

Access Alerts: Making Emergency Information Accessible to People with Disabilities

Need

People with disabilities, like anyone else, need access to timely information when an emergency or weather warning occurs. People with disabilities also want ready access to local traffic and weather alerts, school closings and other community-based information. The primary sources for this information, radio and television broadcasts, do not consistently serve the needs of the 28 million people who are deaf or hard-of-hearing, or the needs of the 11 million people who are blind or have low vision. Broadcast and cable television news programs and updates often fail to include captions (for people who can't hear) or to voice on-screen information (for people who can't see), despite FCC requirements to do so. When an emergency is combined with a loss of power, the problem becomes even more severe, as back-up sources of information are not useable by people with sensory disabilities. Radio, telephone landlines or cell phones are not an option for people with hearing loss and TTYs require power. Web-based information and cell phone menus are often inaccessible to people with vision loss.

The need for an accessible, consistent, reliable and redundant multi-platform emergency notification system that effectively serves people with disabilities is recognized by both the Federal Communications Commission (FCC) and the Department of Homeland Security (DHS). The FCC has stated in various Report and Orders that collaborative efforts are needed to provide people with disabilities with access to all components of the existing emergency communications system — 1) 911 telephone call processing and delivery and wireless call dispatch; 2) radio and/or television and cable news and updates; and 3) the Emergency Alert System (EAS).

Most recently, the FCC held a “Emergency Communications and Homeland Security Summit” where government, industry leaders and stakeholders discussed creative ways to address, among other questions, policy issues that arise as communications services move to Internet-Protocol (IP) based platforms. The meeting focused attention on the ways persons with disabilities can benefit from alert services based upon IP technologies. The National Organization on Disability is also working with the U.S. Department of Homeland Security, other government agencies, emergency planners and responders and the disability community to ensure that emergency plans are developed that accommodate the needs of people with disabilities during future crises.

There are emerging national services and various local and regional systems in development that have the potential to meet the needs of users with sensory disabilities. Some communities are using reverse 911 systems to generate TTY calls or a pager alert system that is generated by activation of emergency sirens. Similarly, there are systems that can send digitized or speech-synthesized phone messages, providing a form of access for consumers with visual impairments. Some of these systems allow users to select their preferred mode of contact: via wireless technologies such as cell phones, pagers or PDAs or via e-mail or landline phone. Some systems support text streams, thus incidentally serving deaf consumers, and work is underway within the private sector to develop methods to transmit EAS audio messages in a text format. New siren systems are capable of providing audio announcements and different audio alert signals for

different types of emergencies, and evacuation systems are exploring the use of directional sound technologies.

The National Weather Service (NWS) has experimented with transmitting text messages over NOAA Weather Radio (NWR). New NWR receivers with LED displays have been developed that can alert deaf and hard-of-hearing consumers via flashing lights or vibrating alerts and display the type of warning. Some specialty products can receive the entire text of an NWR warning via satellite transmission. The Consumer Electronics Association has adopted a new specification, CEA-2009 (Receiver Performance Specification for Public Alert Receivers), which is designed specifically around NWR alerts.

But with the exception of the NWS effort and the specialty products mentioned above, few of the commonly deployed alert systems include features that fully meet the needs of consumers with disabilities. And deaf and blind communities need targeted access to a wide range of emergency-related information, of which NOAA alerts are just a single example.

Although emerging systems, services and products are developing a range of text and audio alert capabilities which could meet this need, most are inconsistent in terms of fully supporting appropriate modalities and accessible interfaces. Communications technologies are integral to the nation's warning and alert systems, and redundant strategies are being developed that will allow individuals to seek information that is specific and customizable, and delivered in flexible ways, such as to wireless handheld devices.

