EAS
Emergency Alert System
CAP IPAWS

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Bay Area Emergency Public Information and Warning Strategic Plan

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ABSTRACT

Establishing effective, fully integrated, and interoperable Emergency Public Information and Warning (EPI&W) systems involving organizational structures, personnel, plans, technology, training, and exercises that can unify multiple jurisdictions to address common hazards remains a challenge for the twelve Operational Areas (OAs) and three major cities in the Bay Area Urban Areas Security Initiative (UASI) region.[1]

The purpose of the *Bay Area Emergency Public Information and Warning Strategic Plan* (*Strategy*) is to outline the means by which the region's twelve OAs and three major cities can come together and develop a comprehensive five-year regional plan to strengthen regional EPI&W capabilities. In doing so, each jurisdiction will maintain control over its own warning and emergency public information system while integrating that system into a larger regional "system of systems" to better manage multi-jurisdictional threats and hazards.

The *Strategy* is based upon the results of a capability self-assessment and gap analysis. The assessment was premised on a series of questions divided among the five elements of the EPI&W capability: Plans, organization, equipment, training, and exercises. Each of the twelve counties and three major cities participated in the self-assessment through several half-day workshops led by an expert team of consultants, with local subject matter experts answering the questions. Each jurisdiction answered the questions individually, and this information was then rolled–up to form a regional gap analysis.

The gap analysis shows that there is currently little formal or consistent regional coordination of EPI&W policy development and planning activities. The current patchwork of public warning systems among the OAs and other regional stakeholders causes great inconsistency in the type, content, and format of warnings received by the public. Almost all of the OAs' warning tools must be activated one-by-one and do not support simultaneous activation using the OASIS Common Alerting Protocol (CAP). This inhibits integration of OA technology systems and creates otherwise avoidable delay, additional workload, and opportunities for error for warning originators.

In the event of a regional incident, OAs and regional stakeholders face a variety of obstacles that, if not overcome, could delay or inhibit the formation of a joint information center (JIC) to provide coordinated emergency public information. Many OAs lack access to properly trained and qualified public information officers (PIOs) for surge or sustainment of JIC operations. Most OAs see the value of providing emergency public information via social media and make use of Twitter and Facebook accounts, among other social media tools. However, few OAs have a social media policy, and several are not using their social media

[1] The 12 Operational Areas (OAs) in the Bay Area are Alameda, Contra Costa, Marin, Monterey, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, and Sonoma Counties. This assessment also included, as OAs, the major cities of San Jose and Oakland. San Francisco is both an OA and a city.

accounts or monitoring social media to determine whether information is being used by the public as intended by the issuer.

Finally, public education on warning systems is limited across the region. While there are preparedness campaigns focused on being "ready" for an incident, there is little in the way of explaining the warning methods used in an OA, what those methods mean, and what protective actions should be taken when a warning is issued.

To close these and other identified gaps, the region has developed four goals and nineteen objectives to be implemented over the next five years:

Goal 1: Establish Consistent Practices and Organizational Structures For Emergency Public Information and Warning
Objective 1.1 Establish a Bay Area emergency public information and warning framework as a baseline agreement for inter-agency and regional cooperation and coordination.
Objective 1.2 Develop regional policy and program structures and assign a regional program manager for emergency public information and warning initiatives, and programs.
Objective 1.3 Develop a process for joint regional procurement of future emergency public information and warning tools, and effective methods for sustaining current public information and warning capabilities.
Objective 1.4 Increase the capability to work with partner organizations in order to reach people with access and functional needs, and limited English proficiency.

Goal 2: Strengthen Regional Planning and Operational Coordination For Emergency Public Information and Warning
Objective 2.1 Enhance local and regional plans for joint information center (JIC) operations, and develop network-based "virtual" JIC support.
Objective 2.2 Develop policy and guidance for social media use in EPI&W and formally integrate social media activities into response plans, including the establishment of community partnerships.
Objective 2.3 Adopt protective actions for all potential Bay Area hazards and develop science-based warning message templates to communicate effective protective actions to the public.
Objective 2.4 Provide timely and effective warning information to isolated populations in the Bay Area.
Objective 2.5 Establish a regional operational support cell for effective public warning.

Goal 3 Acquire Tools and Technology Necessary to Provide Emergency Public Information and Warnings Before, During, and After an Incident
Objective 3.1 Integrate existing and future warning tools in the Bay Area.

Objective 3.2 Implement the Federal Integrated Public Alert and Warning System (IPAWS).
Objective 3.3 Implement the Commercial Mobile Alerting System (CMAS).

Goal 4 Develop and Provide Emergency Public Information and Warning Training, Education, and Exercise Programs
Objective 4.1 Fully integrate public information and warning into regional training programs.
Objective 4.2 Fully integrate public information and warning into regional exercise programs.
Objective 4.3 Include representatives of the access and functional needs community in exercise planning and execution at the OA and regional levels.
Objective 4.4 Increase training opportunities in social media use, and establish a regional platform to exchange best practices and develop regional awareness around existing social media capabilities.
Objective 4.5 Train and educate elected and senior officials on advances in emergency public information and warning practice.
Objective 4.6 Share and coordinate public warning system testing schedules.
Objective 4.7 Develop regional public education for warning and protective actions.

The regional EPI&W Program Manager called for in Goal 1, Objective 1.2, will have overall responsibility for managing and tracking execution and implementation of the *Strategy*. Each objective in the *Strategy* will serve as a project along with several implementing steps or tasks. The total estimated cost for implementing the *Strategy* over five years is approximately $2.5 million. The projects and implementing steps are based on a sequence of:

1. Getting properly organized as a region;
2. Having the appropriate plans and procedures in place;
3. Acquiring the appropriate technology and tools; and
4. Testing and evaluating the plans, organization, and equipment through training and exercises.

TABLE OF CONTENTS

STRATEGIC PLAN SUMMARY

BACKGROUND

"Homeland security" is the coordinated effort to ensure a community is prepared to prevent, protect against, mitigate, respond to, and recover from threats and acts of terrorism, natural hazards and other human-caused incidents. A critical element of homeland security is the ability to provide emergency public information and warnings that result in people taking appropriate protective actions, whatever the hazard.

The National Preparedness Goal defines emergency public information and warning as the ability to "deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard and, as appropriate, the actions being taken and the assistance being made available."[2]

The Bay Area region is comprised of twelve counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Monterey, and San Benito) and the three major cities of San Francisco, Oakland, and San Jose. The region is designed to enhance coordination and collaboration on homeland security and emergency preparedness issues. Each county serves as an Operational Area (OA) to coordinate emergency activities and resources of its political subdivisions under the Standardized Emergency Management System (SEMS).

Despite its overall size, the Bay Area is tightly interconnected in terms of mass media, mobility of population, and hazards. Through risk and capability assessments, the region has determined that the emergency public information and warning (EPI&W) capability is vital to enhancing preparedness and security. Moreover, the Bay Area has determined that a comprehensive regional approach to strengthening and sustaining that capability is needed and that the best way to achieve that goal is through a five year strategic plan.

The following *Bay Area Emergency Public Information and Warning Strategic Plan* (*EPI&W Strategy or Strategy)* outlines how public health and safety leaders can guide the whole community in developing and enhancing the ability to provide effective emergency public information and warnings that will help save lives and property in an all-hazards environment.

[2] U.S. Department of Homeland Security, *National Preparedness Goal* (September 2011); accessed at http://www.fema.gov/pdf/prepared/npg.pdf.

PURPOSE

The purpose of the *Strategy* is to provide a roadmap over the next five years for the Bay Area's component jurisdictions to come together as a region and to integrate, sustain and enhance the EPI&W capability for all hazards that pose a risk to the people and critical infrastructure in the Bay Area. While OAs will always have independent and intra-OA responsibilities and needs, the primary emphasis of the *Strategy* is to develop regional EPI&W capabilities through plans, organization, equipment, training, and exercises.

At the core of the EPI&W capability is the issuing of emergency public information or warnings that result in the public taking appropriate protective actions. Too often, more emphasis is placed on the means to issue the information or warning (reverse telephone, siren, email, etc.) and less on what the results are once the information or warning is released to the public. While the means of issuing emergency information and warnings is important, it is virtually meaningless if the intended public protective actions are not achieved.

SCOPE AND APPROACH

The *Strategy* is not an operational or tactical plan for any jurisdiction, agency or entity. Nor does it alter or impose any new statutory or regulatory authority or responsibility upon any agency in the Bay Area related to public safety, health, or security. Rather, the *Strategy* is designed as an integration tool and guide. The *Strategy* embraces the "whole community" approach, a means by which the public and private sectors (including nonprofits, access and functional needs organizations, residents and visitors) work together on a given topic to assess and satisfy the needs of the community.

Through the *Strategy*, the Bay Area seeks to unify otherwise disparate jurisdictions by outlining a set of well-established standards, policies, and practices, and infusing them in a set of regional goals and objectives the whole community can strive to achieve. The approach involves the following steps: Develop organizational structures and agreed-upon practices develop plans and operating procedures; acquire the appropriate tools and technology; and finally provide training, education and exercises across the whole community to strengthen, test and evaluate region EPI&W capabilities.

VISION

The Bay Area's Vision for emergency public information and warning is described as the following: An interoperable and standards-based system of multiple emergency public information and warning systems that allows Bay Area leaders and public health and safety personnel to disseminate prompt, clear, specific, accurate, and actionable emergency public information and warnings to all affected members of the community in order to save lives and property concerning known threats or hazards.

THE COMMON ALERTING PROTOCOL

A critical element to building an interoperable system of systems is the Common Alerting Protocol (CAP). CAP provides an open, non-proprietary digital message format for all types of warnings. It does not address any particular product application or communications delivery method. Rather, regardless of the hazard, CAP allows a consistent warning message to be disseminated simultaneously over *many* different warning delivery devices, increasing warning consistency and effectiveness while simplifying the warning task. The CAP is the basis for the new federal Integrated Public Alert and Warning System (IPAWS) and the related Commercial Mobile Alert System (CMAS). More information on IPAWS, CMAS and other EPI&W standards and tools can be found in Section 1.7 of the full *Strategy*.

By adopting the Common Alerting Protocol as the standard, Bay Area OAs can make technology procurements that are standards-based and vendor-agnostic.

DEFINING AN EPI&W SYSTEM

A system is defined as "a regularly interacting or interdependent group of items forming a unified whole."[3] In emergency public information and warning practice, the word "system' is often used to describe a "product." This can sometimes lead to significant confusion, as it inaccurately describes what makes up an EPI&W system. A full EPI&W system at either the municipal, OA or regional level involves more than just products or technology. Well-trained and tested personnel and effective plans, procedures, and organization play a vital role in developing a complete EPI&W system at any level.

When dealing with technology, every warning system has, at minimum, one or more "input sub-system(s)" and one or more "output sub-system(s)." These sub-systems are defined as follows:

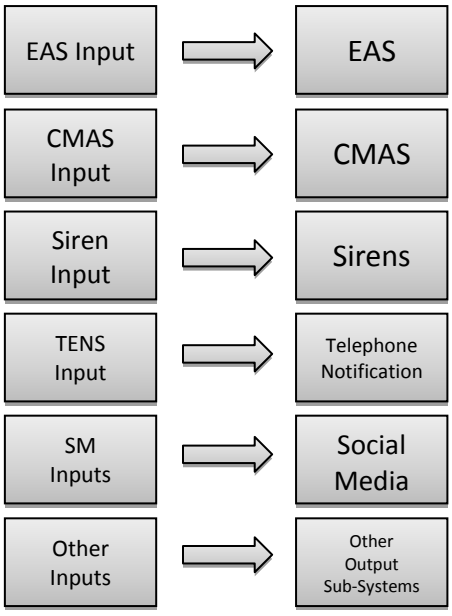
- **Input Sub-Systems:** These involve warning-origination tools used to create warning messages. They usually involve a computer application that can be general purpose or which can be specialized for a particular hazard or agency. Most proprietary warning tools/products are input sub-systems. Such tools typically provide pre-scripted templates for common hazards and protective action patterns (shelter-in-place, evacuate, etc.).

- **Output Sub-Systems:** These are methods used to deliver information and warnings to the public. These warning delivery methods include sirens, telephones, CMAS, EAS, highway message signs, emails, etc., and are usually described as delivery systems.

[3] From mirrriam-webster.com; various other sources use similar language.

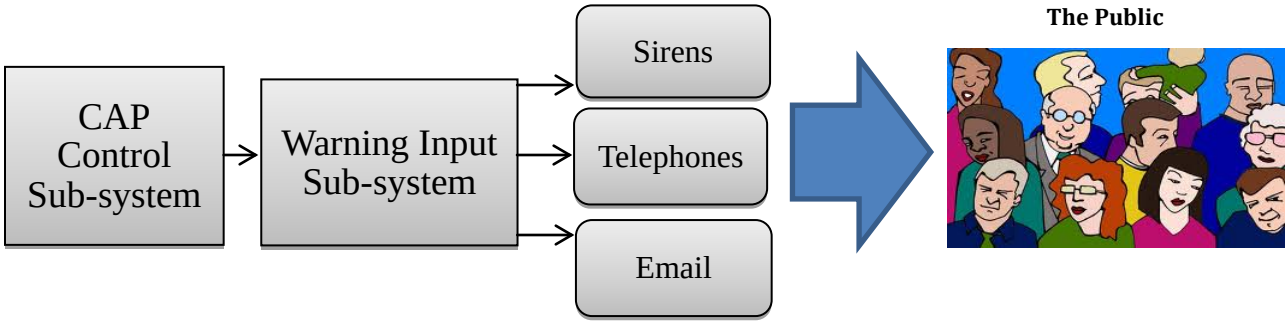
Often, when a warning message must be delivered by an OA, one or more input and output sub-systems are used, resulting in a complex and duplicative array of technological input procedures. This is outlined in the multiple inputs/multiple outputs Figure above. These challenges only grow when dealing with a hazard impacting multiple jurisdictions and the need to deliver a consistent warning message across several OAs. Fortunately, the relationship between inputs and outputs doesn't have to be one-to-one. By careful design, using the CAP as the centerpiece, it is possible to devise a single input that can trigger multiple simultaneous warning outputs -- a write-it-once approach for public warning. This is done by using a single CAP control sub-system.

Multiple Inputs, Multiple Outputs



A control sub-system is the "middleware" that allows for the mixing and matching of various input and output sub-systems. For example, the IPAWS is a control sub-system. Using IPAWS or any other CAP-based control sub-system, a user first inputs the warning message to the input sub-system; the control sub-system then takes the message from the input sub-system and shoots that single consistent message out through multiple output/delivery sub-systems. This process is outlined in the Figure below. Moreover, by adding a few automated rules, the resulting warning system can determine which input messages should go to which output/delivery sub-system(s) on the basis of geography, severity of hazard, time of day, etc.

Output Sub-Systems



By understanding the distinction between input sub-systems and output sub-systems, it becomes possible to mix-and-match any number of separate capabilities into a "unified whole" that is greater than the sum of its parts. This process can be replicated at the OA and the regional level. In doing so, each OA and the Bay Area as a whole can make the transition from a collection of parallel but unrelated warning products to a much more manageable, efficient, and effective integrated "system of systems."

THE SYSTEM OF SYSTEMS APPROACH

Given the size and diversity of the Bay Area, developing a single, centrally-managed EPI&W system is not feasible or necessary. Rather, through common standards, such as the CAP, and the implementation of plans, organization, training, and exercises, the region can achieve an effective regional system of emergency public information and warning systems. Such an approach may be defined as follows:

> A "system of systems" exists when a group of independently operating emergency public information and warning systems within each OA comprised of people, organizations, plans, procedures, and technology are interoperable, thus enabling public health and safety personnel to effectively deliver emergency public information and warnings within and across jurisdictions in the Bay Area.[4]

EPI&W technology between jurisdictions alone *will not* make OAs in the Bay Area fully interoperable. Indeed, the OAs and other jurisdictions and allied agencies must connect *standards based - technology, people, plans, procedures and organizations to achieve true interoperability.*[5] Building and connecting these elements is necessary for both *intra-OA* and *inter-OA* interoperability. Moreover, a regional system of systems recognizes that the Bay Area can connect independently-operated and managed emergency public information and warning systems among its OAs, while not forcing the OAs to lose their independence and control over the timing and delivery of information and warnings to their constituents.

The benefits of adopting the "system of systems" approach at the OA and regional level are many. As outlined by the DHS Office of Interoperability and Compatibility[6] these include: increased capability and efficiency, greater flexibility to upgrade technology, decreased reliance on proprietary technology, cost savings, and a greater ability to expand.

FOCUS AND MISSION

While there is overlap and interconnectedness between "emergency public information" and "public warning" there are relevant differences between immediate public warning and emergency public information. For purposes of the *Strategy*, the terms "public warning" and "emergency public information" are defined as follows:

- "Public warning" refers to urgent communications intended to alert some or all of the public of an immediate threat or hazard and to recommend specific protective actions members of the public can take to reduce harm.

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[4] See, U.S. Department of Homeland Security, Office of Interoperability and Compatibility, *The System of Systems Approach for Interoperable Communications,* at page 1. While the definition used therein was for the purpose of interoperable emergency radio communications, the definition is based upon a universal principal of multi-system interoperability that may be applied to the emergency public information and warning capability (and other capabilities).

[6] Id at 5.

- "Emergency public information" accounts for various communications covering more extensive releases of information from agency spokespersons and subject matter experts prior to, during, or following an incident, that are intended to educate and guide members of the public, reduce losses, speed recovery, and enhance resilience.

