Toward an Integrated Public Warning System

The number of crisis incidents and their severity is rising along with the growing complexity of technology and society. There are innumerable incidents that can disrupt daily functioning of society.

Recent Historical Overview

Interoperability Efforts

An important lesson from the events of September 11 was that emergency responders—police officers, firefighters, and emergency medical service personnel—need to exchange voice and data communications across disciplines and jurisdictions to successfully respond to day-to-day incidents and large-scale emergencies. This recognition lead to the major "Interoperability" initiative of the Department of Homeland Security (DHS): how to make it technically possible for emergency response agencies to talk to all parts of their own agencies— and communicate to agencies in neighboring cities, counties, or states.

Official Public Warning Efforts

Title XVIII of the Homeland Security Act of 2002, as amended, requires the DHS Office of Emergency Communications (OEC) to develop a National Emergency Communications Plan (NECP) that provides short- and long-term guidance to address national emergency communications deficiencies.

In addition, the FCC initiated a broad inquiry into the next iteration of the public warning system. With a focus on issues within its jurisdiction, its outcomes included a directive granting state governors the authority to trigger the national EAS system for statewide and geographically targeted areas. It contained rules providing for the dissemination of national alert messages over digital devices, as well as satellite and public television stations. It provided for the mandatory use of the Common Alerting Protocol (CAP). CAP is a simple but general format for exchanging all hazard emergency alerts and public warnings over all kinds of networks.[1] CAP allows a consistent warning message to be disseminated simultaneously over many different warning systems, thus increasing warning effectiveness while simplifying the warning task.

The Warning Alert and Response Network Act of 2006 (WARN Act) signaled Congress' incorporating other digital technologies, including wireless communications, into public warning. Section 603 of the Act directs the FCC to establish the Commercial Mobile

[1]For a fuller report on this effort and a list of its accomplishments with Multi- Band Radio, Voice over Internet Protocol, Statewide Communication Interoperability Plans (SCIPs), and available of interoperability tools, see: http://www.safecomprogram.gov/NR/rdonlyres/AC78D8BD-FADD-416F-8BEF-7F42884FB9C3/0/DHSInteroperabilityInitiativesFactSheet.pdf and the SAFECOM Web site (www.safecomprogram.gov). See also http://tetontectonics.org/Warning.html.

Service Alert Advisory Committee. The committee will develop and recommend technical standards and protocols to facilitate the voluntary transmission of emergency alerts by Commercial Mobile Service (CMS) providers.

R&D, Innovation and What's Missing

A full review of the materials cited above would lead some to conclude that there has been considerable R&D—all focused on creating a more robust technical system through technical improvements. But, as one person involved in training rural emergency responders recently commented," Public warning is all haphazard."

If we shift our attention from incremental invention to innovation, we begin to see a much broader horizon. This paper aims to consider and apply what is known about communication behavior and decisions of human systems in response to a crisis. It applies a hypothetical, but technically feasible, framework for reaching the public, as well as other agencies, in times of crisis and offers a hypothetical case study.

The Hypothetical System

Instead of addressing the needs of responders, imagine a technology that allows an emergency manager to send targeted simultaneous messages which can reach 85% of the population in 90 seconds. The system would be ubiquitous and have many fixed and mobile outlets for message receipt. The system would not be affected by network load and would be"non-cloggable". Such a system is technically feasible and can be built specifically to operate as a centralized system, integrated with both command and control and designed to validate, coordinate, and distribute messages to categories of people, to specific locations, or both. It would rely on all communications channels to ensure the message is delivered and integrate multiple sources of information. It would be intrusive and would wake people up and arouse the deaf and hard of hearing. Its range would be limited to the physical area affected in a particular emergency. Its subject matter would be dictated only by the needs of the community and its governance structure for deploying messages.

In this discussion, we will call this hypothetical system a URN ("Universal Response Network" or "Universal Readiness Notification").This speculation will consider how communications might be handled with a URN. The example used is built upon the 2005 subway bombings in London.

Hypothetical Case Study: July 2005 London Transit Attacks

The 2005 bombing of London's trains provide a case study in why performance standards and targeted messaging are important—especially the attainable one of being able to notify 85% of affected populations within 90 seconds.

Initially, a power surge was suspected, but the cellular system was quickly downed due to mass use. Communications to the public were problematic. Using a URN, different

kinds of notifications and warnings could have sent during different phases of the response.

Scenario 1: Identification of Event as Power Surge Problem

Officials initially thought the problem was a power surge. On this assumption, and even though the cell system was down, the URN would have been able to get messages to people in affected areas. At a minimum, messages would have helped to reduce panic and direct people not to enter trains until system integrity could be restored.

The URN would also have been able to direct people to alternate paths of transportation and provide emergency direction for the mass exodus of London hours later. This was a big problem at the time. The URN would have been able to provide points of contact for first aid, lost children etc. and taken advantage of other systems to help families get in touch with each other.

Scenario 2: Identification of Event as Likely Act of Terrorism with Rapid Response

Once analysts had identified the explosions as a likely act of terrorism, they could have mitigated the consequences of subsequent attacks. The URN would have allowed authorities to instantly broadcast information to millions of people simultaneously that could have minimized the effects of subsequent bombings and aided in responding to the events of the day. For example, a URN could have helped in London following the initial terrorist attack in averting additional casualties.

