivery from Colorado River has stopped??

[Link](http://bit.ly/Exer24-2-14)

**NOT REAL** News reports of oil appearing at or near Buena Vista Lagoon, many dead animals on shore!


**NOT REAL** TFST. NOT REAL 1,000+ overpass collapses onto I-15!? Need recovery teams to remove wreckage!

[Link](http://bit.ly/Exer24-2-17)

**NOT REAL** Aerial video shows wildfires spreading, both sides of I-15! 


**NOT REAL** I-805 bridge near Mission Valley has weak points/holes appearing! Avoid if possible!


**NOT REAL** Initial estimates: 1,000 dead, 2,000 injured, and 50,000 homeless in southern California.

[Link](http://bit.ly/Exer24-3-2-7)

**NOT REAL** Initial estimates: 700 dead, 5,000 injured, and 200,000 homeless in Mexico.

[Link](http://bit.ly/Exer24-3-6-10)

**NOT REAL** Happy Valley Reservation reports 6 dead, 145 injured, and 900 homeless.

[Link](http://bit.ly/Exer24-3-8-11)

**NOT REAL** Imperial County Irrigation reports an estimated 90 days to repair the All American Canal.

[Link](http://bit.ly/Exer24-3-12-13)

**NOT REAL** American farmers near Mexico border reporting substantial losses in crops from food damage.

[Link](http://bit.ly/Exer24-3-14)

**NOT REAL** More animals wash up on shore covered in oil. This time, it's 8 dolphins - all dead.

[Link](http://bit.ly/Exer24-3-16)

**NOT REAL** Aid shelters & mobile med units overrun with ppl having panic attacks, taking up resources.

[Link](http://bit.ly/Exer24-3-17)

**NOT REAL** Total power outage @ Happy Valley Res. over 1500 families affected. Water supplies low.

[Link](http://bit.ly/Exer24-3-18)

**NOT REAL** Bombay Beach completely destroyed! Nothing left but wet rubble. Where to go? What to do?

[Link](http://bit.ly/Exer24-3-19)

**NOT REAL** Retaining dikes @ Bombay broken, half city flooded. Survivors near CA-111, but in bad shape.

[Link](http://bit.ly/Exer24-3-19)
X24 IS A TEST, NOT REAL Widespread loss of power in Westmorland (insert: Brawley, Heber, Holtville, parts of Calexico, Imperial, and El Centro). When should they expect power?  

X24 IS A TEST, NOT REAL CBP: "Excessive # of persons" cross into US from Mexico @ San Diego & Calexico Ports of Entry  
http://bit.ly/Exer24 4-8-10

X24 IS A TEST, NOT REAL Mexican civil authorities report sheltering 2000 American college students at Ensenada.  

X24 IS A TEST, NOT REAL Municipalities in So Cal report 2 day supply of water in reservoirs.  

X24 IS A TEST, NOT REAL Calexico municipality reporting a shutdown of sewage treatment plants due to loss of power.  

X24 IS A TEST, NOT REAL Relief orgs & hospitals report a high # of ppl w/ flu like symptoms & intestinal illness.  

X24 IS A TEST, NOT REAL More hurt seals in La Jolla. Another 17 victims to mankind's failure to plan.  

X24 IS A TEST, NOT REAL Large explosion just N of Rainbow! Fires moving rapidly around l-15!  
http://bit.ly/Exer24 4-17

X24 IS A TEST, NOT REAL All electronics dead in Herber. No power/water, ppl stranded from floods, need supplies ASAP!  

X24 IS A TEST, NOT REAL New reports show 350,000 persons seeking shelter in LA, Orange, and San Diego Counties.  

X24 IS A TEST, NOT REAL High temperatures in Mexico and along inland CA causing dwindling water reserves to dive.  
http://bit.ly/Exer24 5-8-10

X24 IS A TEST, NOT REAL #CNN reports widespread looting of resources, including food and water in El Centro (insert town/city/location)  

X24 IS A TEST, NOT REAL RT Red Cross sheltering 450 Mexican nationals near border in Calexico.  

TEST NOT RT Red Cross need medicine in Calexico. Most refugees have flu or intestinal illness – bad water.  

X24 IS A TEST, NOT REAL American university students in Mexico sick and dehydrated. Lack of water for all refugees!  

X24 IS A TEST, NOT REAL Freighter Captain reports two-mile long slick of dead fish, mid-Catalina Channel.  