Emergency public information is largely (but not exclusively) managed by public information officers while immediate warnings are largely (but not exclusively) managed by on-site incident commanders and warning officers in an emergency operations center. This functional distinction is recognized at the State of California level under the State Emergency Plan and will be reflected in Bay Area policy and planning work groups called for under the *Strategy.*

CAPABILITY ASSESSMENT

As part of the *Strategy's* development, in March 2012, the Bay Area conducted a series of EPI&W assessments involving all twelve OAs, the cities of San Jose and Oakland and eleven allied agencies in the region including the Bay Area Rapid Transit (BART), the California Emergency Management Agency (CalEMA), California Department of Transportation (Caltrans), and the National Oceanic and Atmospheric Administration (NOAA) among others. The complete set of findings from the assessment and gap analysis report were issued in May 2012.[7] A summary of the OAs capabilities and critical capability gaps at the State and regional levels is provided below.

ALAMEDA

Alameda County has procedures that address EPI&W, but these procedures are generally not formalized into plans. Alameda has multiple means of disseminating all warning messages to the public, such as via telephone, press releases, Emergency Broadcast System, and social media. However, Alameda does not have a single, integrated mechanism for activating all its warning dissemination tools simultaneously and with a consistent message. The county provides some training to public information officers (PIOs) and public information staff, but comprehensive training is lacking, and few exercises are conducted to evaluate EPI&W capabilities.

MARIN

Marin County provides annual training to appropriate staff on the operation of public information, alert/warning, and notification equipment, and has the ability to freely access training for new and existing technology. Some standard messages for public health and fire emergencies exist, but most planning and procedures are informal. Marin is working on a regional PIO Public Outreach and Community Preparedness group and is hoping IPAWS helps with standardization as well as regional consistency. However, the county has not

[7] The full report can be found at the Bay Area UASI, *Emergency Public Information & Warning Gap Analysis Report*, May 2012.

required OA warning systems to support activation using the CAP, or required users to receive IPAWS training.

NAPA

Napa County is currently updating their warning message preparation protocols, procedures, and templates to coincide with the launch of an updated WARN software. Aside from periodic joint information-sharing exercises, warning systems are not exercised regularly and participation occurs on an ad hoc basis. The county would benefit from increased written plans and procedures, as well as from public warning entities being able to monitor major broadcasts, e.g., the Emergency Alert System.

OAKLAND

Oakland recently updated its Emergency Operations Plan (EOP) to address EPI&W needs and has relevant procedures to supplement the plan. Oakland lacks depth in staff who are adequately trained in emergency public information and warning and who can support joint information center (JIC) and emergency operations center (EOC) functions. Current staff with PIO training and expertise are overtaxed because they have other roles and responsibilities in addition to public information and warning. Beyond staffing, Oakland also needs ongoing training that addresses emergency public information and warning and favors a region-wide Bay Area planning/working group dedicated to EPI&W issues.

CONTRA COSTA

The county maintains a Community Warning Program (CWS) that involves a small, dedicated staff of warning specialists who support local Incident Commanders in the development and dissemination of public warning messages during an incident. The CWS involves a CAP-based system that links a single input message tool to the warning delivery devices of the county and several local jurisdictions. These devices include telephones, sirens, email and many others. Contra Costa has fully integrated the CWS with IPAWS and has acquired public-alerting authority for the use of CMAS. However, Contra Costa has not formalized its training programs to ensure consistent and ongoing training for staff involving JIC policies and operations, crisis emergency risk communication for PIOs, and public information staff.

MONTEREY

Monterey County has established plans and procedures that address EPI&W needs. Monterey continually aims to improve its capabilities to reach out to non-English speaking populations. For example, Monterey collaborates with California State University, Monterey Bay, on an ongoing basis to translate brochures that address personal preparedness and use of technology, e.g., social media. Although Monterey can disseminate alerts and notifications via telephone service, the existing database of telephone numbers does not provide information that indicates the primary language of the person/contact associated with each number. Monterey has provided its PIO and other appropriate public information staff with EPI&W training.

SAN BENITO

San Benito's PIO section has a process in place to coordinate emergency public information with the counties of Santa Cruz and Monterey. The tri-county area's PIO and 2-1-1 telephone notification systems are linked to ensure that a common, unified message is disseminated to the public. Although collaboration among the tri-county area is strong, San Benito is not currently involved with any region-wide Bay Area forum or working group that is dedicated to public information and warning issues. San Benito has provided its PIO and all appropriate public information staff with some training relevant to EPI&W.

SAN FRANCISCO

San Francisco has a wide variety of means for disseminating warning messages to the public and has developed relatively robust protocols. These include Alert SF, a text-based message delivery program that delivers emergency information to cell phones and other text-enabled devices and email accounts. San Francisco also has 109 outdoor sirens located across the OA designed to alert residents and visitors and has approximately 50,000 Twitter™ followers for disaster preparedness and response. While the OA can deliver messages in Cantonese and Spanish via sirens, there are remaining challenges for multi-lingual warnings due to the variety of populations in the OA.

SAN JOSE

San Jose uses Santa Clara County's voluntary, subscription-based warning program called AlertSCC to send notifications to cell phones, mobile devices, e-mails, and/or landlines. Additionally, San Jose provides public information messages through its city emergency web-site and is in the process of developing its social media capabilities to support messaging efforts. However, San Jose does not currently have the capability to integrate into IPAWS due to compatibility issues with equipment/technology.

SAN MATEO

The San Mateo County warning systems and procedures are exercised often, but ongoing training in the OA is lacking. Most plans and procedures for EPI&W are not formalized, but a written EPI&W annex is in development. San Mateo would benefit from access to regional resources, as well as regional economies of scale.

SANTA CLARA

Santa Clara uses the voluntary, subscription-based warning program called AlertSCC to send notifications to cell phones, mobile devices, e-mails, and/or landlines. Although AlertSCC is in place, Santa Clara does not currently have the capability to integrate into IPAWS due to equipment compatibility issues. In addition, the County has not fully implemented the use of social media (e.g., Twitter and Facebook) to support dissemination of emergency public information and warnings.

SANTA CRUZ

Santa Cruz has established a process to coordinate emergency public information with the Counties of San Benito and Monterey. Santa Cruz's EOC has designated seats for each locality (within its area) in order to facilitate interagency coordination. However, Santa Cruz does not currently have written/formalized agreements established with municipalities and other organizations to address their support in the JIC. Currently, Santa Cruz has multiple means of disseminating warning messages to the public, including equipment that is certified for activation of IPAWS. Santa Cruz has provided its PIO and all appropriate public information staff with some training relevant to EPI&W.

SOLANO

Although Solano has written EPI&W plans, most cities have their own capabilities which can hinder coordinated warning operations. Solano would benefit from increased standardization and interoperability of warning system, as well as from more consistent training and formal exercises.

SONOMA

Sonoma has a joint powers agreement with its cities. It also has relatively well-developed policies for JIC participation and for coordinating with special needs and other community organizations. For example, the Auxiliary Communications Service (ACS) ham radio community is explicitly integrated into warning efforts. Sonoma would benefit from clearer knowledge of its legal duties and abilities to exercise warning systems. Sonoma is currently working on the IPAWS transition, which should alleviate current turnover and activation issues arising from using different warning products.

STATE GAPS

Due to budget limitations, state capabilities in the region have dissipated in both emergency public information and warning. Specifically, the State Regional Emergency Operations Center has been pulled back to Sacramento and left a void for local Bay Area stakeholders to fill concerning regional level incidents. This includes managing EPI&W through a JIC.

REGIONAL GAPS

- There is currently little formal pre-incident regional coordination of EPI&W activities, such as the coordinated procurement of input sub-systems. There is also no established and ongoing pre-incident regional planning and coordination structures or personnel dedicated to managing it in the Bay Area.

- Almost all of the OA's warning tools must be activated one-by-one and do not support activation using the CAP version 1.1 or 1.2. This means when a warning message must be delivered by an OA, inputs and outputs are often one-to-one, resulting in a complex and duplicative array of technological input procedures. This creates avoidable delay, additional workload, and opportunities for error on the part of warning originators.

- The current patchwork of public warning systems among the OAs and other regional allied agencies causes great inconsistency in the type, content, and format of warnings received by the public.

- OAs across the region have few means of determining the effectiveness of the emergency public information and warnings they are providing. Success is often defined as the ability to push information out as opposed to whether appropriate actions were taken by those who received the information and/or warnings.

- There is a lack of consistency in how similar warning systems are used across OAs. For example, in one OA, a siren is used to warn of a tsunami whereas another OA uses a siren for an industrial accident, and a third for general hazards.

- While the region as a whole has a number of programs to minimize isolation from warning systems for those with access and functional needs and limited English proficiency, there is little formal planning and coordination among OAs with the various community-based organizations throughout the region.

- The region lacks a systematic and consistent means to develop pre-scripted warning messages based on the best available social and physical science data.

- Few OAs have a social media policy, and several are not monitoring social media or using their social media accounts to push information and warnings to the public and to track how information is being used by the public.

- There is a lack of training and education for elected and senior officials on how to coordinate through a JIC during a major incident.

- Public education on warning systems is limited across the region. While there are preparedness campaigns focused on being "ready" for an incident, there is little in the way of explaining the warning methods used in an OA, what those methods mean, and what protective actions should be taken when a warning is issued.

- Emergency public information and warning is not fully integrated or considered a priority within the Bay Area's regional training and exercise program. Training and exercises involving EPI&W across OAs does occur but it is sporadic and consistency in training and evaluations is unknown.

GOALS AND OBJECTIVES

To close the identified capability gaps and sustain existing capabilities, the Bay Area has developed four strategic goals and nineteen objectives to drive its EPI&W efforts over the next five years. These goals and objectives, found in greater detail in Section 5 of the full *Strategy*, are functionally organized, interconnected and largely sequenced around:

Goal 1: Organization and Practice
Goal 2: Planning and Operational Coordination
Goal 3: Tools and Technology
Goal 4: Training, Education, and Exercises

The goals and objectives outline a series of steps within each of the four areas that the region must take to build towards a truly integrated and well-functioning EPI&W "system of systems." In taking these steps, each OA will enhance its individual capacity and help bring the region to a higher level of EPI&W effectiveness. Finally, none of the goals and objectives offers a "silver bullet" that can solve the complex challenge of issuing and coordinating effective emergency public information and warnings. This is especially true in the area of technology. While technology does play a vital role in strengthening EPI&W capabilities, it is but one piece of the puzzle. Viewing technology as the "answer" may in fact make a situation worse, as it creates unrealistic expectations and may cause other areas of EPI&W to be neglected.

There is no silver bullet for strengthening EPI&W and an over-emphasis on technology solutions may cause other elements, such as organization, planning, training, and exercises, to be neglected.

Given the strain on local, state, and federal budgets, the Bay Area's strategic approach in developing the goals and objectives is to ensure that the goals and objectives are based upon what is actually and realistically achievable under the foreseeably long period of constricted public safety budgets. Such an approach avoids trying to build capabilities in non-priority areas or entirely new, exotic and expensive local or regional systems and approaches that cannot be sustained.

The goals and objectives focus on the next five years, but will be reviewed and updated annually as necessary. Some of the objectives likely will carry over from year to year, while others may be removed or updated based on the Bay Area's progress and actual needs. The goals and objectives will continue to be defined by risk analysis, identified capability gaps, and sustainment priorities. The following is a summary of the Bay Area's four EPI&W goals and nineteen objectives and the associated lead entity[8] for implementing the objective:

[8] While the proposed regional EPI&W Program Manager is designated as the specific lead entity for certain objectives, the EPI&W Program Manager will also serve as the overall lead for the *Strategy's* implementation and will support all other lead entities in implementing their respective objectives.

Goal 1: Establish Consistent Practices and Organizational Structures For Emergency Public Information and Warning	Lead Entity
Objective 1.1 Establish a Bay Area emergency public information and warning framework (Framework) as a baseline agreement for inter-agency and regional cooperation and coordination. The Framework is designed to serve as the foundation for establishing a regional approach to emergency public information and warning in the Bay Area and for more formal regional undertakings in the future. At its core, the Framework outlines that the region will agree to certain practices and procedures for EPI&W that the region's jurisdictions, special districts, and others will strive to achieve. It is the first step and sets the foundation for OAs and other agencies to come together as a region on EPI&W.	**UASI Management Team**
Objective 1.2 Develop regional policy and program structures and assign a regional program manager for emergency public information and warning initiatives and programs. Once the Framework is agreed to**,** the Bay Area UASI Management Team will assign a regional EPI&W Program Manager to manage and oversee the *Strategy's* implementation (whereupon after five years, the region will evaluate the future of the position). The Program Manager will re-establish the following two groups to strengthen regional collaboration: • The Bay Area Emergency Public Information Network (BAEPIN) to foster increased coordination and collaboration among the PIOs in the region; • The EPI&W Work Group to focus regional efforts on public warnings. These groups will serve as coordinating bodies for the *Strategy's* implementation and updates.	**UASI Management Team and the EPI&W Program Manager**
Objective 1.3 Develop a process for joint regional procurement of future emergency public information and warning tools and for sustaining current public information and warning capabilities. After the regional organizational structures are in place, it will be critical for OAs, municipalities, special districts and other allied agencies in the region to have procedures in place to procure equipment and services that meet the basic standards agreed upon in the Framework and best practices, such as the CAP. This will include developing language that can be used uniformly in agencies' request for proposals and potentially, regional contracting mechanisms in the future. This will ensure that whether the EPI&W equipment or services are procured on a regional or jurisdictional basis, the same standards will apply and the equipment and service deliverables will be interoperable.	**The EPI&W Program Manager and OA Procurement Offices**
Objective 1.4 Increase the capability to work with partner organizations to reach people with access and functional needs and	**EPI&W Program**

limited English proficiency. To fully implement the whole community approach, the EPI&W Program Manager and OA emergency managers will build relationships with the staff and volunteer leaders of community-based organizations (CBOs) that serve access and functional needs and/or limited English proficiency populations. The Program Manager will focus on CBOs that cross multiple OAs, and the emergency managers will focus on intra-OA groups. This will be done to enhance the ability to send warnings to access and functional needs and/or limited English proficiency populations that are most likely to result in appropriate protective action response. It will be achieved by assisting CBOs in building the capacity to communicate quickly with their constituents through networks that use social media and other tools.	**Manager and OA Emergency Managers**

Goal 2: Strengthen Regional Planning and Operational Coordination For Emergency Public Information and Warning	**Lead Entity**
Objective 2.1 Enhance local and regional plans for joint information center (JIC) operations, and develop network-based "virtual" JIC support. Upon establishing the regional organization and structures in Goal 1, the Bay Area will establish a joint regional program for expanding the level of specificity of JIC plans, standardizing JIC structure and roles, and providing JIC training and exercises at the local and regional level. This will include updating the Regional Emergency Coordination Plan with an EPI&W concept of operations annex. Local EOPs will also be updated as needed.	**The EPI&W Program Manager, Regional Catastrophic Planning Team and OA Emergency Managers**
Objective 2.2 Develop policy and guidance for social media use in EPI&W and formally integrate social media activities into response plans, including the establishment of community partnerships. A critical element to updating regional and local EOPs is the full integration of social media into those plans. This will include procedures for monitoring social media after information and warnings are issued to detect the presence of incorrect or unreliable information, the rate at which people begin protective activities, and more. This view into what the public is thinking, doing, and not doing is critical to assessing the effectiveness of the information and warnings being provided. Problems can be detected and then addressed in subsequent pubic messages to correct misinformation and public response deficiencies.	**The EPI&W Program Manager and OA PIOs**
Objective 2.3 Adopt protective actions for all potential Bay Area hazards and develop science-based warning message templates to communicate effective protective actions to the public. Public warning providers in the Bay Area will develop social and physical science-based, pre-scripted and pre-vetted public warning and subsequent emergency public information messages to quickly adapt as	**The EPI&W Program Manager**

needed during actual events. These messages may serve as annexes to local and regional EOPs. Guidance on protective actions that correspond to the necessary message topics will be identified and adopted by Bay Area public health and safety personnel. As a result, in the event of a disaster, Bay Area public information and warning practitioners can more quickly issue warnings with an increased probability of timely protective action response by the public.	
Objective 2.4 Provide timely and effective warning information to isolated populations in the Bay Area. The OAs will take three major policy and planning steps to better reach isolated populations across the Bay Area. These steps are: • The full set of reasons for warning isolation will be brought together so that every type of individual and group who are warning-isolated are known in each OA. This will include people isolated by social position, activity, impairments, language, location, and more. • OAs will build or enhance relationships with local community-based organizations for those with access and functional needs and limited English proficiency so those groups can assist OAs in outreach to isolated populations. • OAs will develop dedicated means (e.g., tone alert radios) to communicate warnings to key decision makers working in institutions.	**The EPI&W Program Manager and OA Emergency Managers**
Objective 2.5 Establish a regional operational support cell for effective public warning. To begin to make operational the regional approach to EPI&W, the Bay Area will establish a regional warning officer program and concept of operations through a single regional operating framework. Any incident commander from any agency in the region will be able to request support from the on-call warning officer, who will then attach to the incident command system (ICS) as a technical specialist. The duty warning officer will confer with the incident commander or designee (frequently the operations chief) to obtain relevant details, clarify the protective action strategy, compose a warning message, plan the distribution of the warning, and then activate the appropriate warning technologies at the incident commander's instruction.	**The EPI&W Program Manager**