One reported chronology says London's explosions occurred at:

8:51 a.m. Aldgate Station

8:56 a.m. Russell Square

9:17 a.m. Edgware Road Station

9:47 a.m. Tavistock Square

<u>System-Wide Response</u>

The ability to respond on a system-wide basis to a likely terrorist event depends on the speed with which authorities are able to conclude terrorism has likely occurred and that other attacks make follow. If the early attacks were promptly identified as likely terrorist events by the appropriate authorities and a URN had been in place, the authorities might have:

- Sent messages to all mass transit carriers instructing them to immediately unload their passengers and move away from trains and buses that might be carrying bombs.

- Sent messages to evacuate tube (subway) stations. Fewer crowds near the potential site of an explosion mean less causality.

- Begun emptying areas surrounding bus stops and tube stations.

For instance, if after the second (Russell Square) attack authorities had concluded that a terrorist attack had commenced, by 9:10 a.m. these messages could have been sent and reduced the harm subsequently caused by the Edgware and Tavistock explosions.

Site-Specific Messages

Secondary bombs at bus explosion sites may have been planted. Initial blasts bring people to the windows; the second blast would have sent shards of glass into the curiosity seekers watching. Following each specific explosion:

- A geographically-targeted URN message could have been sent to all people within a predefined radius of the explosion sites warning them to stay away from the site and windows.

- Staged affinity group messages targeted by function and occupation could have been sent to first responders of all categories simultaneously with instructions stating what to do, and when and where to go to reach the explosion site. That way, medical staff could have been specifically directed to follow an emergency plan, including preferred route and schedule.

- Passengers could have been stopped from boarding mass transit for London. By reducing the in-flow of people, there would have been less congestion at off-loading sites and in the city overall. It could also have reduced demand for hotel rooms, food and emergency & medical supplies if the bombings had continued.

- Messages could have been sent to all hotels and tourist locations to stop tourists from inadvertently going to "at risk" areas or interfering with rescue/relief efforts. One of the major identified problems in emergency management is how to evacuate people who are not familiar with the geography or landmarks. They are often better served to shelter in place.

- Messages could have been directed to government and other workers “in transit” or not yet in transit not to come to work or travel into the city itself until further notification.

Given improved coordination of intelligence and development of protocols on faster identification of events as part of a multi-pronged terrorist attack, a strategic application of enhanced public mobilization and notification communications might prove a useful tool.

Moving Toward Adoption

Questions for Content Researchers

Having described what a URN might have accomplished in a London terrorist attack, the local EM and advisory councils and researchers might wish to consider:

- How can messages sent by the system be used more "strategically" to enhance the efforts and logistics of first responders?

- From the point of view of the American public and the responders on the scene, what message content and/or instructions are appropriate for the American public nationwide? For the public within 150 miles of a disaster? 50 miles? 10 miles? 2 miles? ½ mile? Two blocks? At the site? In a high rise building, at different floors?

- Which existing public warning systems are capable of giving appropriate message content to these different publics? Should all messages be the same? Should some be structured differently—e.g., for children? For the cognitively impaired?

- How can strategic message content be structured to take into account the ability to communicate to:

    - A small, specific geographic area of arbitrary shape, size and location?

    - Target audiences, determined by function, unit, rank, special cognitive ability or vulnerability or other affinity criteria?

    - Specific audiences with specific skills, located within arbitrarily defined geographic areas to facilitate mass mobilization efforts of volunteers and resources used in response to an emergency?

    - Specific audiences with cultures and languages that may find standard instructions difficult to follow?

    - Facilitate the logistics of evacuation relative to where roads and bridges are?

    - Keep public order and answer everyday life questions in the affected community (for example, are the school buses running on time?).

Questions for local governments

Since most emergencies occur at the local level, local responders need to consider whether a URN system would:

- Allow local emergency officials to disseminate warnings to the public and to local government officials and businesses in a timely manner during or immediately following:

- A life-threatening event?
- Routine public safety situations?

- Serve multiple purposes or impose additional employee workload and training requirements for single-purpose systems in public safety and local communications departments?
- Offer local officials the flexibility to warn people of purely local incidents (for example, notify rural residents of a wandering wild bear or search for child abductor's automobile license plate)?
- Impose minimal additional employee workload and training requirements in public safety and local communications departments?
- Spare local government the expense of constantly updating databases of telephone numbers of the public?
- Spare local government the expense and administrative burden of buying, integrating and training for redundant, single purpose systems?
- Spare local government a charge for each separate message recipient?
- Offer predefined message content but accommodate new messages written by the incident commander, without the incident commander having to use an intermediary or incur significant new charges to send the new message?
- Integrate with other sources of data and event information available from other affected agencies?

  Integrate with existing national systems of NOAA, NWS, EAS? (How would such an integrated system be governed?)

  Comply with ADA requirements and needs?

  Be cost effective in providing services to the public and other agencies?

  Attract the attention of workers in noisy industrial, commercial, and construction settings?

  Have the ability to transmit in multiple languages?

This paper suggests an alternative approach to standards for designing the next generation of public warning. Inevitably, it addresses only some of the issues involved. Readers are encouraged to contact the author with their thoughts on the questions

raised, additional research to be conducted and on how to build a coalition to accomplish such a system.

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