Lecture 7: Disaster Communications

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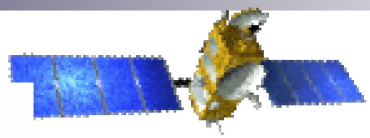
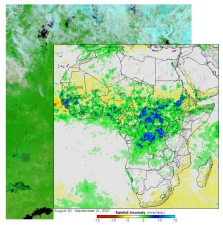
Humanitarian Logistics and Healthcare
March 2013

Former United Nations Secretary General Kofi Annan on the Role of Telecommunications for Humanitarian Assistance

Humanitarian work is one of the most important, but also one of the most difficult tasks of the United Nations. Human suffering cannot be measured in figures.....An appropriate response depends upon the timely availability of accurate data from the often remote and inaccessible sites of crises. From the mobilization of assistance to the logistics chain, which will carry assistance to the intended beneficiaries, reliable telecommunication links are indispensable (ICET-98).

A MULTI-HAZARD APPROACH







Preparedness

Emergency response

Recovery & Rehabilitation

Droughts

Floods

Storms

Fires

Vulcano

An Emergency Coordinator Speaks on a Tornado and Lessons Learned

This real-life set of experiences was documented by Andy O'Brien, Emergency Coordinator, Chautauqua County, New York, when a tornado hit his community. He composed his experiences and lessons learned in a letter published in the ARRL ARES E-Letter, December 21, 2011. The text has been paraphrased.

- I was unharmed — trees were down — so was power, cable TV, and the Internet.
- Tried my iPhone - No luck: Data services not available. The voice telephone of the iPhone worked, but sporadically

Lesson: *Cell phones (also called mobile phones, handys, etc.) are not reliable, even "smart" phones.* The infrastructure for cell phones can be destroyed and/or the cell sites can become overloaded when many are trying to communicate in this way.

An Emergency Coordinator Speaks on a Tornado and Lessons Learned

- I decided to respond via a 2-way radio that I could send email messages through a gateway to the Internet since the antennas were intact.
- I decided that I would not only respond to an emergency email, but copy the message to my supervisor and colleagues. But their e-mail addresses were not in the address book for the radio email program. I could not get into my e-mail account on-line to get their addresses.

Lesson: *Have a hard copy list of important e-mail addresses.*

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- I had access to a second radio technology and booted the modem only to receive a message informing me that it failed to initialize.
- Despite several attempts, I was never able to initiate a connection because I had not initialized a needed setting.
- Since the Internet was down, I could not simply telnet.
- The failure was not due to the program, but it was my failure. In two years of regular use, I had never made a connection with the Internet down.
- The problem would disappear once the Internet came back.

Lesson: *Test capabilities without the Internet.*

An Emergency Coordinator Speaks on a Tornado and Lessons Learned

- I tried voice on our agency's backup radio system. Despite weekly tests, no other station had its radio on.
- I forgot about other frequencies that could be used.

Lesson: *Have radio procedure information available for the organization.*

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- We have an account with PSKmail, which is yet another system, that uses radio to transmit email.
- I immediately connected and executed the send e-mail command.
- The e-mail began to transfer but an old unsent e-mail in my outbox was sent first.
- I waited 20 minutes and my new e-mail failed to transfer.
- A few weeks earlier, I had received a notice that an updated version of the software was available. I failed to install the new version when it was released, thinking that I would do it when I got time. Too late, I had no Internet to download it.

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First, I failed to check the outbox and remove unimportant e-mail. In an emergency, where power sources are scarce, wasting time and power due to an old unsent e-mail is not good.

Second, I failed to update a software release that eliminated known communication problems.

By this time, the cell phones were back up and I could send and receive texts and phone calls.

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5. I failed to perform critical software updates in a timely manner.
6. I failed to write out communications plans. Such a plan would not have caused me to forget two other methods that I could have easily used.

Timeline for Telecommunications Requirements During a Disaster

Communications: Staying Connected to the World

Understanding *real-time* information during disasters or emergencies is more than important – it is a matter of life and death.

The need for accurate, timely information during emergencies to take proper actions cannot be over emphasized.

The First 24 Hours

- Command/Control of emergency responders
- Initial call to relief/humanitarian organizations
- Sporadic on-scene news reports

The Next 24 Hours

- Continued search/rescue by first responders
- Logistics/Food/Shelter for responders and those displaced
- Disaster assessments by governmental-relief-humanitarian agencies
- Health and welfare calling - Letting relatives and friends know that you are safe
- Live news reporting

The First 30 Days

- Relief efforts continue
- Recovery operations begin
- Assess infrastructure rebuilding needs
- Full news coverage

Types of Communications Required

- Communications among first responders — Government — Relief — Humanitarian Agencies
- Communications getting information and news to the population

Strengths and Weaknesses of Communication Devices

Landline Phones: These are very efficient for less-severe events and are most accessible for reaching emergency personal employees, family, or citizens. Phones also offer the ability to create conference calls or command centers for full incident management. Phone lines may be compromised or tied up during a very-severe incident. Landline phones are ubiquitous in the developed world and much less available in the developing world.