Goal 3 Acquire Tools and Technology Necessary to Provide Emergency Public Information and Warnings Before, During, and After an Incident	Lead Entity
Objective 3.1 Integrate existing and future warning tools in the Bay Area. The Bay Area will move to adopt a regional CAP-based control sub-system to serve as a clearinghouse to bind all the existing technical warning capabilities of OAs, municipalities, and districts into a comprehensive technology system of systems. An authorized warning originator, e.g., a warning duty officer from the regional support cell, will input a single warning message, which is rendered in the CAP format and automatically distributed to all appropriate delivery sub-systems, e.g., email, sirens, telephones in the region, for simultaneous delivery in a form particular to each medium yet consistent in content across all media.	**The EPI&W Program Manager**
Objective 3.2 Implement the Federal Integrated Public Alert and Warning System (IPAWS). Bay Area OAs will move to implement IPAWS across the Bay Area. IPAWS is a federally-managed control sub-system designed to enable Federal, state, territorial, tribal, and local alert and warning officials to access multiple broadcast and other communications pathways for the purpose of creating and activating alert and warning messages related to any hazard impacting public health and safety. Implementation of IPAWS will create a one-stop-shop for OAs to access multiple federal warning input and output sub-systems, including EAS, NOAA Weather Radio, CMAS, and others.	**OA Emergency Managers**
Objective 3.3 Implement the Commercial Mobile Alerting System (CMAS). Upon implementing IPAWS, Bay Area OAs will use the Commercial Mobile Alert System (CMAS) to provide warning text messages of up to 90 characters to members of the public via an individual's wireless device through the IPAWS-OPEN platform. Such messages may be geographically targeted down to the county level. CMAS will enable warning messages to be sent to any cell phone within range of a particular cellular communications tower, and messages can be sent even if cellular voice and data services are overloaded. CMAS also uses a unique signal and vibration to attract attention, which is designed to help those with access and functional needs become aware of the message.	**OA Emergency Managers**

Goal 4 Develop and Provide Emergency Public Information and Warning Training, Education, and Exercise Programs	Lead Entity
Objective 4.1 Fully integrate public information and warning into regional training programs. EPI&W will be fully integrated and made a priority within the regional training program. This will include training on writing EPI&W messages, JIC training, etc**.** Specialized EPI&W training on access and functional needs groups, as well as those with limited English skills, will be fully incorporated. To save time and resources, training may be delivered online or at sub-regional sites, e.g., hubs, to minimize travel. As a result of dwindling federal grant funds, the Bay Area will also seek to leverage partnerships between OAs and allied agencies in the region to include maritime ports, mass transit agencies, and airports.	**Regional Training and Exercise Program Manager**
Objective 4.2 Fully integrate public information and warning into regional exercise programs. The Bay Area will identify opportunities for coordinated cross-jurisdictional exercises and will expand other exercise efforts in the region to test and evaluate the EPI&W capability. This will involve exercises that include EPI&W as part of a larger scenario and capabilities to be tested, as well as designing exercises specifically around testing and evaluating EPI&W only. In addition to regional exercises, OAs will also benefit from, "exercise mutual aid," such as sharing exercise templates and simulation resources to reduce the burdens on individual OAs in developing and putting on an exercise. Finally, a password-protected database of After Action Reports will be developed that can be accessed by regional stakeholders.	**Regional Training and Exercise Program Manager**
Objective 4.3 Include Representatives of the Access and Functional Needs Community in Exercise Planning, and Execution at the Operational Area and Regional Levels. Representatives from the Emergency Information Access Council (EIAC) and other organizations should become active in the design and execution of EPI&W exercises at the regional and OA level. These representatives will help set expectations and work with public safety and emergency management personnel on the joint development of exercises.	**Regional Training and Exercise Program Manager**
Objective 4.4 Increase Training Opportunities in Social Media Use, and Establish a Regional Platform to Exchange Best Practices and Develop Regional Awareness Around Existing Social Media Capabilities. Personnel who use social media platforms to support EPI&W should be identified and provided with opportunities to attend trainings specific to the use of these tools. Specialized training to adapt to technological advancements and the use of social media will enhance the usefulness of social media during an incident, both in terms of pushing information out and in monitoring how people are reacting to	**Regional Training and Exercise Program Manager**

that information. Additionally, lessons learned and best practices around the use of social media to support EPI&W will be shared throughout the region using a web-based platform.	
Objective 4.5 Train and Educate Elected and Senior Officials on Advances in Emergency Public Information and Warning Practice. The Bay Area will take advantage of California's Senior Officials Workshop, which provides a forum to discuss strategic and executive-level issues related to disaster preparedness and response in order to enhance coordination among officials responsible for emergency response to a disaster.	**The EPI&W Program Manager and OA Emergency Managers**
Objective 4.6 Share and Coordinate Public Warning System Testing Schedules. Joint testing of OA warning systems will improve coordination and the calibration of public expectations regarding warning capabilities across OAs.	**The EPI&W Program Manager and OA Emergency Managers**
Objective 4.7 Develop Regional Public Education for Warning and Protective Actions. The Bay Area will develop a consensus on a regional template for public warning education focused on generic information applicable across the Bay Area. Each OA will then modify the template as needed and develop its own OA based template for distribution to the public as a reference during actual incidents. This will help the public better understand how it will receive warnings and what protective actions should be taken as a result.	**The EPI&W Program Manager**

STRATEGY IMPLEMENTATION

The regional EPI&W Program Manager will have overall responsibility for managing and tracking execution and implementation of the *Strategy*. This will include working with appropriate stakeholders at the OA level and through BAEPIN, the UASI EPI&W Work Group and such other organizations and agencies as needed. The Program Manager will also be responsible for reporting to the Bay Area UASI Approval Authority and Advisory Group and other regional entities as needed on specific implementation tasks, thus ensuring that the *EPI&W Strategy* is followed and updated annually.

Implementation will occur through a series of projects and other steps outlined in more detail in Section 6 of the full *Strategy.* Each objective in the *Strategy* will serve as a project along with several implementing steps or tasks and associated costs, timelines, and grant eligibility. These projects and implementing steps are based on a sequence of first, getting properly organized; second, having the appropriate plans and procedures in place; third, acquiring the appropriate technology and tools; and fourth, testing and evaluating the

plans, organization, and equipment through training and exercises.[9] The total cost of all projects by goal over a five year period is summarized in the table below.

EPI&W Goals and Projects	Total Costs
Goal 1 Projects	$681,159
Goal 2 Projects	$845,620
Goal 3 Projects	$195,660
Goal 4 Projects	$735,400
TOTAL STRATEGY COST	**$2,457,839**

While implementation of the *Strategy* is not mandatory, in the event the Bay Area's OAs, municipalities, special districts, etc. make no changes in their EPI&W capabilities, most of the identified capability gaps will remain and the ability to come to together fully as a region on EPI&W issues will likely not occur. However, given the strain on public safety budgets, implementation of the *Strategy* will be contingent upon available resources.[10]

STRATEGY EVALUATION

A consistent mechanism to evaluate the effectiveness of the emergency public information and warning activities (i.e., the plans developed, personnel hired, equipment purchased, number of people trained, and exercises conducted) generated through investments is crucial. The results from each evaluation will be used to update the *Strategy* to make sure it accurately reflects where the Bay Area needs to focus its efforts.

Evaluating the implementation of this *Strategy* will be done in the form of measuring whether the identified emergency public information and warning capability gaps are being closed and tracked. Such an evaluation requires consistent data collection and analysis.

[9] Before the region or its OAs should even consider technology solutions, they must first ensure they are properly organized, have the appropriate plans in place for the technology to support, and have a full understanding of the standards that now govern EPI&W technology, e.g., the CAP.

[10] As part of the process to generate resources for the *Strategy's* implementation, the Bay Area leadership will explore with the California Emergency Management Agency the opportunity of using a portion of the State of California's 20% hold back of UASI grant funds to help fund elements of the *Strategy*.

There is no single method to assess capabilities. Rather, there are a number of data sources and methodologies to help with this activity, each of which can be used in the evaluation process:

- Self-assessments (workshops, questionnaires, etc.)
- Performance-based assessments (real-world incidents and exercise events)
- Modeling and simulation

NEXT STEPS

The *Strategy* is, at a minimum, a five year plan with many of the goals and objectives designed around a sequenced approach to implementation. This means the Bay Area is not expected to tackle all of its problems at once or in a single year or even set of years. Rather, each issue and capability should be addressed one step at a time through a logical sequence of actions as outlined in the *Strategy* Implementation Section. In doing so, the region will steadily build toward its goals and objectives and be able to adapt to changing circumstances, such as advancements in technology, and other variables over time.

SECTION 1: INTRODUCTION AND BACKGROUND

"Homeland security" is the coordinated effort to ensure we are prepared to prevent, protect against, mitigate, respond to, and recover from threats and acts of terrorism and other human-caused or naturally caused incidents. It requires a risk management process in order to ensure the right capabilities are in place to manage those hazards that pose the greatest risk to a region, its people, and critical infrastructure and key resources.

In 2003, the United States Department of Homeland Security (DHS) established a new program designated to enhance regional preparedness in major metropolitan areas – the Urban Areas Security Initiative (UASI). Since 2003, the UASI program has provided financial assistance to address the unique multi-jurisdiction, multi-discipline planning, organization, equipment, training, and exercise needs of high-threat, high-density urban areas. In doing so, the UASI program has been instrumental in assisting urban areas in enhancing and sustaining such capabilities. The San Francisco Bay Area joined the UASI program in 2003.

The people and infrastructure of the Bay Area face risks from a variety of sources that include the following: Acts of terrorism, such as terrorist use of explosives; natural hazards, such as earthquakes, floods and wildfires; and industrial accidents, such as hazardous materials spills. A key element of homeland security necessary to address these risks is the ability to provide prompt, clear, specific, accurate, and actionable emergency public information and warnings before, during, and after any incident.

The following *Bay Area Emergency Public Information and Warning Strategic Plan* (*EPI&W Strategy or Strategy)* outlines the Bay Area's approach to developing the structures, plans, procedures, tools, training, education, and exercises needed to build and sustain the ability to provide effective emergency public information and warnings that will help save lives and property in an all-hazards environment.

1.1 Defining Emergency Public Information and Warning

Released in September 2011, the National Preparedness Goal (NPG) outlines the national focus for homeland security across the spectrum of homeland security mission areas: Prevention, protection, mitigation, response, and recovery. The NPG lists 31 "Core Capabilities" necessary to achieve the NPG, with each capability aligned to a mission area or several mission areas or all mission areas, in which case the capability may be defined as "common." The Core Capabilities succeed and replace the Target Capabilities List.

Under the NPG, the Public Information and Warning capability is now categorized as a common capability under the Core Capabilities, whereas the Target Capabilities List

accounted for the capability only in the response category.[11] Such a change reflects the fact that the Public Information and Warning capability cuts across all mission areas, whether the information or warning is intelligence-based and designed to help prevent an incident, or results from an impending natural disaster or post-incident protective actions, etc.

The NPG defines Public Information and Warning as the ability to "deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard and, as appropriate, the actions being taken and the assistance being made available."[12]

While there is overlap and interconnectedness between "emergency public information" and "public warning" there are relevant differences between immediate public warning and follow-on emergency public information. The *EPI&W Strategy* makes clear this distinction. For purposes of the *Strategy*, the terms "public warning" and "emergency public information" are defined as follows:

- **"Public warning"** refers to urgent communications intended to alert some or all of the public of an immediate threat or hazard and to recommend specific protective actions members of the public can take to reduce harm.

- **"Emergency public information"** accounts for various communications covering more extensive releases of information from agency spokespersons and subject matter experts prior to, during, or following an incident, intended to educate and guide members of the public, reduce losses, speed recovery and enhance resilience.

These distinctions are reflected in sources of information, objectives, and operational tempo:

Sources: While public information messages are crafted by public information officers (PIOs), warnings tend to come from either scientific or intelligence-gathering sources external to the responsible agencies, or from operational personnel (typically incident commanders) in the field. In particular, the need to get a warning to people at risk often precedes the activation of a Joint Information Center or even the arrival of a trained PIO.

Objectives: The focus of most emergency public information is to inform and, by informing, to reassure and guide the public. Public warning, on the other hand, is primarily concerned with redirecting the affected populations' attention to an immediate threat and eliciting immediate protective actions.

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[11] In addition to moving the capability under the "common" mission area, DHS has removed the word "emergency" from the Core Capability's name. The Bay Area UASI will still use the word emergency when referring to this capability, but otherwise will look to federal guidance to assist in building, sustaining and enhancing emergency public information and warning in the region.

[12] U.S. Department of Homeland Security, *National Preparedness Goal* (September 2011); accessed at http://www.fema.gov/pdf/prepared/npg.pdf.

Operational Tempo: Pre-incident public information (sometimes described as education) is a continual and gradual process that takes place over periods of weeks, months, and years. Incident-specific emergency public information is a process that can continue for several hours, days or weeks. Public warning at the local and regional level, on the other hand, must be started and completed within minutes, and the entire warning period rarely extends beyond an hour or two.

The distinction between public warning and emergency public information is also reflected in the State of California Emergency Plan, which outlines seven key elements for the response phase concept of operations with "alert and warning" listed distinctly as number three and "public information" listed as number five.[13]

Finally, the overall goals and messages of public warning need to be carefully aligned with those of emergency public information, and both activities use some of the same communications media. However, those similarities do not negate the differences that also exist. A "one size fits all" approach cannot adequately guide both emergency public information and the specific function of public warning.

1.2 Bay Area Overview

The current Bay Area UASI region (Bay Area or region) is comprised of twelve counties (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Monterey, and San Benito) and the three major cities of Oakland, San Francisco and San Jose. The Bay Area is one of the most culturally diverse regions in California. The twelve counties are inclusive of over 100 incorporated cities and a combined total population exceeding 7.5 million people. In addition to the 7.5 million residents, the Bay Area annually attracts 15.9 million visitors who spend more than $16.6 million per day in the region. With just over 800,000 residents, San Francisco is the 4th most populous city in California and the most densely populated major city in the state. San Jose is the third largest city in California with Oakland being the eighth largest in the state. A map of the current Bay Area UASI is set in Figure 1.

Figure 1:
12 County Bay Area UASI Region

[13] *State of California Emergency Plan*, (July 1, 2009) at page 43.

1.3 Operational Areas

The Emergency Services Act designates each county in California as an Operational Area (OA) to coordinate emergency activities and resources of its political subdivisions. The governing bodies of political subdivisions within each county coordinate to establish the lead emergency response agency for the OA. The OA lead agency serves as a coordinating link between the local government level and the regional level of state government. OA responsibilities involve coordinating with the jurisdictions and organizations to deploy field-level emergency response personnel, activate emergency operations centers, and issue emergency information and warnings to protect the public. There are twelve OAs in the Bay Area.

1.4 Bay Area UASI Management

The Bay Area homeland security program is comprised of the UASI grant program, COPS Technology Grant, Interoperable Emergency Communications Grant Program (IECGP), Regional Catastrophic Preparedness Grant Program (RCPGP), and the Public Safety Interoperable Communications (PSIC) grant program. These grants serve as both terrorism and all-hazards preparedness programs.

Governed by a multi-year Memorandum of Understanding (MOU) between the participants, the Bay Area UASI is managed through a three-tiered governance structure involving an Approval Authority, Advisory Group and a UASI Management Team. The Bay Area's governance structure is widely viewed as having an important, groundbreaking regional approach that has been recognized across the country as a homeland security "best practice." The Bay Area UASI is a planning and preparedness entity. It is not an operational entity and does not exercise governmental authority under the California Emergency Services Act before, during, or after an incident or disaster.

1.5 Bay Area Risk Profile

Risk is the expected negative impact of an adverse incident on an asset or population, considering both its likelihood and the magnitude of its impact. Risk can be expressed as a number or value in order to make comparisons. It is calculated by DHS based on threat, vulnerability, and consequence: Risk = Threat x Vulnerability x Consequence. The Bay Area follows this equation in defining risk to the region.

The Bay Area's risk environment is a complex one involving terrorism, crime, natural hazards, and industrial and other accidents. Through risk and capability assessments, the Bay Area has determined that the EPI&W capability is vital to enhancing regional preparedness and security. Indeed, the EPI&W capability has ranked within the top fifteen capabilities among the thirty seven DHS Target Capabilities in terms of risk relevance.[14]

[14] Risk relevant capabilities are defined as those capabilities most necessary to possess in order for a region to prevent, protect against, respond to or recover from terrorist acts that pose the greatest risk to that region's population, critical infrastructure ,and key resources.

The Bay Area's approach to using the EPI&W capability is based on using common practices to ensure that compatible emergency public information and warning tools and procedures are in place, regardless of the hazard. With a better understanding of the risks to its people and critical infrastructure assets, the Bay Area will be in a better position to understand what EPI&W capabilities are needed to protect its assets and the people who frequent them.

1.6 The Standardized Emergency Management System

To more effectively address the hazards that pose a risk to the State of California, the state has developed the Standardized Emergency Management System (SEMS). SEMS is the NIMS-compliant incident management system for managing responses to multi-agency incidents under the Emergency Services Act as set forth in California Government Code Section 8607(a). In order to be eligible for any state funding for response-related personnel costs under disaster assistance programs, local agencies in California must use the SEMS to coordinate multi-jurisdiction or multi-agency incident operations. The four components of SEMS are: The Incident Command System (ICS), Multi-Agency Coordination System (MACS), California Disaster and Civil Defense Master Mutual Aid Agreement (MMAA) and the OA concept.