X24 IS A TEST, NOT REAL Online reports of food rioting near corner S. Dory and W. Imperial Highway, LA.  

X24 IS A TEST, NOT REAL RT @CNN price gouging and profiteering from fuel stations lining highways out of CA.  

X24 IS A TEST, NOT REAL All freeways N and E of quake/flood affected areas in SW US/Mexico r gridlocked w/ traffic.  
APPENDIX E

BUZZMGR SOCIAL MONITORING EXECUTIVE SUMMARY
Exercise 24
Social Media Monitoring

Prepared by:
Kathleen Hessert & BuzzMgr team
Sources of Discussion

- Twitter was the prominent source of discussion as volunteers took advantage of the immediacy of the site; blog and Facebook discussion may increase as individuals react deeper to the exercise.

- While the focus of Twitter conversation involved the spread of information, the discussion on Facebook included in-depth conversation. Many users exchanged ideas of how to better respond to disasters and provided recommendations for future drills, recovery periods, and communication blackouts. Several complained about having to use the official Facebook account to share suggestions so were alternately provided an email—tomsmith@buzzmgr.com.

- Traditional media focused on social media being used to help save lives. This creates an opportunity to supply news organizations with follow up on the entire exercise.

- Prominent Media Exposure: @twitter, @cnn, Technorati, OC Register, San Diego Union Tribune
• Dedicated core of the volunteers generated over half of the social media discussion. 24 accounts were responsible for 58.23% of total posts. *BuzzMrg systematically identifies those who comment most on the topic along with the most influential sources and authors on the topic. This information should be used to disseminate information to reach larger and more engaged audiences.

**TOP AUTHORS**

<table>
<thead>
<tr>
<th>Author</th>
<th>Posts</th>
</tr>
</thead>
<tbody>
<tr>
<td>@GeoFried2 (Twitter)</td>
<td>474</td>
</tr>
<tr>
<td>@RoyalAlert (Twitter)</td>
<td>462</td>
</tr>
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<td>@caesarTate</td>
<td>321</td>
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<td>@MichaelAid (Twitter)</td>
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<tr>
<td>@thedakota (Twitter)</td>
<td>140</td>
</tr>
<tr>
<td>@Fletcher (Twitter)</td>
<td>107</td>
</tr>
</tbody>
</table>

Discussion Themes

• Much of the discussion involved RTs that warned people that Exercise24 was a drill. People were willing to help the exercise and promote helpful information to their followers.

**Content type during Exercise24:**

- 18% - Actionable Posts
- 77% - Informative/Warning posts
- 5% - Responses from organisations

**Common Words used in online discussion:**

- earthquake
- spread of initial inject
- cnntech
- copy of CNN message
- Vaequakebound
- Humanity Road volunteer
- damage/injured
- much less attention

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• Individuals were willing to share updates from trusted sources - @Exercise24, @HumanityRoad, @CNN. These trusted sources must be established quickly in response to disaster.

• Two-way communication was much more prevalent with the @Exercise24 Twitter account on the second day of the exercise. More questions were asked by the account and by followers. Followers provided recommendations, offered assistance, and completed polls. Rest social media practices include real dialogue that can be leveraged into insight and action.

Disaster Relief Notes

• Most of the “action” by response teams was spread by volunteers, not the actual organizations.

• Simulated calls for help on social media were not answered by relevant organizations. This appears evident in actual disasters as well. Organizations may or may not be aware of the calls for help. When they are aware they may incorporate them into their decision making and even act on the calls for help. However, if they do not respond to the initial call for help communicating that they heard and are acting on it, the perception is “no help is coming.”

• There were multiple problems in the form of injects with few solutions from response/relief organizations on social media. Almost complete lack of two-way social media communication from involved organizations. Social media was used as media broadcast for only. There is a large opportunity to improve conversation between public and organizations in future exercises and actual disaster scenarios.

<table>
<thead>
<tr>
<th>Sentiment</th>
<th>Count</th>
</tr>
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<tbody>
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<tr>
<td>Negative</td>
<td>737</td>
</tr>
<tr>
<td>Very Negative</td>
<td>0</td>
</tr>
</tbody>
</table>

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Moving Forward

- Results from automated listening tools (BuzzMgr) during disasters should be improved through identification of clear goals for the types of information viewed as most valuable by key stakeholders. For instance, are disaster relief organizations looking for first person calls for assistance? Verification through third parties? etc.