There is vital work to be done to ensure that people with disabilities are provided with equally appropriate and flexible methods of receiving information. There is a need for research and suggested structures for tailoring messages to be effective. For example, processing voice mail messages is also more time consuming for blind users which means the volume of information provided must be calibrated to ensure that consumers are well-informed without overwhelming them so much that they unsubscribe from the service in frustration. Further, users with disabilities may not be well-served by terse alerts that direct them to inaccessible sources for further information. And people with disabilities may require evacuation and recovery information that is substantially different than what will be delivered to other consumers.

The subscription path for many emergency alert systems is inaccessible: delivery systems that target cell phones with speech alerts must ensure that their sign-up pages are fully accessible to users who are blind or who have mobility impairments and who utilize assistive technologies to navigate. New digital television and consumer electronics-based public alert systems are designed to produce multimodal output, as needed by a range of users with sensory disabilities. However, many of these systems are embedded within consumer equipment that often requires the ability to operate on-screen menus, something blind and low vision users cannot currently do.

This project has generated great interest and support within the information and emergency alert community to learn how to address these needs and implement solutions.

Project goal

The WGBH National Center for Accessible Media (NCAM) proposes to unite emergency notification providers, information resources, telecommunications industry and public broadcasting representatives, and consumers in a collaborative effort to research and disseminate replicable approaches to making emergency and weather warnings, local traffic and weather alerts, school closings and other community-based information accessible to people with sensory disabilities. Solutions devised for these populations will also result in benefits for populations with mobility impairments using assistive technologies that require appropriately formatted content.

We will explore methods of aggregating data from multiple sources and suggest methods of using wireless and wired Internet and telecommunications technologies to make emergency information, weather and traffic alerts and other vital local information accessible to people with disabilities.

The project will meet an urgent need to develop and encourage adoption of standardized methods within emerging protocols, systems and services to identify, filter and present content in ways that are meaningful to people with disabilities. User control of information as it arrives must also be accessible, whether via interactive voice response system, web page or cell phone messaging. This work will reflect consumers' needs and incorporate end-user research on the effectiveness and usability of message components and display devices with consumers with disabilities.

Project activities

There are three major components to project activities. Project staff will:

- Conduct needs assessments within the deaf and blind communities and conduct a resource assessment within the public warning community of emergency system protocols, technologies and services for wired, wireless and DTV-based delivery. This assessment will include analysis of several recently developed interoperable data format standards for emergency alerts, the Consumer Electronic Association's Receiver Performance Specification for Public Alert Receivers (CEA-2009) and the OASIS Common Alert Protocol (CAP) to determine how to capture the needs of people with disabilities in the alert data models.
- Develop and disseminate an Information Model with specifications that represent the ideal enhancements to serve people with disabilities. This model will suggest how to integrate the relevant data needs of the disabled community within related database management, information processing and alert distribution systems to ensure accessibility throughout, including the user interface and multiple output modalities. We will encourage integration of these enhancements in specifications within the CEA specification, the CAP protocol (and others as they emerge or are already deployed), and within DTV datacasting protocols and models as well as within municipal and state alert systems, and proprietary products and services.
- Develop a demonstration model and conduct user testing to identify key usability factors that must be addressed to serve people with disabilities, including cross platform and cross-environment issues.

Project deliverables

- Specifications for the comprehensive metadata that are required to include people with disabilities in wireless and wired information alert systems.
- Guidelines for information alert system developers and distributors that detail effective practices based on usability research, and specify resource requirements and end-user requirements.
- Guidelines for local emergency managers and responders that share lessons learned from the needs assessments and end-user tests, and provide an accessibility checklist for ensuring that local information alert systems can serve consumers who are deaf, hard-of-hearing, blind or have low vision.