There are five SEMS organization levels as outlined in Figure 2: State, regional, operational area, local, and field. Together with the private sector, these comprise the California Emergency Organization. This organization represents all resources available within the state that may be applied in disaster response and recovery phases. SEMS operates from established Emergency Operations Centers (EOCs) at the first four levels, as well as in many businesses and industries, and through an incident command post at the field level. SEMS fully incorporates the use of the ICS, which is a standardized organizational structure and process used to manage an incident through the use of resources and personnel. ICS is typically structured to facilitate activities in five major functional areas: Command, Operations, Planning/Intelligence, Logistics, and Finance/Administration. All of the functional areas may or may not be used, based on the incident needs.

Figure 2: SEMS Organization Levels

Under SEMS, emergency public information and warning is directly managed and controlled by the jurisdiction(s) with responsibility for the emergency incident. For

emergency public information, this is often done through a local PIO who serves as an adjunct to the incident commander and/or a senior official such as a mayor, and through a Joint Information Center (JIC). A JIC is a central location where personnel with public information responsibilities perform critical emergency information functions, crisis communications, and public affairs functions.[15] When a JIC is established, it is supposed to be staffed with, among others, PIOs from the responding agencies that coordinate and act as a team.

Collectively, the activated JICs form the Joint Information System (JIS). The JIS provides the mechanism to organize, integrate, and coordinate information to ensure timely, accurate, accessible, and consistent messaging activities across multiple jurisdictions and/or disciplines with the private sector and non-governmental organizations. The JIS coordinates and communicates lifesaving measures, evacuation routes, threat and alert methods and other public safety information in an accurate, timely, accessible, and consistent manner.[16]

Under SEMS, the decision to issue a public warning often resides with an on-site incident commander directly involved in managing the incident that is causing the need for the public warning to be issued. Therefore, the ICS plays a vital role in maintaining warning authority in local jurisdictions, even while the Bay Area builds out a regional framework to integrate the exercise of that authority for incidents that impact multiple jurisdictions. The actual issuance of the public warning may come from an EOC or other watch and warning center(s) after consulting with the incident commander or that incident commander's staff.

1.6.1 Mutual Aid

For more than 55 years, California has emphasized mutual aid operational plans as the center of emergency response augmentation. California's emergency assistance is based on a statewide mutual aid system designed to ensure that additional resources are provided to the state's political subdivisions whenever their own resources are overwhelmed or inadequate. The basis for this system is the MMAA, which is entered into by and between the State of California, its various departments and agencies, and the various political subdivisions, municipal corporations and public agencies to assist each other by providing resources during an emergency. The MMAA obligates each signatory entity to provide aid to each other during an incident without expectation of reimbursement. Under specific conditions, federal and state funds may be used to reimburse public agencies who aid other jurisdictions.

For mutual aid coordination purposes, California has been divided into six Mutual Aid Regions. The Bay Area is in Mutual Aid Region II. The purpose of a Mutual Aid Region is to provide for the more effective application and coordination of mutual aid and other emergency related activities. Each party to the MMAA must ensure that their adopted and

[15] *State of California Emergency Plan*, (July 1, 2009), at page 51.

[16] *Id.*

approved emergency plans document how they will mobilize public resources to render mutual aid during any type of emergency.

In order for mutual aid to be truly effective, the resources provided under the system must be interoperable. In the case of EPI&W, this involves not only technology, but a larger array of practices and procedures where the same terms and actions mean the same thing. For example, when a local population is told to "evacuate the area" these terms and actions should be consistent across the whole community in the Bay Area. Today, across jurisdictions and even within jurisdictions in the Bay Area, too many key terms and actions related to EPI&W are inconsistent in meaning, and therefore, the strength of mutual aid is diminished.

1.7 Emergency Public Information and Warning Standards and Tools

The world of public warning has recently changed. At the center of this change is the national-level adoption of the Emergency Alert System (EAS), the institution of standards such as the Common Alerting Protocol (CAP), and tools that include the federal Integrated Alert and Warning System (IPAWS) and the related Commercial Mobile Alert System (CMAS). These standards and tools are designed to become the future backbone of public warning in the United States. They serve to facilitate the standardization of warning practices throughout the nation. However, as innovative and potentially powerful as these standards and tools may be, they are not a "silver bullet" that will finally "solve" the complex challenge of generating and delivering effective warnings to the public in the Bay Area. Rather, they will serve to strengthen the region's efforts to build and sustain its vision for effective emergency public information and warning.

The following is a summary of some of the essential standards and tools that operate nationally, in the State of California and specifically in the Bay Area. A complete list of the delivery tools is outlined in Appendix A – Message Delivery Tools.

1.7.1 The Common Alerting Protocol

The CAP is a standard around which warning capabilities are being integrated. CAP provides an open, non-proprietary digital message format for all types of warnings. It does not address any particular application or communications method. Regardless of the hazard, CAP allows a consistent warning message to be disseminated simultaneously over many different warning systems, thus increasing warning consistency and effectiveness while simplifying the warning task. This process is outlined in Figure 3 below.

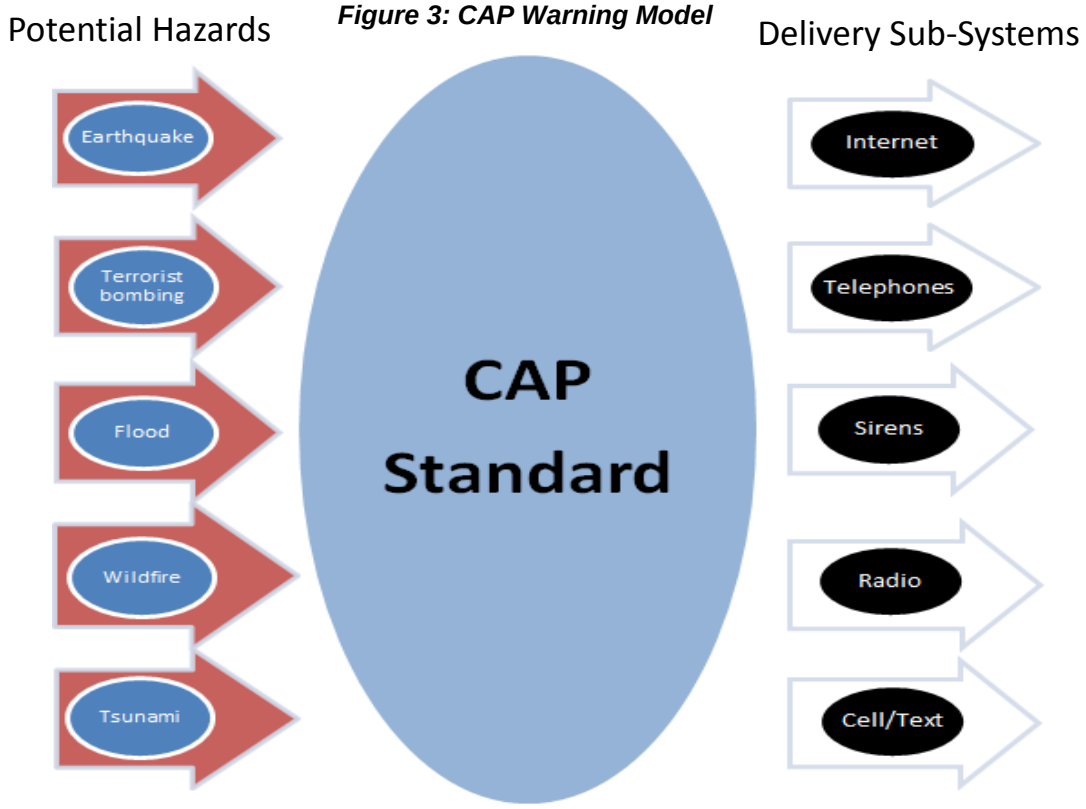
Each "CAP Alert Message" consists of an "alert" segment, which may contain one or more "info" segments, each of which may include one or more "area" and/or "resource" segments. The CAP format is compatible with emerging techniques, such as Web services, as well as existing formats, including the Specific Area Message Encoding (SAME) used for the National Oceanic and Atmospheric Administration (NOAA) Weather Radio and the

EAS.[17] The CAP is the basis for both IPAWS and CMAS discussed below. Three documents currently define how CAP is implemented and used by IPAWS:

- OASIS CAP Standard v1.2;
- OASIS CAP v1.2 IPAWS USA Profile v1.0 (IPAWS Specification to the CAP Standard); and
- EAS CAP Industry Group (ECIG) CAP to EAS Implementation Guide

CAP can also be used as a format for post-EAS public information and distribution to the media and other public warning partners. The CAP application is not constrained by word or character length.

Figure 3: CAP Warning Model



1.7.2 The Emergency Alert System (EAS)

The EAS is a national public warning program that requires broadcasters, cable television systems, wireless cable systems, satellite digital audio radio service providers and direct broadcast satellite providers to provide to the President of the United States the communications capability to address the American public during a national emergency. It is the successor to the Emergency Broadcast System. The Federal Emergency Management Agency (FEMA) implements the national-level activation of the EAS for emergency

[17] Common Alerting Protocol Version 1.2 at page 6. Copyright© OASIS® 2010. All Rights Reserved.

incidents, tests, and exercises. The first nationwide test of the EAS took place on November 9, 2011.

In addition to national-level emergencies, EAS messages can be originated by the National Weather Service and state and local authorities such as the governor of California, and Bay Area emergency managers, police, and others, regarding natural or technological disasters posing an immediate threat to life and property. Reports received by the Federal Communications Commission (FCC) reveal that the EAS is activated more than 100 times a month at state and local levels nationwide.

All cable and wireless cable systems are mandated by the Federal Communications Commission (FCC) to have EAS equipment and to issue national alerts and conduct tests. Broadcast stations and cable systems may elect to participate in national-level activations (stay on the air) or not participate (go off the air). Over 99% have elected to participate. All broadcast station and cable system participation in EAS at the state and local levels is at the discretion of management.

The EAS system is an important and effective way to quickly reach many, but not all, people to make them aware of pending rapid onset hazards. It is constrained by the length of words that can be disseminated and, therefore, must be supplemented with additional information distribution to communicate more information to the public.

1.7.3 National Oceanic and Atmospheric Administration Weather Radio All Hazards

NOAA Weather Radio (NWR) is a nationwide network of radio stations broadcasting continuous weather information directly from the nearest NWR office. NOAA weather radio covers a major portion of the population within the United States. Its chief function is to provide continuous weather forecasts. The National Weather Service (NWS) can activate radio receivers to issue warnings regarding severe weather. This system can be used to issue warnings for other hazards when local emergency managers make arrangements with the NWS. The advantages of the tone-alert system include a quick dissemination time, the combination of an alerting signal with specialized messages, and around-the-clock availability. Disadvantages include maintenance problems, availability during power failures, limited broadcast range, and the difficulty of outdoor use.

1.7.4 Integrated Public Alert and Warning System (IPAWS)

The IPAWS is a FEMA-managed system created in response to Executive Order 13407, which required FEMA to develop "an effective, reliable, integrated, flexible, and comprehensive system to alert and warn the American people."[18] IPAWS is designed to allow the President of the United States to speak to the American people under all emergency circumstances, including situations of war, terrorist attack, natural disaster, or

[18] Executive Order 13407, Public Alert and Warning System, (June 2006). The Executive Order directly tasked the Secretary of Homeland Security, who in turn delegated the responsibility to FEMA.

other hazards. One of IPAWS' goals is to diversify and modernize the EAS by expanding the traditional EAS to include more modern technologies such as cell phones and other mobile devices.

IPAWS is also being designed to enable other federal, state, territorial, tribal, and local alert and warning emergency communication officials to access multiple broadcast and other communications pathways for the purpose of creating and activating alert and warning messages related to any hazard impacting public health and safety. Through the IPAWS Open Platform for Emergency Networks[19] (IPAWS-OPEN), the *goal* is for IPAWS messages to be sent through a series of communications pathways to include:

- EAS messages
- Commercial Mobile Alert System
- Local systems such as digital road signs
- National Weather Service All Hazards Emergency Message Collection System

Through IPAWS, the federal government also hopes to enable the interoperable routing of messages between agencies to enhance collaboration, sharing, and situational awareness. The goal is for agencies to exchange messages as long as each system or software they use is compatible with IPAWS and each agency is established as an IPAWS Collaborative Operating Group (COG). Each agency that becomes an IPAWS user is designated as a COG and each COG administers individual member accounts.

While it is yet untested, IPAWS holds great promise for the rapid dissemination of the same message to a multitude of public warning providers. This will greatly enhance the standardization of messages the public hears during an incident. And, in turn, it should help people confirm risk and what actions to take more rapidly than before.

1.7.5 Commercial Mobile Alert System (CMAS)

The CMAS is intended to allow warning authorities to use the IPAWS-OPEN platform to send geographically-targeted text alerts of up to 90 characters to members of the public through a person's wireless device down to the county level of government. CMAS messages currently do not reach below the county level, e.g., municipalities, towns or villages. CMAS messages cover three topic areas: Presidential messages, America's Missing: Broadcast Emergency Response (AMBER), and imminent threat messages. Imminent threat messages involve "alerts with information on emergencies, such as hurricanes and tornadoes, where life or property is at risk, the event is likely to occur, and some responsive action should be taken."[20]

[19]IPAWS-OPEN is a set of securely hosted web services that enable the routing of standards-compliant messages from warning authorities to the public

[20] U.S. Department of Homeland Security, Science and Technology Directorate, *Commercial Mobile Alert Service RDT&E Program Fact Sheet*.

CMAS messages can be sent even if cellular voice and data services are overloaded. CMAS uses a unique signal and vibration to attract attention, which is designed to help those with access and functional needs become aware of the message. Members of the public do not need to sign up for CMAS messages, and, unlike most subscription-based cell phone alerting programs, individual members of the public will not be charged for the delivery of CMAS messages.

While members of the public don't have to sign up for CMAS messages, the public can "opt out" of receiving CMAS messages (except for presidential messages). Additionally, CMAS capable cellular phones or other mobile devices will soon have the means of reaching registered people who are away from home. Commercial wireless carriers currently sell CMAS capable phones/hand-held devices with the service already intact.

CMAS also holds great promise. The "personal delivery" of alerts that this system provides will greatly help members of the public understand that the alert is actually being directed to them. The lack of such a specific capability has heretofore been an obstacle to public protective action-taking. However, it too, is in the early stages of development and remains untested in the state and local environment on a large and consistent scale.

1.7.6 National Threat Advisory System

The National Threat Advisory System (NTAS) is the federal government's primary means to provide terrorist threat advisories to the general public and professional security officials. The NTAS is the successor to the color-coded Homeland Security Advisory System established in 2002 under Homeland Security Presidential Directive-3 and later codified in the Homeland Security Act of 2002. The NTAS is managed by DHS. The Bay Area's Northern California Regional Intelligence Center (NCRIC) is a primary recipient of NTAS alerts. The NCRIC then disseminates the information to its public and private sector partners.

NTAS Alerts are distributed when there is credible information concerning a terrorist threat. An alert may include specific information about the nature of the threat, including the geographic region of the country and/or the critical infrastructure sector that may be the target of the threat. Such threats under the NTAS come in two forms: an "imminent threat", which warns of a credible, specific, and impending terrorist threat against the United States, and an "elevated threat" which warns of a credible (but not specific or impending) terrorist threat against the United States. All NTAS alerts include recommended protective measures that can be taken by individuals, businesses, and safety and security officials.

1.7.7 The National Warning System

The National Warning System (NAWAS) is an automated telephone line that connects each state emergency operations center to FEMA's Mt. Weather, as well as several military and other government facilities. NAWAS was originally designed as a Cold War tool to be used in the event of a missile attack on the United States by the Soviet Union or its allies. Today,

it is used during major disasters. In California, there is a subset of NAWAS called CALWAS, which connects California Emergency Management Agency (CalEMA) in Sacramento to the emergency operations centers or other local facilities of the State's 58 OAs**.**

1.7.8 Emergency Digital Information Service

The Emergency Digital Information Service (EDIS) is a State of California system that delivers official information about emergencies and disasters to the public and the news media in California. EDIS has been in continuous operation since 1990. In 1999 the statewide EDIS network was upgraded to add image and sound capabilities and to make use of an advanced satellite data-cast technology for reliable statewide service.

1.7.9 California State Warning Center

The California State Warning Center (CSWC) is staffed 24 hours a day, seven days a week and managed by CalEMA. The mission of the CSWC is to be the central information hub for statewide emergency communications and notifications. The CSWC is responsible for informing, communicating, alerting, and notifying local governments, OAs, and state officials and the federal government of natural or human-caused emergencies. The CSWC does not provide direct warnings to the public. The CSWC maintains contact with county warning points, state agencies, federal agencies, and the National Warning Center in Berryville, Virginia. Local governments and OAs notify the CSWC of emergencies that affect their community in accordance with existing laws, protocols, or when state assistance is requested or anticipated.

1.7.10 California Health Alert Network

The California Health Alert Network (CAHAN) is a state-sponsored web-based system managed by the California Department of Health Services (CDHS). CAHAN sends warnings of impending or current situations that may affect the public's health. As with the State Warning Center, CAHAN does not issue warnings directly to the public. Rather, it is a system designed for practitioners of medical and public health and emergency response. The CDHS can send alerts out to all OA health departments and those OA health departments can send alerts within their OA, to neighboring OA health departments, and to the CDHS. CAHAN sends a message to e-mail addresses, telephones, faxes, e-mail-capable alphanumeric pagers, and cell phones. CAHAN also provides a collaborative environment where emergency preparedness planning and response information can be shared between local and state health and emergency response agencies.