- Agencies need to determine in advance, what the best route is for the monitoring tool to redirect relevant information in a timely manner.

- A social media version of 911 would help amplify the critical calls for help from victims. It’s clear that an innovative communication triage system would be a valuable addition to disaster relief. Lack of trust in social media messages is a major problem and calls for help from victims themselves are often drowned out by the larger public as they spread the news and discuss the event. This occurred in Exercise24 but was also evident in other disasters BuzzMgr has recently monitored. Victims cries for help need to emerge from the larger discussion and be prioritized and redirected based on greatest need.

- Education. Disaster relief organizations should educate the public that their social media calls for help provide as much detail as possible. This can help significantly decrease the response time saving lives and property.

- In an actual event, response organizations should not rely on one social media platform or account to distribute information. You need flexibility and options. With the use of multiple platforms and accounts you will expand your reach, not be limited to one group of followers, or crippled by one system failing. Additionally as referenced above different platforms are better used to accomplish different goals.

- Among its many important goals Exercise24 proved the willingness of the public to offer suggestions on how disaster relief organizations can use social media following a disaster. Disaster relief organizations can work with experts who can use new tools to help.

- Citizen groups can be invaluable in identifying and spreading vital information during a disaster. That said, with what is at stake, as well as the volume and velocity of social media communication during a major crisis, people aren’t enough. A layer of technology is required to optimally monitor, analyze, and alert multiple governments, agencies, etc. so that they can most efficiently and effectively achieve goals and deliver on missions.
APPENDIX F

AFTER-ACTION SURVEY QUESTIONS FOR EXERCISE24 PARTICIPANTS
After-Action Review: X24 Participant Survey

DEFINITION AND PURPOSE

An after-action review (AAR) is a professional discussion of an event, that focuses on performance standards and enables development professionals and colleagues with similar or shared interests to discover for themselves what happened, why it happened, and how to sustain strengths and improve on weaknesses. The AAR tool affords leaders, staff, and partners an opportunity to gain maximum benefit from every program, activity, or task. It provides:

- Candid insights into specific strengths and weaknesses from various perspectives
- Feedback and insight critical to improve performance
- Details often lacking in evaluation reports alone

The AAR provides the basis for learning successes and failures. The manager or leader does not learn in a vacuum: the people involved in an activity—those closest to it—are best poised to identify the lessons it offers. No one, regardless of how skilled or experienced they are, will see as much as those who actually carry out the exercise. The AAR is the keystone of the process of learning from successes and failures. Feedback compares the actual output of a process with the intended outcome.

QUICK NOTES

- An AAR is a dynamic, candid, professional discussion of the event, activity, or program itself. Everyone can, and should, participate if they have an insight, observations, or question that will help identify and correct deficiencies or maintain strengths.

- An AAR is not a critique or a complaint session. No one, regardless of rank, position, or strength of personality has all of the information or answers. AARs maximize learning by offering a venue for staff and leadership to talk frankly about a topic, produce a report, and better understand how to carry out similar events, activities, or programs in the future.

- An AAR is not a full-scale evaluation or a evaluation report. That is, an AAR does not grade success or failure.

An AAR answers four major questions:

* What was expected to happen?
* What actually occurred?
* What went well, and why?
* What can be improved, and how?

Your username [austin.howe@inrelief.org](mailto:austin.howe@inrelief.org) will be recorded when you submit this form. Not [austin.howe]? [Sign out](#)

[Continue »](#)
After-Action Review: X24 Participant Survey

Your username (austin.howe@inrelief.org) will be recorded when you submit this form. Not austin.howe? Sign out

* Required

Background

What is the name of your organization and position or responsibility within it? *

Are you filling this survey out as an individual participant or on behalf of your organization? *

- My Perspective
- Organization's Perspective
- Other:

Where is the headquarters of your organization located? Please provide City, Province (State), and Country. If you are not apart of an organization, please list your home location. *

Classify your organization? *

- Governmental (non-military)
- Governmental (military)
- International
- Extra-Governmental
- Non-Governmental
- Private Industry
- Faith-based
- Other:

Briefly describe your organization's purpose.
Briefly describe your organization's purpose.