Cell Phones: These are very efficient for contacting individuals. They are ubiquitous in both the developed and developing world. Their use requires the cellular infrastructure to be operative. Responders must have cell phones that are enabled in the disaster area.

Strengths and Weaknesses of Communication Devices

SMS (Short Message Service): While it takes longer to type a message than to speak it, SMS has proven to be often the most reliable method of communications. Because SMS messages require less bandwidth, the ability to send SMS messages is often available when a voice calling is not.

MMS (Multimedia Messaging Service): Most cell phones allow some type of MMS. Since the bandwidth requirements for MMS are higher than that for SMS, at times, MMS messages will not get through.

Strengths and Weaknesses of Communication Devices

Smartphones, Tablets, and Emails: Smartphones have proven valuable because they can receive email, voice, SMS, or MMS messages. However, they often rely on a corporate server or backup server that would need to be in a safe location distant from the incident. E-mail without a Smart Phone or Tablet is effective only in less-severe incidents when someone is near a computer.

Two-Way Radios - Conventional

- Two-way radios are ubiquitous among Police — Fire — Ambulance and other first responders.
- Two-way radios provide point-to-point communications to ensure adequate communication during a disaster.
- Two-way radios do not rely on phone lines, electricity (except to charge the batteries), or towers.
- They can typically be used within a range of 20 Km depending on terrain.
- They allow for regular voice communication and require minimal special training.

Two-Way Radios - Repeater and Trucked

- Two-way radio systems may use repeaters to extend coverage.
- Two-way radio may used trunking to provide frequency use efficiency.
- In both cases infrastructure such as repeaters at high locations or trunking controllers are needed.
- In case of major emergencies the infrastructure may be damaged or inoperative.

More Specialized Radio Systems

High Frequency Radio

- Allows transmission of voice and low-speed messages over short and long distances.
- Advantages - No infrastructure required. Can be used for large distances, thus suitable for disasters out of ones' local area or in remote locations.
- Disadvantages - Slow message speed and need for trained operators at each end.

More Specialized Radio Systems

Satellite Phones

- Often look like cellphones on steroids that will allow transmission of voice and data anywhere on the earth by bouncing the messages off a communications satellite.
- Advantages - Suitable for disasters out of ones' local area or in remote locations. Usually require only power at the site. Depending on the provider, often linked with the normal phone system.
- Disadvantages - Requires some training for the user. Cost is relatively high and agreements for satellite use must be made in advance.

Getting Information to the General Population

- Public media - Radio and Television
- Social Media
- New forms of Media.

Media - Radio and Television

- Radio and television for over half a century have been the dominant sources of information for most people.
- Most people have access to a radio/TV, which needs no infrastructure, except power (which can be provided by batteries).
- Radio and television infrastructure is relatively robust and redundant, usually surviving during a disaster.
- With the consolidation of media (at least in the US), many radio/TV stations produce less programming and, therefore, rely on information aggregated from more distant sources.
- *Emergency or Public Alert* Radios are available to alert families to oncoming tornadoes, storms, civil unrest, and any other form of emergencies.

Reverse 911 - Emergency Alerting Protocol

- Reverse 911 is a way for cities/towns/governmental agencies to send emergency information to all phones with a certain region. Different countries may have different codes.
- At first, worked only with landline phones - most systems now allow use of cell phones.
- The *Common Alerting Protocol (CAP)* standardizes the content of alerts and notifications across all hazards, including law enforcement and public safety as well as natural hazards such as severe weather, fires, earthquakes, and tsunami. Systems using CAP have shown that a single authoritative and secure alert message can quickly launch Internet messages, news feeds, television text captions, highway sign messages, and synthesized voice over automated telephone calls or radio broadcasts.

Social Media for *Real Time* Communication

In recent years, the use of social media such as FaceBook, Twitter, and web-based connections as a method of real-time disaster communications has skyrocketed.

When these systems are up and available to both victims and responders, the ability to communicate assistance, needs, resources, emergency instructions, and *real-time* situational ground reports is superior to nearly all forms of information gathering.

New Forms of Real Time Communication Emerging

Ushahidi — Ushahidi is of the greatest tools that has emerged this decade, which allows the mapping and tracking of a plethora of resources, needs, and the emergency status of both victims and responders. Created by spontaneous, international, all-volunteer programming teams, Ushahidis use for mapping in recent earthquakes (such as Haiti, New Zealand, and Japan) has proven to be invaluable in ways unimaginable only a few years ago.

In 2011, Ushahidi was used in New Zealand, the Middle East, India, Japan, Australia, and the Balkans for disaster relief.

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