SECTION 2: PURPOSE

The purpose of the *Bay Area Emergency Public Information and Warning Strategy* is to provide a clear roadmap for the region's public health and safety agencies, and for whole community members to integrate, sustain and enhance EPI&W capabilities across the region for all hazards that pose a significant risk to its people and critical infrastructure. Having such a document will ensure the Bay Area is in the best possible position to clearly track and articulate its progress in building the EPI&W capability.

The Bay Area region may apply the resources available from DHS to address unique planning, organizational, equipment, training, and exercise needs to assist in building an enhanced and sustainable EPI&W capability to deal with all hazards. However, this *Strategy* is not a grant strategy. Rather, it is a comprehensive *EPI&W Strategy* that will be implemented through projects funded by federal grants, general funds, and such other funding opportunities that may become available.

2.1 The Whole Community Approach

In 2011, FEMA formally developed a concept of "whole community" emergency preparedness. Whole community is a means by which private and nonprofit sectors, including businesses, faith-based, access and functional needs organizations, residents, visitors, and government agencies at all levels, collectively understand and assess the needs of their respective communities and determine the best ways to organize and strengthen their assets, capacities, and interests.[21]

There are three core principles for the whole community approach.

- **Understand and meet the actual needs of the whole community**. This includes understanding demographics, values, norms, community structures, networks, and relationships. This inward-looking focus allows public health and safety officials to gain a better understanding of the community's needs and how to meet those needs.
- **Engage and empower all parts of the community**. Engaging the whole community and empowering local action will better position stakeholders and community members to plan for and meet their own needs.
- **Strengthen what works well in communities on a daily basis**. Building from institutions, mechanisms, and systems already in place is the most efficient and effective way to strengthen preparedness and resiliency across a community.

The purpose of using the whole community approach is to ensure that the public health and safety community engages and works *with* the community and not just *for* the

[21] Federal Emergency Management Agency, *A Whole Community Approach to Emergency Management: Principles, Themes, and Pathways for Action* (December 2011) at page 3.

community. The challenge for those professionals engaged in public health and safety is to understand how to work with the diversity of groups and organizations and the policies and practices that emerge from them in an effort to improve emergency public information and warning concerning any type of threat or hazard.

Engaging the whole community will likely mean different things to different groups within different communities. This is especially true in the twelve-county Bay Area, which includes diversity in geography, demography, and risk. Therefore, a community's needs and level of ability in emergency public information and warning will vary across the Bay Area. Going forward, the goal is to ensure that, regardless of level of ability, those capabilities across the region are built and sustained on common practices, plans, procedures, tools and technology and other preparedness activities.

2.2 Strategy Development Process

The *Strategy* was developed through a comprehensive process of stakeholder engagement and data collection and analysis. This involved a review of existing plans and procedures governing EPI&W in the Bay Area, followed by a series of assessment workshops covering all 12 OAs, plus the cities of Oakland and San Jose. These workshops centered on a self-evaluation by the participants based on a number of focused questions on EPI&W capabilities in the areas of planning, organization, equipment, training, and exercises.

Following the workshops, a series of interviews with allied local, state and federal agencies were conducted. These allied agencies (special districts, state and federal agencies) were chosen on the basis of their role in the EPI&W mission space in the Bay Area and included the Bay Area Rapid Transit (BART), CalEMA, National Weather Service, and several others. Following the assessment, the region engaged in meetings and discussions to review the data and recommended corrective actions that should be taken. For a more detailed discussion on the assessment process see Section 4 of the *Strategy*.

2.3 Relationship to Other Plans

The *EPI&W Strategy* is not an operational or tactical plan. It does not alter the statutory or regulatory authority or responsibility of any entity or agency in the Bay Area related to public safety, health, and security. Nor does the *Strategy* impose any affirmative duty on any agency or entity in the Bay Area to take any specific action or inaction. Rather, the *EPI&W Strategy* is an integration tool and guide to better coordinate and focus disparate authorities and resources necessary to strengthen and sustain EPI&W across the entire region.

The Bay Area EPI&W Strategy is not an operational or tactical plan. It is an integration tool and guide to better coordinate and focus often disparate authorities and resources necessary to strengthen and sustain EPI&W across the entire region.

Plans such as local emergency operations plans (EOPs) often describe functions, authorities, and operational responsibilities during an emergency. While distinct, the *EPI&W Strategy* and such operations plans should be mutually reinforcing by providing a consistent framework and taxonomy of hazards that the Bay Area (and its component jurisdictions) must be prepared for, and capabilities that must be built and sustained. Finally, the *EPI&W Strategy* not only guides the implementation of local priorities and initiatives, but serves as a mechanism to steer the implementation of state and national priorities and programs such as the federal IPAWS and the related CMAS at the local level.

2.3.1 The Bay Area Homeland Security Strategy

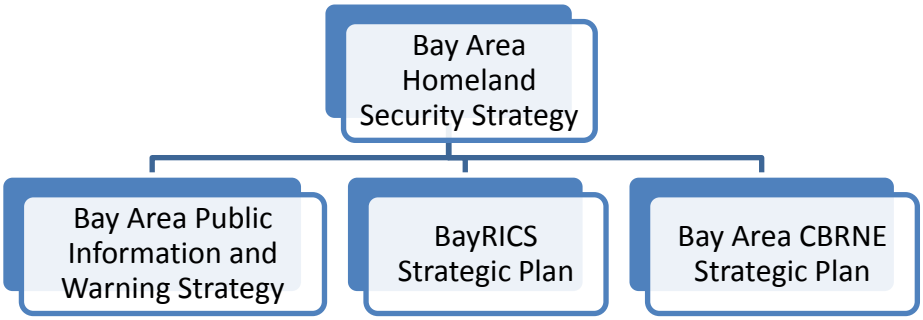
The *Bay Area Homeland Security Strategy* is the region's overarching strategic plan concerning all facets of homeland security from prevention to protection to mitigation, response and recovery. It outlines the framework and strategic end state related to a variety of goals and objectives each of which is linked to national and/or State of California priorities and capabilities. This includes a strategic objective tied directly to Emergency Public Information and Warning.

In the past, in addition to the *Bay Area Homeland Security Strategy*, the region has conducted assessments and developed several capability-based or subject area-based strategic level plans that have produced valuable data to help drive the region's homeland security policies and programs in specific areas. Most notably, in 2008, the Bay Area produced an assessment and strategic plan for regional interoperable communications, along with a CBRNE assessment and strategic plan. Similar to those assessments and plans, the *EPI&W Strategy* serves two purposes concerning the Bay Area Homeland Security Strategy:

- First, it provides valuable data and strategic input into the *Bay Area Homeland Security Strategy*; and
- Second, it serves as an implementation plan, outlining far more detailed policies and procedures for emergency public information and warning under the umbrella of the larger region-wide *Bay Area Homeland Security Strategy*.

The relationship between the *EPI&W Strategy* and the *Bay Area Homeland Security Strategy* is outlined in Figure 4 below.

Figure 4: Strategy Relationships



SECTION 3: VISION AND GUIDING PRINCIPLES

The Bay Area's Vision for emergency public information and warning is:

An interoperable and standards-based system of multiple emergency public information and warning systems that allows Bay Area leaders and public health and safety personnel to disseminate prompt, clear, specific, accurate, and actionable emergency public information and warnings to all affected members of the community in order to save lives and property concerning known threats or hazards.

3.1 Defining EPI&W Systems

A system is defined as "a regularly interacting or interdependent group of items forming a unified whole."[22] In emergency public information and warning practice, the word system often is used to describe a "product." This can sometimes lead to significant confusion, as it inaccurately describes what makes up an EPI&W system. A full EPI&W system at either the municipal, OA or regional level involves more than just products or technology. Well-trained and tested personnel and effective plans, procedures, and organization play a vital role in developing a complete EPI&W system at any level.

When dealing with technology, every warning system has one or more "input sub-systems" and one or more "output sub-systems." These sub-systems are defined as follows:

Input Sub-Systems: These involve "origination tools" used to create warning messages. They usually involve computer software or other application that can be general purpose or which can be specialized for a particular hazard or agency. Most proprietary warning tools/products are input sub-systems. Such tools typically provide pre-scripted templates for common hazards and protective action patterns (shelter-in-place, evacuate, etc.).

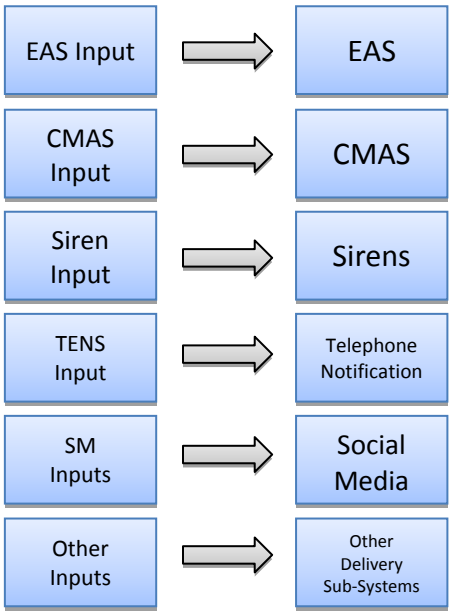
Output Sub-Systems: These are the methods used to deliver information and warnings to the public. These include sirens, telephones, CMAS, EAS, highway message signs, emails, etc., and are often described as "delivery systems."

Often, when a warning message must be delivered by an OA, one or more input and output sub-systems are used, resulting in a complex and duplicative array of technological input procedures. This is outlined in Figure 5. These challenges only grow when dealing with a hazard impacting multiple jurisdictions and the need arises to deliver a consistent warning message across several OAs.

[22] From mirrriam-webster.com; various other sources use similar language.

Fortunately the relationship between inputs and outputs doesn't have to be one-to-one. By careful design, using the CAP as the centerpiece, it's possible to devise a single input that can trigger multiple simultaneous warning outputs -- a write-it-once approach for public warning. This is done by using a single CAP control sub-system.

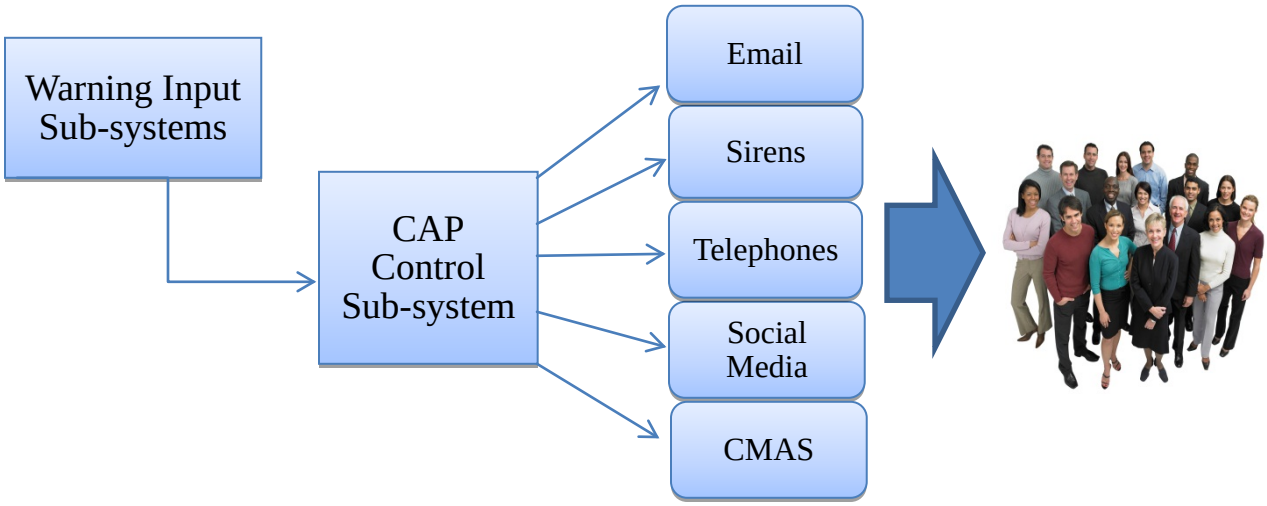
Figure 5: Multiple Inputs, Multiple Outputs



A control sub-system is the "middleware" that allows for the "mixing and matching" of various input and output sub-systems. The CAP control sub-system (sometimes called the "aggregator" or "server") is a redundant, high-reliability application running simultaneously on two or more computers. The primary purpose of the control sub-system is to authenticate alerts as coming from sources authorized to use the overall warning system. The control sub-system usually maintains a current collection of warnings that are currently in effect, as well as logs of all prior system activity.

For example, the IPAWS is a control sub-system. Using IPAWS or any other CAP-based control sub-system, a user first inputs the warning message to the input sub-system. The control system then takes the message from the input sub-system and shoots that single consistent message out through multiple output/delivery sub-systems to the public. This process is outlined in Figure 6 below. Moreover, by adding a few automated rules, the resulting warning system can determine which input messages should go to which output/delivery sub-system(s) on the basis of geography, severity of hazard, time of day, etc.

Figure 6: Single Input, Multiple Outputs



By understanding the distinction between input sub-systems (warning origination tools) and output sub-systems (warning delivery methods), and how a CAP-based control sub-system integrates the two, it becomes possible to mix-and-match any number of separate capabilities into a "unified whole" that is greater than the sum of its parts. This process can be replicated at the OA and the regional level. In doing so, each OA and the Bay Area as a whole can make the transition from a collection of parallel but unrelated warning products to a much more manageable, efficient and effective integrated "system of systems."

3.2 The System of Systems Approach

At the center of the Bay Area's vision for emergency public information and warning is the "system of systems" approach. Given the size and diversity of the Bay Area, developing a single centrally managed EPI&W system is not feasible or necessary. Rather, through common standards, such as the CAP, the region can achieve an effective regional system of emergency public information and warning systems. Such an approach may be defined as follows:

> A "system of systems" exists when a group of independently operating emergency public information and warning systems within each OA comprised of *people, organizations, plans, technology, and procedures* are interoperable; enabling public health and safety personnel to effectively deliver emergency public information and warnings within and across jurisdictions in the Bay Area.[23]

A key factor to understanding the system of systems approach is to recognize that compatible EPI&W technology between jurisdictions alone *will not* make OAs in the Bay Area interoperable. Indeed, the OAs and other jurisdictions and allied agencies must connect *standards-based technology, people, plans and organizations to achieve true interoperability.*[24] Building and connecting these elements is necessary for both intra-OA and inter-OA interoperability and compatibility. Moreover, a regional system of systems recognizes that the Bay Area can connect independently-operated and managed emergency public information and warning systems among its OAs while not forcing the OAs to lose their independence and control over the timing and delivery of information and warnings to their constituents.

The benefits of adopting the system of systems approach at the OA and regional level are many. As outlined by the DHS Office of Interoperability and Compatibility[25] these include:

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[23] See, U.S. Department of Homeland Security, Office of Interoperability and Compatibility, *The System of Systems Approach for Interoperable Communications,* at page 1. While the definition used therein was for the purpose of interoperable emergency radio communications, it is a universal principal of multi-system interoperability that may be applied to the emergency public information and warning capability (and other capabilities).

[24] Id at 2 (emphasis added).

[25] Id at 5.

- **Increased Capability** – Systems based on standards can connect to other systems without compromising functionality. This means being able to use whatever delivery sub-systems (email, sirens, telephones, etc.) are available without having to switch input subsystems/origination tools or alter procedures. It allows reciprocity and mutual aid across boundaries when appropriate.

- **Increased Efficiency** – The need for additional equipment and technical resources to improve interoperability decreases.

- **Increased Flexibility to Upgrade** – Each system can make changes or adopt new technology without affecting other connected, standards-based systems.

- **Decreased Reliance on Proprietary Technology** – Jurisdictions can choose from multiple vendors. Single-vendor solutions make switching expensive in the future. Change means writing off old equipment, retraining everyone involved, and recalibrating public expectations. Power shifts from the vendor to the customer.

- **Decreased Cost** – Price competition increases and the need for expensive customized interoperability solutions is reduced. Training can be standardized across jurisdictions, thus reducing training costs. A lesson need only be learned once and can be applied across multiple jurisdictions.

- **Increased Capacity to Expand** – Standards-based solutions are more likely than proprietary solutions to be able to integrate the next system into a larger regional system of systems. This opens the door to future regional procurements without devaluing already existing investments.

Through the system of systems approach, applied at the OA and the regional level, the Bay Area will enhance cooperation and organization to build those capabilities necessary to achieve the regional benefits of more efficient and cost-effective operations, and ultimately, to more effective emergency public information and warnings being delivered and acted upon by the public.

3.3 Guiding Principles

The Bay Area's vision for an interoperable system of emergency public information and warning systems will be implemented through a set of guiding principles that will help shape this *Strategy* and its implementation. These principles are:

- There is no single or one-time solution to enhancing and sustaining the EPI&W capability. The ability to effectively provide emergency public information and warnings will require the integration of often complex capability elements involving plans, equipment, organization, training, exercises, and consistent leadership.

- Emergency public information and warning capabilities will be built upon a framework that balances local control with regional collaboration and integration.

- The whole community must be engaged in emergency public information and warning-preparedness activities to include public awareness and education on warning capabilities and protocols within and across OAs in the region.

- The Bay Area is committed to ensuring that the whole community receives necessary emergency public information and warnings to include those with access and functional needs and limited English proficiency.

- The Bay Area will strive to develop pre-vetted public warning messages based on the latest and best available social science and physical science data.

- The Bay Area will develop multiple methods and technologies for communicating emergency public information and warnings to ensure reliability and survivability and avoid a single point of failure.