A Plan of Operation and a detailed Timeline can be found on page 1 in the Appendices

WGBH National Center for Accessible Media (NCAM)

NCAM is the research and development division of the WGBH Educational Foundation's Media Access Group. In the early 1970s, WGBH pioneered captioning for television and in 1988, again broke new ground by developing the Descriptive Video Service (DVS) for television users who are blind or visually impaired. In 1993, WGBH established NCAM as a research and development center to build on this unique expertise. NCAM is a founding member of the Web Accessibility Initiative of the World Wide Web Consortium (WAI/W3C). NCAM projects seek to influence technology development and public policy through research, advocacy and technical development of solutions. Staff serve on numerous national advisory boards and committees working on accessibility issues including the FCC Consumer Advisory Committee and the FCC Technological Advisory Council. NCAM currently leads access working groups within the IMS Global Learning Consortium, the National Science Digital Library, and the Advanced Television Systems Committee (ATSC).

Project Design and Partners

The project utilizes three national platforms to further its goals, which are provided by the participation of the Partnership for Public Warning (PPW) and the National Organization on Disability (NOD), and by efforts led by NCAM within the Advanced Television Systems Committee (ATSC) to ensure that the nation's digital television systems and receivers are accessible to people with disabilities. All of the organizations listed below are key participants in this project, committed to planning, implementation, and dissemination of a feasible and sustainable effort that permanently enhances the nation's warning systems.

Partnership for Public Warning (PPW)

PPW is a nonprofit membership organization that includes local, state and federal agencies, emergency managers, emergency alert services, technology manufacturers and public interest groups engaged in public warning activities. PPW provides an objective, consensus-based forum where all interested stakeholders – public and private – are working together to develop

processes, standards, systems and strategies to ensure that the right people have the right information at the right time. PPW members include the Florida Division of Emergency Management, Com Labs, The MITRE Corporation, the Association of Public Television Stations, the Allport Group, Alaska Office of Homeland Security and Emergency Services, ClassCo, Inc., Sugar Grove Emergency Management Agency, California State Emergency Communications, Warning Systems, Inc., Contra Costa County Office of the Sheriff, International Association of Emergency Managers, Washington State Emergency Management Division, Federal Signal Corporation, Oak Ridge National Laboratory, National Emergency Management Association, and RoamSecure. Federal liaisons to the Partnership for Public Warning represent the Federal Communications Commission, Department of Commerce/National Telecommunications and Information Administration, Department of Commerce/ National Oceanic and Atmospheric Administration, and the Department of Homeland Security/Federal Emergency Management Agency.

PPW is a major project partner and will support the establishment by project staff of an open, collaborative Accessibility Working group, led by project staff, that will draw members from diverse stakeholders and elevate the issue of accessibility within the public warning community.

National Organization on Disability: Emergency Preparedness Initiative

Compelled by the attacks of September 11, 2001, the National Organization on Disability (NOD) launched the Emergency Preparedness Initiative (EPI) and is working with the U.S. Department of Homeland Security, other government agencies, emergency planners and responders and the disability community to develop strategies and resources to meet the needs of people with disabilities in emergency planning and services. NOD has sponsored a Harris poll to determine needs and concerns of people with disabilities about emergency planning and EPI has produced and widely distributed the *Emergency Preparedness Initiative Guide for Emergency Managers, Planners & Responders*. EPI also maintains a repository of information, links, guides, standards, plans, video clips, research, and an electronic bulletin board.

NOD is a major project partner and will utilize its extensive networks to generate widespread involvement in project activities and dissemination of deliverables by the disabilities community and by emergency management entities at the federal, state, local and community level.

Digital Television Standards within the ATSC

NCAM leads the DTV Access Working Group within the Advanced Television Systems Committee which has developed specifications for proper handling of captions and video descriptions in television and cable systems and equipment. NCAM also provides stations and manufacturers with recommended practices, engineering guidelines and test files. In addition, as PBS' flagship station, WGBH is a member of America's Public Television Stations (APTS) and has pioneered the use of many innovative broadcasting technologies including the first nationwide satellite interconnection, closed captioning, video description and now server-based digital program delivery services.