May we contact you in the future regarding your AAR survey? *
- Yes
- No

Did you or your organization participate in providing services to: *
- 2004 Indonesian Tsunami
- 2005 Hurricane Katrina
- 2005 Pakistan Earthquake
- 2003 & 2007 California Fires
- 2010 Mexicali Earthquake
- 2010 Haiti Earthquake
- 2010 Pakistan Floods
- Other: [ ]

What kind of data does your organization provide? *
Check all that apply
- Imagery
- Electronic Maps
- Websites
- Missing Persons Locator
- News & Weather
- Communications (email/message boards/Twitter)
- Emergency Information
- Emergency Services Information (food, medical, water)
- Coordination
- Other: [ ]
After-Action Review: X24 Participant Survey

Did your organization have at least one person participate in the technology trainings provided by X24 leads? *

- No
- No, but trained through the online training videos
- Yes, 1 training
- Yes, 2 trainings

Did your organization have at least one person participate in the final planning conference? *

- No
- No, but trained through the online training videos
- Yes
After-Action Review: X24 Participant Survey

Your username (austin.howe@inrelef.org) will be recorded when you submit this form. Not austin.howe? Sign out

* Required

Exercises

Which day(s) did you or your organization participate in the X24 event? *
- September 24, 2010
- September 25, 2010
- Both Dates

When (date and time) did you or your organization receive notification of the crisis and a request for help? *
Please provide MM DD YYYY HH MM

What types of Social Media did you or your organization use during X24? *
- GEOChat
- Facebook
- Twitter
- Skype
- InRelief/USTream
- Phone Conferencing
- GlobalTalk
- Other:

Which tools (physical) did you or your organization use during X24? *

What are your or your organizations initial actions *
Check all that apply
- Notify higher authorities
- Conduct initial assessment
- Implement initial prepared responses/actions
- Notify supporting departments/agencies
- Notify first responders
- Other:
Do you or your organization have protocols when responding to requests for help in the event of a disaster? If so, please explain.

Check all that apply

When (time) did your or your organization first begin actions in response to the initial call for help?

Please provide MM DD YYYY HH MM

Did you or your organization provide aid in the form of: *

Check all that apply

☐ Personnel
☐ Material
☐ Transportation
☐ Medical
☐ Food and Water
☐ Aid and Comfort
☐ Communications and Computing
☐ Imagery and Mapping
☐ Spiritual or Psychiatric
☐ Other: ____________________________

What was your or your organization's response time to the initial request for help? *

☐ < 6 hours
☐ 6-12 hours
☐ 12-24 hours
☐ 24-48 hours
☐ 48-72 hours
☐ 72 hours, <7 days
☐ >7 days

How does your or your organization plan to move aid (personnel and/or material) to the crisis location? *

Check all that apply

☐ Air
☐ Rail
☐ Surface
☐ Waterborne
☐ >7 days
☐ Other: ____________________________
After-Action Review: X24 Participant Survey

Your username (austin.howe@inrelief.org) will be recorded when you submit this form. Not austin.howe? Sign out

Future Improvements

Are any of the Exercise24 resources redundant or overlapping?

Were the data provided by Exercise24 easily understandable? Why or Why not?

Which types of resources provided by the exercise or others are most valuable/usable to your or your organizations response?

Were “bottle-necks” (obstacles) encountered in obtaining X24 resources?

What “work-arounds” (solutions) were developed and used to overcome bottle-necks in obtaining resources?
Was the delivered information data usable and timely?

Was the amount of information being provided overwhelming? Underwhelming? Just right? Why?

Where the rules or protocols for using data and providing data to X24 resources previously known and easily understood?

Do you understand the advantages of cloud computing solutions and was it apparent during the exercise?

What other organizations would you include in the exercise?

Do you feel the use of social media could be effective in a real disaster?
What other organizations would you include in the exercise?

Do you feel the use of social media could be effective in a real disaster?

Do you have any recommendations for improving future exercises like Exercise24?

Additional Comments

Thank You Very Much!

Please remember to submit your survey. We appreciate your time!

-InRelief.org/Exercise24 Team

*** If you have pictures or relating documents/data relating to the exercise - please email it to austin.howe@inrelief.org

-you Send me a copy of my responses.