- While federal grant funding is important to sustaining and building the region's emergency public information and warning capabilities, the Bay Area is committed to strengthening and sustaining emergency public information and warning, regardless of federal funding.

SECTION 4: CAPABILITY ASSESSMENT

In March 2012, the Bay Area conducted a self-assessment of each OA's EPI&W capability in order to identify strengths and gaps, and serve as the baseline from which to develop the *EPI&W Strategy*. Each of the twelve counties and three major cities participated in the self-assessment through several half-day workshops. Each jurisdiction answered a series of questions individually. The results were then rolled-up to form a regional gap analysis report. [26] The report gives OAs and regional stakeholders an initial understanding of their overall EPI&W capability as a region by highlighting strengths in the Bay Area in developing the EPI&W capability, and identifying areas in which regional coordination and support can be strengthened. Below is a summary of the methodology, approach and key findings from the assessment and gap analysis report issued in May 2012.[27]

4.1 Capability Assessment Metrics and Measures

In order to assess the Bay Area's level of ability across the elements of the EPI&W capability, an assessment tool, the *Social Science Public Warning Metric,* was developed that synthesized the social science research literature on imminent threat warnings.[28] The metric is based on two social science themes: The organizational aspects of warning systems, and understanding what shapes public protective action warning response behavior. The region then used parts of that metric and combined it with public information and warning operational standards of practice. These two combined data sets were then merged with the results of a review of Bay Area plans and other assessments in order to design practical questions with which to measure the current EPI&W capability of OAs and the region as a whole. The final metric consists of nine interrelated elements:

- **Element 1** Communication Linkage from Risk Detectors to Information Managers
- **Element 2** When to Warn
- **Element 3** Warning Impediment Abatement
- **Element 4** Salient Audience Profile
- **Element 5** Pre-scripted and Pre-vetted Science-based Public Messages
- **Element 6** Public Message Delivery and Dissemination
- **Element 7** Public Message and Public Information Management
- **Element 8** Pre-event Public Warning Education
- **Element 9** Adherence to General Planning Elements

[26] The assessment data was then "rolled up" to provide a regional picture of capability. The assessment did not include municipalities in the Bay Area other than San Jose and Oakland.

[27] The full report can be found at the Bay Area UASI, *Emergency Public Information & Warning Gap Analysis Report*, May 2012.

[28] Mileti, Dennis, Ph.D., *Social Science Public Warning Metric*. March 28, 2012.

As part of the metric, and to inform the establishment and implementation of the *Strategy*, three key terms and concepts were identified and defined:

- **Detection** – involves those who detect and then communicate risk data and information to those responsible for managing that data and information for public warnings.

- **Managing the information** – involves taking the risk data and information and making decisions about how and when to warn the public. The people responsible for this element include local emergency public communication personnel.

- **Public response** – involves how the public responds to the warning and what motivates public warning response.

This approach has been used to assess and develop a number of successful warning systems. These include systems in the U.S. and abroad, such as the Federal IPAWS and, in the Bay Area, the Contra Costa County "Community Warning System" (CWS).

4.2 Capability Assessment Methodology

The methods employed to conduct the assessment were designed to provide an integrated planning approach, from data collection through analysis, to inform strategic planning and investment prioritization. This was done by collecting data and identifying gaps in plans, organization, equipment, training, and exercises (POETE).

DHS has defined POETE as the elements of capability.[29] These elements of capability also align with DHS-allowable grant expenditure areas and grant investment justification budget sections. The POETE categories are defined in Table 1 below.

Table 1: Overview of POETE Structure

Element	Definition
Planning	Development of policies, plans, procedures, mutual aid agreements, strategies and other publications that comply with relevant laws, regulations, and guidance necessary to perform assigned missions and actions.
Organization	Specific personnel, groups, or teams, an overall organizational structure, and leadership at each level in the structure that comply with relevant laws, regulations, and guidance necessary to perform assigned missions and tasks. Paid and volunteer staff who meet relevant qualification and certification standards necessary to perform assigned missions and tasks.

[29] U.S. Department of Homeland Security, *Target Capabilities List*, September 2007.

Table 1: Overview of POETE Structure

Element	Definition
Equipment	Major items of equipment, to include those on the DHS Authorized Equipment and Standardized Equipment Lists, supplies, facilities, and systems that comply with relevant standards necessary to perform assigned missions and tasks.
Training	Content and methods of delivery that comply with training standards necessary to perform assigned missions and tasks.
Exercise	Exercises, self-assessments, peer-assessments, outside review, compliance monitoring, and actual major events that provide opportunities to demonstrate, evaluate, and improve the combined capability and interoperability of the other capability elements to perform assigned missions and tasks to standards necessary to achieve successful outcomes.

The Bay Area conducted several workshops with representatives from each of the OAs in the Bay Area in order to collect baseline data. Participants generally included a cross-section of county or city employees who had expertise in EPI&W, as well as in a wide variety of other areas. These included PIOs, emergency managers, public health and first responder leaders and the access and functional needs community. During these workshops, the facilitator posed the set of POETE questions developed for the EPI&W capability, as well as two additional questions focused on sustainment and opportunities for improvement.

OAs answered the questions with either a "Yes," "Partial," or "No" response, based on their understanding of the OA's current abilities. An OA answered "Yes" for capabilities it possessed or could perform. An OA answered "Partial" for capabilities not fully developed (for example, if written procedures were under development but were not yet completed). An OA answered "No" if they did not have or were unable to perform the ability in the question being asked. OAs were also asked to provide an explanation for their answers to establish specific context.

Several interviews with key regional allied agencies from across the Bay Area were also held to answer questions and review regional strengths and weaknesses. The list of allied agencies included:

- Bay Area Rapid Transit (BART)
- California Emergency Management Agency (CalEMA)
- California Department of Transportation (Caltrans)
- California Department of Forestry and Fire Protection (CAL FIRE)
- California Highway Patrol (CHP)
- Metropolitan Transportation Commission (MTC)
- National Oceanic and Atmospheric Administration (NOAA)

- Northern California Regional Intelligence Center (NCRIC)
- Santa Clara Valley Transportation Authority (SC-VTA)
- United States Coast Guard (USCG)
- Water Emergency Transportation Authority (WETA)

4.3 Summary of Capability Assessment Findings

The data collected from each OA and allied agency was then rolled up and analyzed to provide a regional picture of capability and gaps in EPI&W. The following is a summary of the key findings from the capabilities assessment and Gap Analysis Report. It outlines certain key findings in the areas of organization and standards of practice, planning and operational coordination, tools and technology, and training, education and exercises.

4.3.1 Organization and Practice

Due to budget limitations, state capabilities in the region have dissipated in both emergency public information and warning. Specifically, the State Regional Emergency Operations Center has been pulled back to Sacramento leaving a void for local Bay Area stakeholders to fill concerning regional level incidents that include managing EPI&W.

There is currently little formal regional coordination of EPI&W activities pre-incident, such as regional procurements of EPI&W products and services, and there is no established and ongoing pre-incident regional planning and coordination structure or personnel dedicated to managing it. This prevents the OAs from working together through a consistent organizational framework that can foster regional collaboration on a wide range of EPI&W issues.

The duplication of warning delivery systems in the region, combined with the lack of unified warning control sub-systems, creates avoidable delay, extra workload, and opportunities for error for warning originators. In addition, there is a lack of consistency in how similar systems are used. For example, in one OA, a siren could be used for tsunami. Another OA uses a siren for an industrial accident, and a third uses a siren for general hazards. Almost all of the OAs' warning systems must be activated one-by-one and do not support activation using the CAP version 1.1 or 1.2.

OAs across the region have few means of determining the effectiveness of the emergency public information and warnings they are providing. Success is often defined as the ability to push information out as opposed to whether appropriate actions were taken by those who received the information and/or warnings.

Finally, from federal fiscal years 2006 through 2010, the Bay Area has allocated approximately $837,911 for public information and warning POETE activities out of approximately $150 million in UASI funds awarded to the region during that time frame. While other funding sources are used to support EPI&W activities, current UASI funding levels for EPI&W represent approximately one half of one percent of total available funding

under the covered time frame, despite EPI&W having been designated a priority capability for the region as a result of the Bay Area's risk management program.

4.3.2 Planning and Operational Coordination

The current patchwork of public warning systems among the OAs and other regional allied agencies causes great inconsistency in the type, content, and format of warnings received by the public. The region also lacks a systematic and consistent planning process to develop pre-scripted warning messages based on the best available social and physical science data.

The Bay Area is adept at managing EPI&W activities for common, smaller cross-jurisdictional incidents and traditionally-encountered response environments, such as wild fires, flooding, and spills. However, there is no technical or operational means by which the region can routinely share warning messages to the public for hazards that cross multiple OAs.

The ability to establish an intra-OA JIC varies across the region and the ability to establish and effectively staff a multi-jurisdictional JIC and JIS to manage a major incident in the region is lacking. While such a JIC/JIS would normally be established by CalEMA under the Regional Emergency Coordination Plan, CalEMA's ability to do so rapidly and effectively is now in doubt and the Bay Area has not filled that void.

While the region as a whole has a number of programs to minimize isolation from warning systems due to non-English-speaking language barriers, or access and functional needs, there is limited planning and coordination among each of the OAs and with the various community based organizations throughout the region. There is also a lack of training on customizing any warranted message additions for these populations.

4.3.3 Technology and Tools

Few OAs have agreements in place to access and integrate new and emerging EPI&W systems, such as IPAWS and CMAS. Many OA agencies have not certified that their equipment is IPAWS-ready. Almost all of the OAs' warning systems are not CAP-compliant and this hinders interoperability of warning technology used in the various OAs.

In general, most OAs recognized the value of providing and monitoring information via social media, and most OAs have social media accounts such as Twitter and Facebook. However, few OAs have a social media policy, and several are not monitoring social media or using their social media accounts. There is also a lack of training to assist PIOs and warning originators in adapting to technological advancements and the use of social media.

4.3.4 Training, Education and Exercises

Emergency public information and warning is not fully integrated or considered a priority within the Bay Area's regional training and exercise program. This prevents the OAs from testing, evaluating, and improving their ability to act regionally. Training and exercises involving EPI&W across OAs does occur, but it is sporadic, and the level of consistency in training and evaluations is unknown.

Although it is not consistent or coordinated across the region, there are training opportunities to varying degrees for PIOs on emergency public information issues. However, there is no standard or consistent training curriculum for warning issuers that might include, for example, risk communication training on how to prepare warnings and subsequent information that enhance public response. Similarly, public information is sometimes included in regional exercises, but there is currently no warning exercise at the regional level.

There is a lack of training and education for elected and senior officials on how to coordinate through a JIC during a major incident. This creates confusion and inconsistent messaging when multiple jurisdictions try to or do form a JIC, as the elected and senior leaders are often the least familiar with the JIC procedures and protocols.

Public education on warning systems is limited across the region. While there are preparedness campaigns focused on being "ready" for an incident, there is little in the way of explaining the warning methods used in an OA, what those methods mean, and what protective actions should be taken when a warning is issued.

SECTION 5: GOALS AND OBJECTIVES

The goals and objectives of the *Strategy* serve as the basis for what the Bay Area must do to sustain and enhance its system of systems over the next five years in the area of emergency public information and warning. The goals and objectives are the culmination of integrating risk and capabilities assessment data by establishing actions to be taken that are designed to enhance or maintain EPI&W capabilities in the Bay Area. Finally, the goals and objectives represent not only the priorities of the Bay Area but also the region's implementation of State of California and national level policy and programs on EPI&W at the Urban Area level, e.g., CAP, IPAWS and CMAS, etc.

Given the strain on local, state, and federal budgets, the Bay Area's strategic approach in developing the goals and objectives is to ensure that the goals and objectives are based upon what is actually and realistically achievable under the foreseeably long period of constricted public safety budgets. Such an approach distinguishes the perfect or ideal from the achievable and focuses on *closing priority capability gaps and sustaining priority capabilities that already exist,* as opposed to trying to build capabilities in non-priority areas or entirely new, exotic, and expensive regional systems and approaches that cannot be sustained.

The goals and objectives focus on the next five years, but will be reviewed and updated annually, as necessary. Some of the objectives likely will carry over from year to year, while others may be removed or updated based on the Bay Area's progress and actual needs. The goals and objectives will continue to be defined by risk analysis, identified capability gaps, and sustainment priorities.

5.1 Organization and Structure of the Goals and Objectives

The Bay Area's EPI&W goals and objective for the next five years are organized into four main areas:

- Goal 1 Organization and Practices
- Goal 2 Planning and Operational Procedures
- Goal 3 Technology and Tools
- Goal 4 Training, Education and Exercises

Each goal outlines a broad strategic end-state that the Bay Area will seek to achieve. The objectives that follow each goal outline further detailed actions that must be taken to help achieve the end state articulated in the goal. While each goal and objective is distinct, they are all interconnected. Each serves a common purpose of driving the Bay Area to achieve its vision for EPI&W in the region.

The structure of the goals and objectives follows a logical progression of identifying the EPI&W challenge facing the Bay Area, outlining the causes behind the challenge, and providing a solution and associated benefits to address the challenge and overcome its causes. As part of the structure, issues such as supporting community members with access and functional needs and the use of social media are fully integrated throughout the goals and objectives, as opposed to treating the issues distinctly with their own goal(s). This approach is consistent with the "whole community" concept and avoids treating those with access and functional needs, for example, as an ancillary issue separate from the rest of the community. By fully integrating the needs of those with access and functional needs into various solution areas throughout the objectives, the Bay Area will increase the likelihood of actually addressing and meeting those needs.

> **"My experience tells me if we wait and plan for people with disabilities after we write the basic plan, we fail."**
> ***Craig Fugate, FEMA Administrator***

The order of the goals and objectives is based on a sequence of events necessary to strengthen EPI&W in a coordinated and effective way:

- First, in order to act regionally in the development of policies, programs and initiatives, the regional structures, governance, means and mechanisms must be in place. These issues are addressed in Goal 1.

- Second, once the regional policy and program structures are in place, the region must have sufficient and integrated plans and operating practices. These issues are addressed in Goal 2.

- Third, with ever evolving technology, the Bay Area must ensure it has sufficient tools to deliver essential emergency public information and warnings, and achieve interoperability among the tools it has and will acquire in the future. Goal 3 addresses these issues.

- Finally, Goal 4 addresses the critical need to provide training, education, and exercises on EPI&W to the whole community in order to effectively implement each of the prior three goals.

GOAL 1: ESTABLISH CONSISTENT PRACTICES AND ORGANIZATIONAL STRUCTURES FOR EMERGENCY PUBLIC INFORMATION AND WARNING

Moving toward an interoperable and CAP-based emergency public information and warning "system of systems" in the Bay Area requires the region to adopt common standards and the appropriate organizational structures, as well as the right leadership to coordinate adoption of those standards and guide those structures. All other goals and objectives in the *Strategy* flow from this first step. These standards, structures, and personnel are crucial to actualizing a "regional" approach to building and sustaining emergency public information and warning capabilities. Together, they break down barriers and provide the "glue" to bring together disparate jurisdictions and agencies and form the foundation for the regional "systems of systems" approach.

OBJECTIVE 1.1 ESTABLISH A BAY AREA EMERGENCY PUBLIC INFORMATION AND WARNING FRAMEWORK AS A BASELINE AGREEMENT FOR INTER-AGENCY AND REGIONAL COOPERATION AND COORDINATION

Challenge: There is a lack of consistency across the Bay Area in how similar emergency public information and warning capabilities are developed and used. As a result, public expectations can be confused, especially for people who live, work, and travel in multiple OAs. For example, people from different parts of the region may interpret the sound of a siren in a variety of ways, e.g., fire, hazardous materials release, tsunami, flash flood, school "lockdown," etc.

The lack of shared standards can inhibit mutual aid among agencies with warning or public information responsibilities. Each jurisdiction's staff must be custom-trained to their particular local systems and policies, and a responsible official from one OA or municipality cannot be assumed to have working knowledge of the warning and public information methods and policies in a nearby jurisdiction. For example, different OAs have different understandings as to when they might be permitted to use CalTrans' changeable message signs on freeways.

While most emergencies are small enough to fall entirely within a single OA, city, or special district, it is not unusual for even small incidents to affect multiple jurisdictions and involve multiple disciplines, e.g., fire, law, health, public works, etc. Larger emergencies and incidents frequently violate the boundary of a single OA. When that occurs, lack of consistency in policies and practices for warning and emergency public information can complicate cross-jurisdictional and multi-disciplinary response. For example, in the event of an airborne hazardous materials release that originates in one jurisdiction but travels into another, precious minutes can be lost in warning people at risk because there is no pre-arranged reciprocity agreement in place and no technical mechanism for activating an adjoining jurisdiction's output sub-systems (sirens, telephone notification, etc.).

Even before an incident, there is no existing mechanism for coordinating the development of warning and emergency public information capabilities for efficiency or cost-effectiveness. As such, potential budgetary savings are lost because there is no consistent framework for inter-jurisdictional procurements or long-term planning. The current fragmentation has led to duplicative and relatively small procurements of "commodity" services, such as telephone-based notification services, and to the accompanying excess costs and loss of market power for government agencies.

Causes: The primary cause of this lack of coordination is the fragmented way in which local warning and emergency public information capabilities have developed over the years. There has been no generally accepted mechanism for setting common practices or even the exchanging of information about warning capabilities and local policies. With a few notable exceptions, rather than viewing warning as an all-hazards function that cuts across disciplines, most local warning capabilities have been developed and funded in agency and jurisdictional "silos." These silos often focus on a single hazard, or the immediate concerns of the individual development teams and agencies, with little or no consideration of broader use or resource sharing.