NCAM will assure that the information model is circulated for comment within the broadcast community, and that it will influence the design and delivery of emergency information capabilities in digital datacasting by public, cable and broadcast television. Public broadcasting stations and data broadcasting manufacturers have expressed interest in using materials

developed by this project to operate accessible demonstration models as PTV stations explore the use of digital datacasting for information delivery and exchange among public safety organizations, information providers and the general public.

Advisory Board

The project will also benefit from the participation of a 15-member Advisory Board that includes the leadership of the Partnership for Public Warning, the National Organization on Disability, the National Association of the Deaf, the American Council of the Blind, the National Federation of the Blind, the American Foundation for the Blind, Self Help for Hard of Hearing People, Telecommunications for the Deaf, Inc., and Northern Virginia Resource Center for Deaf and Hard of Hearing Persons. Also on the advisory board are the commissioners for the Massachusetts Commission for the Blind and the Massachusetts Commission for the Deaf and Hard-of-Hearing and the directors of three relevant U.S. Department of Education funded-Rehabilitation Engineering Research Centers (RERCS) – the RERC on Telecommunications Access run by Gallaudet University in cooperation with the Trace Center, University of Wisconsin; the RERC on Hearing Enhancement at Gallaudet University; and the RERC on Mobile Wireless Technologies for Persons with Disabilities at Georgia Institute of Technology. Additional members include the Chief of Operations for the Massachusetts Emergency Management Agency and research meteorologist at the National Severe Storms Laboratory/NOAA who has written extensively on the subject of access to emergency alerts (and who is deaf). *See page 5 in the Appendices for information about advisory board members.*

Working Group and Implementation Partners

PPW, NOD, DTV broadcasters, and advisors are joined in this project by a wide variety of stakeholders who have committed resources to this project, agreeing to serve on the Working Group, contribute to user testing and guidelines, and implementing recommendations within systems, services and products. Numerous agencies, companies and other potential partners have asked to be contacted for participation if we are funded. *See page 10 in the Appendices for a list of cost-share partners and other supporters.*

Evaluation

The American Institutes of Research (AIR) will serve as the project's external evaluator. AIR is a research organization serving clients that include federal, state, and local government agencies, not-for-profit organizations, and private corporations. AIR's staff of more than 850 professionals performs basic and applied research, provides technical support, and conducts analyses based on methods of the behavioral and social sciences. AIR is expert in the "critical incident technique," a method of identifying behaviors (critical incidents) that contribute to the success or failure of a human activity. AIR will provide formative support for research and project planning. AIR staff will lead a series of Visioning sessions with the project's Advisory Board and will guide project staff through a two-day conceptual modeling workshop to refine the project approach to needs assessment and user testing. AIR will also design goals, scripts and activities for eight focus groups to be conducted with eight groups of diverse consumers by a subset of board members — the American Foundation for the Blind, Telecommunications for the Deaf, Inc. and the Northern Virginia Resource Center for Deaf and Hard of Hearing Persons. AIR will enable iterative dynamic surveys of various stakeholders throughout the project to provide feedback on development of the information model, project activities and draft deliverables. AIR will also help shape the design, implementation, and analysis of lab-based and field-focused user testing

in Massachusetts, which will be coordinated with Advisory Board members from the Massachusetts Emergency Management Agency, the Massachusetts Commission for the Deaf, and the Massachusetts Commission for the Blind. AIR will also conduct the project's summative evaluation through surveys attached to final deliverables, phone interviews with advisors and selected stakeholders, and review of project documentation of dissemination and implementation. *See page 13 in the Appendices for AIR's plan for evaluation procedures and mechanisms.*

Dissemination

Dissemination activities will be conducted throughout the project, as indicated in the project timeline. The various partner organizations listed in the proposal offer the project well established dissemination channels that will reach all of the major policy, consumer, emergency planning and communications industry sectors. Widespread dissemination of end-user research within industry and consumer organizations will articulate barriers and needs. Clearly defined information and demonstration models will also encourage development of additional accessible consumer products and services. Together these efforts will support increased accessibility of emergency alert messages and notifications. Through coordination with the Access Working Group in the Partnership for Public Warning, formal submissions to standards organizations including OASIS/CAP, ATSC, SMPTE, SCTE and CEA, and promotion of project activities through the project's Advisory Board, the impact of the project will be extended and magnified. Final drafts of project models, guidelines and usability data will be reviewed by the Access Working Group and Advisory Board, revised and published by NCAM to include comment and implementation data, and used as the basis for final project evaluation by AIR.