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APPENDIX G

GOOGLE ANALYTICS ON INRELIEF.ORG
(SEPTEMBER 23-27, 2010)
12,772 people visited this site

- 14,543 visits
- 12,772 Absolute Unique Visitors
- 54,363 Pageviews
- 3.74 Average Pageviews
- 00:04:35 Time on Site
- 1.29% Bounce Rate
- 83.80% New Visits

Technical Profile

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Traffic Sources Overview

All traffic sources sent a total of 14,543 visits

- 17.80% Direct Traffic
- 78.33% Referring Sites
- 3.88% Search Engines

Top Traffic Sources

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Pages on this site were viewed a total of 54,363 times

- 54,363 pageviews
- 21,307 unique views
- 1.29% bounce rate

Top Content

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APPENDIX H

EXERCISE24 EXECUTIVE TEAM SUMMARY
Executive Summary

The Immersive Visualization Center (VizCenter) at San Diego State University hosted a two-day virtual humanitarian assistance and disaster relief exercise September 24-25, 2010 called Exercise 24 (X24). This was the first time a collaborative HADR exercise of this scale has ever taken place online and integrated into real events. This precedent-setting event was conducted using the VizCenter-managed, US Navy-funded, collaborative cloud computing platform "InRelief.org," which was successfully employed during the Haiti earthquake response.

X24 was more than an exercise, it was and will continue to be an openly inclusive bridge between nations and communities around the world. X24 involved over 79 nations including Mexico, Colombia, Somalia, India, Pakistan, and Tribal Nations in addition to 90 U.S. government, non-government organizations (NGOs), and public/private partners including US European Command, FEMA, DHS/Science and Technology, US Customs and Border Protection, Red Cross, and Google in a collaborative environment using crowd sourcing (a method of gathering information or assistance from the global online community), social media, cloud computing applications, real-time chat, visualization maps, and live streaming video. Over 12,500 people visited the X24 dashboard during X24 with 46,475 page views, and a prolific social media participation with over 5000 individual posts to Twitter and Facebook alone during the exercise. One of the exercise observers, Mexican Navy Admiral Gomez, Commander of the 2nd Naval Region, plans to develop and host an X24 Mexico.

While there is a lead agency/government during a crisis, experience has proven governments, NGOs and public/private partners must work together to ensure that response is rapid, coordinated, and efficient. X24 tested the ability of multiple organizations to work together in an online environment. Participating organizations were able to collaborate openly through a variety of resources including multiple-user real-time document editing, chat tools with real-time language translations to breakdown language barriers during a conversation, Google Map visualizations with real-time damage assessments, casualties and SMS posts, and numerous flavors of VTC capabilities. Since the exercise took place in the cloud, users were able to participate around the world from any laptop computer, smartphone, and cell phone.

All events in the X24 scenario were participant-requested. The X24 Team consulted with NOAA, Pacific Disaster Center, California Seismic Safety Commission, and other experts to determine as many science-based causes as possible to foster realism. The scenario initiated with an earthquake off the coast of Huntington Beach, California, USA, generating: a catastrophic subsurface and surface oil spill; a tsunamigenic event off the coast of Baja California, Mexico; a large inland earthquake within the first hour resulting in notional reports of deaths and injuries;
damage to the All-American Canal, roadways, power lines, and other key resources and critical infrastructures in Southern California, USA and Northern Baja California, Mexico; a series of aftershocks, fires, loss of power, loss of water, disease concerns, and other challenges continued throughout the exercise to facilitate participant objectives.

The 150+ persons physically present at the VizCenter were able to connect with thousands around the world using the Internet and social-networking tools via Google, Twitter, Facebook, Ustream and many others—very much like the Haiti crisis response. The broad global community adoption of social media for communication has generated the necessity for social media aggregation and filtering of two-way social communications, which can become vital for decision making during an actual event. By linking appropriate technology such as smartphones, back-end cloud computing and visualization, and all for decision support to the front-line responder, X24 helped nurture and optimize solutions for complex emergencies in difficult settings. By doing this in a real-play format where the intensity of emergencies and controlled chaos takes place, this was really an orchestrated conversation of global players to better prepare for and already begin the response to the next major disaster. X24 as a template for enabling people, organizations, and countries to prepare for and respond to very difficult challenges will make a significant difference in future disasters and raises the bar of disaster collaboration in a wonderful way— but also raises the intense desire from highly motivated people to continue to work together and facilitate solutions in an increasingly challenging world. What is needed now is a specific roadmap for follow-on X24’s around the world.

Sincerely,

X24 Team

http://exercise24.org/