The existing diversity is not entirely unjustified. It reflects local variations in government structures, risk profiles, and resources among the OAs, municipalities, districts and other agencies in the region. Those variations, in turn, are largely artifacts of local history, and may reflect variety in local hazards, geography, demography and economy. It would be neither desirable nor productive to deny individual jurisdictions the flexibility to make their own best choices and to adapt to changes as they occur over time.

Finally, differences among OAs have been exacerbated by aggressive marketing of warning systems at the lowest possible governmental levels (e.g., municipalities and school districts). Sales of multiple small products are frequently more profitable for the vendor than sales of larger combined systems under more competitive conditions. In the absence of a broad regional program of coordination, many local agencies and/or jurisdictions have judged they were "on their own" and have taken the initiative to develop warning capabilities that might have been less expensive and more effective if they were shared.

Objective Lead: The Bay Area UASI Management Team.

Solution and Benefits: Operational Areas, municipalities, special districts, and other organizations with emergency- and disaster-management responsibilities will be encouraged to subscribe to a Bay Area Emergency Public Information and Warning Framework (Framework). The Framework will serve as the foundation for establishing a regional approach to emergency public information and warning in the Bay Area and for more formal regional undertakings.

The Framework will articulate a structure and standards for mutual aid, coordination and assistance in the planning and conduct of emergency public information and warning and in the strategic planning and coordination of ongoing capability development across the region. The Framework is attached as Appendix B. The Framework will outline:

- Basic practices for public warning and emergency public information, setting a consistent expectation as to appropriate use of emergency public information and warning systems;
- An agreement to consolidate JICs across jurisdictions and disciplines and to avoid the creation of multiple JICs for a single incident or disaster;
- A pledge to pursue development of a regional mechanism for support to OAs, municipalities, and other entities with emergency public information and warning responsibilities in the areas of:

    - National Incident Management System (NIMS) requirements for CAP compatibility in federally-funded warning system procurements, and also to FEMA's "FY2012 Guidance on Public Alert and Warning" and its recommendation of regional, multi-jurisdictional and multi-disciplinary projects. [30]
    - Monitoring trends, technologies and legislation through established organizations such as Bay Area Emergency Public Information Network (BAEPIN) and the UASI Emergency Public Information and Warning Work Group.
    - Development of requirements and evaluation of proposals for joint investments to include the integration of grant funds such as the UASI and Port and Mass Transit Security Grant Programs, among others.
    - Development and execution of joint training and exercises in emergency public information and warning to include through the Bay Area Regional Training and Exercise Program.
    - Common criteria for the use of public warning systems to establish a predictable basis for inter-jurisdictional cooperation and mutual aid in warning.

California has been a leader in the development of frameworks for cooperation among emergency management and public safety personnel. OA, municipal, special district and state agency staff point with legitimate pride to practical successes in managing warning and public information during fires, floods, hazardous materials spills and other emergencies over many years. Much of this has been accomplished in the context of the California SEMS, ICS, the California MMAA, and other mature cooperative frameworks. California also led in the development and implementation of the CAP, which is now a national and international standard. It is critical that the Framework build upon these other frameworks and not duplicate or undermine those existing arrangements and practices.

[30] This could include a move to forge a partnership with the State of California and with Silicon Valley firms (e.g., Google, which is already active in the application of CAP alerting) and institutions (e.g., Carnegie Mellon University Silicon Valley through its Disaster Management Initiative) in the development and deployment of CAP based all-mode warning control systems for both local systems and the IPAWS.

OBJECTIVE 1.2 DEVELOP REGIONAL POLICY AND PROGRAM STRUCTURES AND ASSIGN A REGIONAL PROGRAM MANAGER FOR EMERGENCY PUBLIC INFORMATION AND WARNING INITIATIVES AND PROGRAMS

Challenge: There is presently no established and ongoing region-wide coordination group(s) in the Bay Area for emergency public information warning policy and program development. Nor is there a program manager to steer a regional structure or group to include organizing meetings, overseeing project development and implementation, ensuring training and exercise programs include EPI&W, etc. This results in a fragmented EPI&W policy and program development process and a lack of focus on EPI&W capability enhancements in the Bay Area at the regional level.

Causes: While several attempts have been made in the past to develop forums and working groups to coordinate emergency public information and warning policy and programs in the Bay Area, these organizations have fallen short for a variety of reasons. These include the lack of a dedicated person whose function was to help steer the group and track and oversee progress. For example, BAEPIN was originally established in 2008 under the Regional Emergency Coordination Plan (RECP) as a network of Bay Area PIOs to facilitate professional engagement, information-sharing, vetting and processing of information and training opportunities. BAEPIN designated a volunteer coordinator but no one has been able to fulfill that role as originally envisioned. As such, BAEPIN has not developed into a standing regional coordination group for EPI&W activities. Instead, multiple PIO coordination groups operate across the region, resulting in a lack of consistency in coordinating and maintaining regional projects and activities.

In addition to BAEPIN, under the UASI program a regional EPI&W Work Group was established to share best practices and develop regional projects involving planning, equipment purchases, training and exercises. However, this group also failed to sustain itself and is no longer in place. As with BAEPIN, a lack of dedicated resources to manage the EPI&W Work Group contributed to its demise. Both BAEPIN and the EPI&W Work Group were well conceived structures that simply lacked resources to ensure their viability.

Objective Lead: The Bay Area UASI Management Team and the EPI&W Program Manager.

Solution and Benefits: To enhance regional collaboration and integration, the Bay Area will reconstitute the BAEPIN and the EPI&W Work Group and assign a regional EPI&W Program Manager to serve as the coordinator for both bodies and to oversee implementation of the *EPI&W Strategy* and the Framework.

The Program Manager

The EPI&W personnel at the OA level have limited resources to manage their day-to-day intra-OA responsibilities. Managing regional policy and programs is a complex and additional duty that few, if any, OAs can provide with full time resources. As such, organizations often spend precious resources on conducting assessments and generating regional plans, only to see the results of that work wither due to a lack of implementation

resources, especially program management. A Program Manager will ensure the region maintains focus regarding the *EPI&W Strategy* and its implementation over a five year period. Thereafter, the need for and role of the Program Manager will be re-evaluated.

The Program Manager will ensure that both BAEPIN and the EPI&W Work Group (both discussed below) meet on a regular basis and that group activities are followed through. The Program Manager will be the interface between the EPI&W community and the larger Bay Area homeland security and emergency management communities on major policy issues impacting EPI&W. This will include making sure policy makers at the regional level, such as the Bay Area UASI Approval Authority and Advisory Group, are kept informed as to progress in implementing the *EPI&W Strategy* and what challenges exist. This will help maintain executive engagement and resource allocation for *Strategy* implementation.

The EPI&W Program Manager will be similar to those for interoperable communications, risk management, and the training and exercise programs in the Bay Area. Therefore, the Program Manager may be placed within the Bay Area UASI Management Team or could serve separately from the Management Team, but work in close coordination with them. The Program Manager may be hired as a consultant/contractor or employee through any number of jurisdictions in the region. However, in all cases the Program Manager must be seen as a regional position not beholden to any one jurisdiction. To support the Program Manager, the four Hub Planners (there is currently a planner for the North, South, East and West Bay Hubs under the UASI program) should serve as field or deputy program managers in support of Hub projects designed to implement the *EPI&W Strategy*.

The EPI&W Program Manager will also be responsible for monitoring developments and trends in public warning and emergency public information technologies and practices, and for providing advisory updates, training and reference resources to OAs, the Bay Area Regional Training and Exercise Program Manager, and allied agencies in the Bay Area. This will include canvassing other states and localities, as well as local subject-matter experts from across the region through BAEPIN and the EPI&W Work Group. These local groups provide regional expertise on the fast-advancing state of the art in the area of emergency public information and warning and can provide decision-makers with a broad perspective from which to make policy choices and investments based on the *EPI&W Strategy*.

Regional Coordination Groups

Robust regional coordination structures will be vital for a region as large and diverse as the Bay Area to maintain a sense of unity and focus in strengthening EPI&W across the entire region. The BAEPIN and EPI&W Work Group will each provide a consistent forum to share best practices and information, develop and adapt regional policy and initiatives, and serve as steering groups for the *EPI&W Strategy's* implementation. The BAEPIN will focus primarily (but not exclusively) on emergency public information, and the EPI&W Work Group will focus primarily (but not exclusively) on public warning issues.

In addition to local OA and municipal representatives, each group should also include representatives from allied agencies such as NOAA, Cal EMA, BART, NCRIC, CalTrans, Coast Guard, etc. Both groups should also develop basic operating procedures to make decisions

and recommendations. While the BAEPIN consists primarily of PIOs, the EPI&W Work Group, in addition to warning professionals from across the region, should involve incident commanders from the public health, law enforcement and fire service sectors, etc. Incident commanders are the individuals who most often call for the issuance of initial public warnings or alerts and must be made part of the policy making process.

Both the BAEPIN and the EPI&W Work Group should also include representatives from the access and functional needs and limited-English proficiency communities. These representatives should come from both the government sector, such as local Americans with Disabilities Act coordinators, and non-government sectors, e.g., community-based organizations. Including such representatives will help ensure that as regional policy is developed, the needs of both communities are addressed upfront and made part of the larger solution(s).

As part of the reconstitution of both groups, the region may include developing a virtual platform, e.g., the soon-to-be-developed Bay Area UASI website platform or SharePoint©,[31] for communication and collaboration among and between the BAEPIN and the EPI&W Work Group. Given the size of the Bay Area, face-to-face meetings are not always practical and a virtual platform will allow for collaboration to occur even in the absence of in-person meetings.

[31] The reference to SharePoint® is for illustrative purposes only and does necessarily represent an endorsement of the use of the product for this purpose.

OBJECTIVE 1.3 DEVELOP A PROCESS FOR JOINT REGIONAL PROCUREMENT OF FUTURE EMERGENCY PUBLIC INFORMATION AND WARNING TOOLS AND FOR SUSTAINING CURRENT PUBLIC INFORMATION AND WARNING CAPABILITIES

Challenge: The Bay Area lacks an integrated regional approach to procuring emergency public information and warning resources. It also lacks a consistent and reliable multi-year funding stream for emergency public information and warning equipment and maintenance. Without such an approach and funding stream, the ability to integrate and sustain current and future capabilities will be increasingly difficult. At the same time, funding for public safety and homeland security is under significant budget pressure, shrinking the available funding pool for sustainment.

Causes: For sustainment, state and local budgets are under significant strain due to a weak economy and other factors. This has a direct impact on public safety budgets down the line from personnel to equipment to training and exercises. As a result of tight local budgets, localities across the country, including the Bay Area, have relied increasingly on federal homeland security and public safety grants to help acquire homeland security resources, including emergency public information and warning capabilities. However, these federal funding streams are unstable as the federal budget deficit forces Congress and the executive branch to cut federal programs. For example, from federal FY 2011 to FY 2012, the Bay Area saw a 40% cut in its UASI funding as a result of such cut backs.

The lack of integrated procurement is based, in part, upon the vendor-driven design of warning products. Lacking expertise or specific independent guidance, many agencies and governing bodies have been guided in their procurements primarily by marketing presentations. However, the design priorities of vendors are not automatically aligned with those of government agencies. In particular, many vendors strive to maximize revenues by "locking in" their customers to proprietary products through "free" deployments that do not interoperate with other systems and that can become expensive to sustain.

Another component is the reactive context in which many local warning systems have been designed and deployed. High-profile incidents—for example, shooting incidents involving schools and colleges—have created powerful public, media, and political pressure for quick action on warning systems. This has made it difficult, in many cases, for responsible officials to take time to conduct a comprehensive or in-depth review of best practices in public warning for procurement purposes. Instead, there have been strong incentives in some cases to adopt "quick fix" solutions.

Objective Lead: The Program Manager with support from OA procurement offices.

Solution and Benefits: The Bay Area will develop and maintain a shared regional mechanism for pursuing economies of scale in equipment/system procurement, maintenance, and operation. This will include a regional mechanism for developing additional funding sources to include from the private sector.

Both BAEPIN and the EPI&W Work Group will serve as the primary forums within which regional stakeholders can engage in ideas and best practices for effective procurement that benefits each jurisdiction, agency and the region as a whole. The EPI&W Program Manager will facilitate these discussions and help ensure that stakeholders are provided the latest information on standards and technology to include the most current technology available to communicate with people with access and functional needs. By collaborating on requirements and pooling their market power, the Bay Area can obtain financial and operational efficiencies and simultaneously improve service to the public.

The Program Manager will also develop consistent or "boilerplate" language to be used among OAs, municipalities, special districts, allied agencies, etc. for individual agency or jurisdiction requests for proposals and other EPI&W contracting mechanisms. This will build into the contracting process certain EPI&W standards and practices to help ensure interoperability and compatibility among items procured at each level of government.

This approach will allow the acquisition of highly commoditized warning output-sub-systems, such as sirens and telephone notifications systems, to become independent of the acquisition of the sub-systems used to originate warning messages. This is important because when warning originators invest staff time in training to use a particular warning input sub-system, e.g., computer software, an unintended side effect is that it becomes expensive and disruptive to make changes. If that input sub-system is specific to a particular warning output sub-system, that increased "switching cost" becomes associated with the output sub-system as well, making it even more difficult to replace the input sub-system, even if better products become available. Separating the two functions will result in enhanced regional buying power immediately and in the future.

Finally, training for warning and public information officers will address modern integrated approaches to public alert and warning and highlight NIMS requirements for CAP interoperability in new warning system procurements. Such training will provide decision-makers with key background information they may not have time to research when events or funding opportunities require action on warning capability development.

OBJECTIVE 1.4 INCREASE CAPABILITY TO WORK WITH PARTNER ORGANIZATIONS TO REACH PEOPLE WITH ACCESS AND FUNCTIONAL NEEDS AND LIMITED ENGLISH PROFICIENCY

Challenge: The Bay Area is increasingly capable of communicating emergency public information and warnings to able-bodied English speakers. However, the Bay Area is highly diverse and home to growing populations of people with limited English proficiency as well as access and functional needs. There is a high risk that these populations will experience warning information isolation if they are unable to receive or understand emergency public information and warnings.

In order to integrate the needs and perspectives of people with access and functional needs, as well as limited English proficiency, into planning and exercise activities, some OAs work with organizations whose constituents include these populations. However, there is no regional strategic approach for doing so and few examples of formalized roles and agreements to work with such organizations.

Causes: Only recently have OAs begun to consider a wide range of community based organizations (CBOs) as full partners in emergency management planning and response. In addition, many of the CBOs that work with these populations are short-staffed and much focused on implementing their own mission, and consequently do not have the resources to take responsibility to fulfill such an important role in emergency management.

Objective Lead: The EPI&W Program Manager and OA emergency managers.

Solution and Benefits: In order to send effective messages to access and functional needs and/or limited English proficiency populations that are most likely to result in appropriate protective action response, the Bay Area will focus on two areas:

- Building relationships with the staff and volunteer leaders of CBOs that serve access and functional needs and/or limited English proficiency populations.

- Assisting those CBOs to build the capacity needed to communicate quickly with their own constituents through robust communication networks that use social media and other tools for transmitting primarily to cellular telephones.

To achieve this, Bay Area emergency public information and warning leaders will strengthen their outreach to and develop sample contracts and MOAs between OAs and CBOs within each OA. These MOAs may also be used between municipalities and CBOs within OAs in addition to or in lieu of the MOAs between CBOs and OAs.

The EPI&W Program Manager will work to develop a template document for how OAs/municipalities can work with CBOs to develop roles and responsibilities for a) CBOs getting information from warning message providers, and b) for CBOs to disseminate warning messages to their constituents/members. In doing so, the Program Manager will

use the Communication, Medical, Independence, Supervision and Transportation (C-MIST) functional needs framework with a focus on Communication.

Instead of solely working to convince their constituents to sign up to receive warning notifications directly from their local jurisdiction's warning system (as has been attempted before with moderate success), the CBO staff and volunteer leaders would receive the warnings and transmit them to their constituents in a manner (or in the language) that is most likely to result in their constituents taking protective actions without delay.

The CBOs are already trusted sources of information for the constituents they serve. For example, Collaborating Agencies Responding to Disasters (CARD) has had success in helping non-profit organizations to integrate emergency preparedness education activities into their service organizations by showing the staff and volunteers how such activities align with the mission of their organizations. Such organizations can become partners with emergency managers in both warning education and warning message dissemination, if funding and technical support is provided.

The CBOs will be evaluated for their level of capability and interest in providing assistance in emergency public information and warning planning, public education, and message dissemination. OAs and/or municipalities will then develop and maintain a database of organizations whose constituents include people with access and functional needs or limited English proficiency. The database will include information about the CBOs' mission, activities and which populations they serve. Most OAs and likely many municipalities across the region have done this already and it is simply a matter of updating what they have in their respective databases.

Warning education designed to assist access and functional needs and/or limited English proficiency populations to be more familiar with warning systems and protective actions will be added to the Bay Area's regional training curriculum for preparedness. Training should also to be developed for CBOs' PIO contacts throughout the region.

GOAL 2: STRENGTHEN REGIONAL PLANNING AND OPERATIONAL COORDINATION FOR EMERGENCY PUBLIC INFORMATION AND WARNING

Having emergency public and warning plans and procedures in place before an incident reduces the probability of errors committed by people who work as risk detectors and by emergency management actors. These plans support operational efforts and reduce the likelihood of error for several reasons. These include: (1) they help to eliminate *ad hoc* and sometimes counter-productive emergency warning provider behavior, (2) they reduce the likelihood that individual personalities and personal beliefs will determine warning system performance in favor of thought-out procedures, and (3) they help agency and organizational actors to more appropriately fill the gaps presented by inevitable unplanned-for problems that invariably arise during actual incidents.