Impact

Project activities and deliverables have great potential to permanently enhance the nation's emergency warning systems to better serve all citizens. The desired project outcome is to influence the design and delivery of this country's information alert systems, services and products, which will have a pervasive impact on the safety of people with disabilities in every community and in every conceivable environment in this country.

The establishment of an Accessibility Working Group within PPW will provide a national forum within the emergency alert community for review of and participation in solutions by all stakeholders. This group will engage in a collaborative public process, uniting public and private agencies, services, and technology developers in development of an information model that addresses the needs of people with disabilities. This information model will detail how to serve the needs of people with disabilities through specifications that are platform- and protocol-agnostic but can inform all systems architecture and implementation methods.

The involvement of the major membership organizations of people with disabilities in conducting the project's needs assessment with consumers and shaping the user testing ensures that consumers are active participants in defining the need and determining how solutions are evaluated. The proposed user tests will produce enormously valuable data about user needs and behaviors. This will provide a publicly available baseline of information that will inform the design of accessible products and services in the near term and suggest future areas of usability research needed to serve people with disabilities.

The work will also impact national efforts to ensure interoperability of information in ways that serve people with disabilities. There is widespread agreement that interoperability of communications and incident management systems is critical. Study after study recommends development of a standard method to collect and relay instantaneously and automatically all types of hazard warnings and reports locally, regionally and nationally to a broad range of dissemination systems using multiple platforms to ensure the widest possible reach. (National Science and Technology Council, "Effective Disaster Warnings" 2000, Council on Foreign Affairs reports "America Still Unprepared" (2002) and "Emergency Responders: Drastically Underfunded, Dangerously Unprepared" (2003) as well as the National Strategy for Homeland Security (2002).)

As the Department of Homeland Security develops policy in this area, project activities and deliverables will provide useful data to help inform an inclusive and universal design.

Finally, the most direct impact of project activities will be provided by the integration of project solutions into project partners' commercial products. The project is designed to catalyze implementation of solutions and result in development of accessible systems, services and products. A number of emergency alert systems and services have already committed to or have expressed interest in conducting field tests in numerous communities throughout the country, implementing project suggestions within their products as part of this proposal.

Project Management

Much of NCAM's growth and work over the past ten years stemmed from needs identified through the Web Access Project, conducted with funding awarded in one of the early rounds of Department of Commerce technology grants. Subsequent projects focused on access needs within advanced television, distributed learning platforms, streaming media and digital cinema technologies. In each of these initiatives, NCAM activities and deliverables have successfully and directly impacted how people with disabilities can access emerging digital technologies and systems in their homes, at school, at work and in their communities. *See page 16 in the Appendices for an overview of NCAM initiatives.*

This project promises to have a similar impact on the nation's information and emergency alert systems. Project management will benefit from senior NCAM staff, experienced in managing multi-institution collaborations that unite consumers, industry, researchers, and government in access-focused initiatives. The proposed staff has produced recommendations, tools and resources that have been widely used by standards bodies, government and industry to better serve consumers with disabilities. *See page 19 in the Appendices for staff roles and responsibilities.*

Moreover, all NCAM projects are subject to bi-annual technical monitoring meetings with a team of senior NCAM staff, which require submission of a written summary of project progress on the original schedule of activities, detailing accomplishments, challenges, and budget status. Meetings focus on adjustment and clarification of strategies to reach desired outcomes. The monitoring team consists of NCAM's director of research and development, project developer, and financial manager.