OBJECTIVE 2.1 ENHANCE LOCAL AND REGIONAL PLANS FOR JOINT INFORMATION CENTER (JIC) OPERATIONS, AND DEVELOP NETWORK-BASED "VIRTUAL" JIC SUPPORT

Challenge: In the event of a multi-disciplinary regional event, formation of a JIC in the Bay Area would be complicated by a number of factors including:

- Overlapping or ambiguous responsibilities, especially in complex disasters, leading to delays in identifying a lead agency or a framework for joint management;
- Possible establishment of multiple JICs with overlapping responsibilities and/or inadequate coordination;
- Inconsistent procedures for mobilizing and assigning JIC personnel;
- Difficulties in transporting JIC personnel to a distant location;
- Shortage of skilled personnel for sustained operation over multiple periods, days or even weeks; and,
- Lack of consistent training of personnel in a common JIC structure and process.

While organizations such as FEMA that frequently operate JICs have detailed and well-tested procedures for establishing, maintaining, and ultimately demobilizing a JIC, most existing JIC plans in the Bay Area are much less complete and proven. Instead, great reliance is placed on the personal skills (and availability) of key personnel who have received various forms of JIC training at irregular intervals.

At the same time, while most of the OAs have nominal plans for the establishment of JICs during extended emergencies, few of these plans include details as to JIC membership, structure or processes. Further, there is little or no consistency in the criteria for JIC activation, nor is there a clear policy on the coordination of multiple JICs or the establishment of a single regional JIC during a large-scale event.

The RECP provides a basic overarching emergency response approach for the region. However, today, it does not reflect the reality that CalEMA and the Regional Emergency Operations Center (REOC) will likely play less of a coordination role in the event of a major regional incident in many response areas, including in EPI&W and JIC operations. In addition, the RECP does not accurately reflect current emergency public information and warning practices and systems to include IPAWS and CMAS. The pre-scripted messages in the RECP Annexes also need to be reviewed to ensure that they are based on the latest social and physical science data.

At the local level, just over half of the Bay Area's 12 OAs have an up-to-date emergency public information operations annex and/or an all-hazard alert and warning annex in their EOP. However, many OAs address the EPI&W capability at various points within their EOPs or in hazard-specific annexes. As with the RECP, IPAWS and CMAS are not accounted for in most local EOPs

Causes: Due to state budget cuts, as of 2012, the REOC has been pulled back to Sacramento. This leaves the Bay Area without an on-site, state level EPI&W coordinating entity, thus placing that responsibility on the region to meet such a need. As a result, most JIC planning at the regional and local level is at a fairly preliminary stage. Dwindling government funding at all levels has retarded detailed JIC planning as limited resources have been directed toward even higher priorities. For example, much of the planning for JIC operations in the Bay Area does not go much further than to specify that a JIC shall, under some circumstances, be convened. Very little detail appears to be provided as to specific criteria for JIC activation or particulars of JIC organization and procedure.

Finally, a PIO's expert understanding of the issues and priorities of their own jurisdiction may not always be helpful in another jurisdiction's JIC. Further, many PIOs are accustomed to working alone or in small teams and may not always be comfortable or fluent in a specialized role within a larger and more formally structured JIC.

Objective Lead: The Program Manager with support from the Regional Catastrophic Planning Team and OA emergency managers.

Solution and Benefits: The Bay Area will establish a joint regional program for:

- Standardizing OA and regional JIC structures and roles. In doing so, FEMA and state guidance should be used to ensure integration with state and federal concepts and procedures.

- Expanding the level of specificity of OA and regional JIC plans.

    - This should include an annex to the RECP focused on a regional concept of operations (ConOp) for addressing EPI&W and establishing and operating a regional JIC based on the SEMS, NIMS and the ICS. The annex should outline

the situation and assumptions underpinning the ConOp, with the actual ConOp and related phases to include activating a local JIC and phasing into a regional JIC.

- This should also include OAs having an up-to-date emergency public information operations annex to their local EOP or ensuring that throughout their EOP the emergency public information and warning function is fully and accurately accounted for. This should include fully accounting for IPAWS and CMAS in plans and procedures.

- Providing JIC training and exercises at the regional level to build consistency across OAs. Such training should focus on procedures for establishing, maintaining, and ultimately demobilizing a JIC based on the updated plans.

This program and process will include members of the access and functional needs community to ensure their needs are understood up front and are accounted for in any final plans and decisions. Such a program will help in familiarizing responsible personnel with the structure of the JIC and the specific roles they may be required to perform.

All sections of the RECP and its associated annexes on the topic of emergency public information and warning will be updated to include the use of social media (see Objective 2.2). Once completed, the updated EPI&W components to the RECP will also help inform development of additional EPI&W training and exercise needs. The same is true for local OA EOPs.

Finally, the Bay Area will seek to partner with academic and industry partners in Silicon Valley to identify requirements and develop a network-based "virtual JIC" system to maximize coordination and utilization of remote personnel. Such a virtual system should be based on linking existing technologies already employed with OAs, e.g., WebEOC®, in order to provide a low-cost capacity for coordination of public messages and sharing of information, while reducing logistical burdens such as travel and workspace.

OBJECTIVE 2.2 DEVELOP POLICY AND GUIDANCE FOR SOCIAL MEDIA USE IN EPI&W AND FORMALLY INTEGRATE SOCIAL MEDIA ACTIVITIES INTO RESPONSE PLANS, INCLUDING THE ESTABLISHMENT OF COMMUNITY PARTNERSHIPS

Challenge: OAs and regional stakeholders are exploring the use of social media as a platform for EPI&W to varying degrees. However, established policies for use of social media in OAs across the region are relatively non-existent. Similarly, the role of these platforms in response has been largely relegated to ad-hoc usage, leading to uncoordinated messaging across public information events.

Monitoring and warning through social media varies across OAs. In general, the use of social media tools can be considered to support four distinct functions within individual OAs, progressing as follows:

- Use as an awareness or listening tool (e.g. monitoring various platforms and pulling in relevant information and data);
- Use as a one-way communications tool (e.g. pushing out warnings and related information to individuals);
- Use as a two-way communications tool to engage with the community, creating a dialogue by both sending and receiving information (e.g. education and training opportunities); and
- Use as a tool to leverage the community as a resource in response efforts (e.g. mobilizing and achieving communal goals).

Causes: Most OAs recognize the value of providing information via social media and have media accounts on Twitter and Facebook, but many have not developed specific strategies to guide use in support of these tools. Issues of strategy development are compounded by the lack of existing policy. Few OAs have a social media policy in place, making it difficult to formally develop and incorporate the use of these capabilities into both day-to-day and response-related EPI&W activities. Furthermore, OAs have not conducted a formal analysis to better understand the demographics of their social media audiences and information-sharing between OAs around best practices and lessons learned has been limited.

Objective Lead: OA and local PIOs and emergency managers.

Solution and Benefits: Specific attention will be given to developing the best ways to incorporate the use of social media tools into existing EPI&W activities and frameworks. This includes integration into the workflow of a JIC (at the OA) level through EOPs, and the regional level through the RECP. Understanding how social media capabilities fit within the functions of a JIC will allow OAs and regional stakeholders to better synchronize messaging across all media during response. The results from the San Mateo County Sheriff's Office of Emergency Services' survey of all OAs in California on the use of social media in emergency management will be used to help formulate approaches to utilize social media effectively at both the OA and regional level.

Common challenges in the use of social media will be identified and addressed at the OA and regional levels through development of policy and guidance documents. Reports such as the "2011 Social Media + Emergency Management Camp: Transforming the Response Enterprise," written by CNA[32]and "Disaster Relief 2.0: The Future of Information-sharing in Humanitarian Emergencies," written by the Harvard Humanitarian Initiative[33]point to some of the common challenges encountered by response organizations in adapting to the use of new technologies thus far.[34]

Both BAEPIN and the EPI&W Work Group will work to establish a joint sub-committee to review and incorporate existing guidance on the use of social media in emergency management into OA and regional policies. Examples of existing policy and guidance documents can be found through the U.S. Army,[35] the U.S. Navy,[36] the Center for Disease Control and Prevention ,[37] the International Association of Chiefs of Police Center for Social Media,[38] and the report, "Designing Social Media Policy for Government: eight Essential Elements," by the Center for Technology for Government.[39]

By defining how social media tools can be used, and who can use the tools, OAs will be able to better define strategies for the growth and sustainment of their social media capabilities. The effective use of social media platforms during response is dependent on OAs having established a credible *voice* on the relevant mediums. This type of reputation-building is done through day-to-day engagement on the platform.

By specifically defining guidance and policy, organizations will be able to more effectively leverage these platforms during incident response by better understanding their audience, and by developing an increased awareness of the social media activities of regional stakeholders through day-to-day engagement. While tools such as Schmap (ww.schmap.it) for Twitter, and Insights for Facebook, can provide a demographic breakdown of an OA's social media audience, OAs should recognize that the most intimate knowledge of their community will come through sustained interaction with that community.

In addition, to aid in the formal integration of social media capabilities in support of public information activities during incident response, targeting and outreach of strategic community partners, such as local radio stations and well-known local personalities who might have large audiences on social media, should occur in advance of response events. As

[32] See: http://www.cna.org/sites/default/files/news/2011/Social%20Media%20Emergency%20Management%20Camp.pdf or http://www.wilsoncenter.org/event/social-media-and-emergency-management-transforming-the-response-enterprise
[33] See: http://unfoldsite.pub30.convio.net/assets/pdf/disaster-relief-20-report.pdf
[34] In addition, more information can be found at http://idisaster.wordpress.com/
[35] See: http://www.slideshare.net/USArmySocialMedia/army-social-media-handbook-2011
[36] See: http://www.cnrc.navy.mil/pao/socialnetwrk/soc_med_hnd_bk.pdf or http://www.slideshare.net/USNavySocialMedia/sm-handbook-print
[37] See: http://www.cdc.gov/socialmedia/Tools/guidelines/pdf/SocialMediaToolkit_BM.pdf
[38] See: http://www.iacpsocialmedia.org/
[39] See: http://www.ctg.albany.edu/publications/guides/social_media_policy/social_media_policy.pdf

an example, the Los Angeles Police Department partnered with Ashton Kutcher and several L.A. area celebrities to get alert messages out via Twitter about a significant freeway closure. A related benefit to the development of community partnerships is that by identifying the appropriate partners ahead of an incident, OAs can better reach socially vulnerable populations. The role and expectations of these partners should be explicitly communicated, and documented in response plans.

Because of the ease in which information can be published by individual participants on social media platforms, the ability of OAs to control messaging around an incident is somewhat limited relative to traditional mediums. Leveraging credible community partners to disseminate and reinforce OA messaging on social media platforms will help to drive messaging congruent with an OA's overall public information strategy. In particular, as rumors and misinformation can quickly spread on social media platforms in the wake of a disaster, pre-established partnerships can help to quickly suppress these rumors and direct individuals toward more credible and verified sources of information.

OBJECTIVE 2.3 ADOPT PROTECTIVE ACTIONS FOR ALL POTENTIAL BAY AREA HAZARDS AND DEVELOP SCIENCE-BASED WARNING MESSAGE TEMPLATES TO COMMUNICATE EFFECTIVE PROTECTIVE ACTIONS TO THE PUBLIC

Challenge: Most people go through life thinking that they're safe. Warnings about impending or occurring threats and hazards tell them that they're not safe. Consequently, initial warnings compel most people to "mill" around interacting with others to search for confirming warning information in an effort to form new ideas about personal safety, risk, and action. This milling intervenes between receiving warning messages and initiating a protective action. Milling occurs regardless of the message-delivery technology used. While the credibility of the source of information can influence milling, it is marginal at best. Social science research shows that people are effectively hardwired to search for more information, regardless of the perceived credibility of the source. The result of this natural human reaction to receiving a warning is that humans are the most difficult animal on the planet to warn about impending threats and hazards and that expectations on warning effectiveness must account for this fact.

Social science research has also found that warning messages are most effective in getting people to take necessary protective actions when the messages conform to a particular message structure and content. However, to develop warning message templates, message developers in the region first require sets of pre-established protective actions that have been adopted by Bay Area public health and safety personnel.

Although there have been various efforts by individual agencies to develop public warning messages for traditional Bay Area hazards, such as wildfires and flooding, those messages have not necessarily been completed with grounding in social science or with the benefit of vetted and adopted sets of protective actions. In addition, the Bay Area has not adopted sets of warning messages and protective actions for more unusual or catastrophic hazards, such as an improvised nuclear device detonation in a major Bay Area city.

Causes: While numerous Bay Area emergency public information and warning practitioners understand the need for development of comprehensive, pre-vetted, social and physical science-based warning messages, organizational and funding challenges have created limited opportunities to work as a region to develop these messages. Often, there is insufficient time to write and vet messages before the incident occurs. In addition, many local emergency public information providers believe there are factors that impede making appropriate public warning decisions. Some key impediments are belief in the following popular myths:

- Warning messages must be short in all cases
- People will easily panic
- One-way warning message delivery is effective communication
- People will understand the warning message
- Warning messages can't be changed

- There's only "one" public
- A credible warning message source exists
- People in the public will blindly follow instruction in a warning message
- One channel public warning delivery will work
- Effective warning messages guarantee effective public response

Objective Lead: The Program Manager.

Solution and Benefits: Public warning providers in the Bay Area will develop social and physical science-based pre-scripted and pre-vetted messages to quickly adapt as needed during actual events. Bay Area public information and warning leaders will use the warning message matrix (attached as Appendix C – Public Warning Message Templates and Matrix) to identify the full range of hazards that require warning messages development. Next, guidance on protective actions that correspond to the needed message topics will be identified and adopted by Bay Area public health and safety personnel. This process should be led by the Program Manager and take place though the Bay Area EPI&W Work Group with support from the BAEPIN as needed.

With robust stakeholder participation and feedback, messages will be developed by message development professionals using the sample templates created during the course of the *Strategy's* development. The primary benefit of completing a full suite of social and physical science-based, pre-vetted warning messages is that Bay Area public information and warning practitioners can more quickly issue well-crafted warnings increasing the probability of timely protective action response. Such messages should contain information on five topics:

- What: Tell the audience exactly what to do.

- When: Say by when (time) people should begin the protective action and by when they should have that action(s) completed.

- Where (who): Include information about who should *and* shouldn't perform the protective action in terms of geophysical location.

- Why: Inform people about the hazard's consequences so people know why they are being advised to take the recommended protective action *and* tell why people not advised to take action don't have to do so.

- Who (source): Say who the warning message is from.

These messages should also be written and communicated with the following style elements:

- Clear: Warning messages should be clearly worded and devoid of jargon.

- Specific: Warnings should be as specific, precise, and non-ambiguous as possible regarding what they say.

- Accurate: Errors cause problems and if any are detected, they should be explained in subsequent warnings.

- Certain: Warnings work better if they are worded and/or spoken authoritatively and with confidence.

- Consistent: It is important to maintain uniformity both *externally* with previously released information by explaining changes from what was said in previous messages or differences with what others are saying, and *internally* with any one message itself, meaning two pieces of information should not be included in the same message that contradict each other or that don't make sense to the listener when considered together.

Once the templates are complete, each OA can then tailor the templates to meet the OA's specific needs and circumstances. As part of the Bay Area's UASI regional training and exercise program, the Bay Area will develop training for local emergency public information providers aimed at addressing each of the above listed warning impediments and methodology for crafting effective warning messages.

OBJECTIVE 2.4 PROVIDE TIMELY AND EFFECTIVE WARNING INFORMATION TO ISOLATED POPULATIONS IN THE BAY AREA

Challenge: Unfortunately, history provides many examples of isolated populations who are over-represented among victims in disasters because of warning isolation. Research has documented this problem for decades in events that include the recent Joplin, Missouri tornado, Hurricane Katrina, the Big Thompson, Colorado flood, and many more.

Warning isolation can exist for a variety of social or physical reasons. People are isolated from receiving warnings for the following reasons: Due to functional needs, such as living independently but being mentally, hearing or sight-impaired; having limited English proficiency; and membership in socially isolated groups such as the homeless, rural communities, and the elderly. Isolation can also occur as a result of being engaged in warning-isolating activities such as camping or hiking, and much more.

There is no comprehensive catalogue of warning-isolated people in the Bay Area with access and functional needs. There is no comprehensive Bay Area approach to provide them warnings in a format that is acceptable to them, nor is there a Bay Area catalogue of specialized communication tools and approaches available to overcome the diverse range of reasons for warning isolation. The extraordinarily diverse character of the populations in the Bay Area exacerbates the challenge of reaching everyone who is isolated from warnings, whatever the cause.

While many OAs in the Bay Area have developed programs to support some populations with limited English proficiency, such as Spanish and Chinese speakers, and those with functional needs, such as the deaf, only limited and uneven planning for reducing warning information-isolation for other populations is in place. Moreover, there are unique needs among warning-isolated populations in institutionalized care facilities that lack clarity. For example, there is limited ability in the region to identify key decision-makers in these facilities who make warning response decisions for the institutionalized populations under their care, and to provide those decision-makers with fail safe warning receipt devices.

Causes: The reasons for warning isolation are diverse; some are obvious and others are less apparent. Many warning-isolated access and functional needs people do not have advocacy groups to represent their interests. Many are simply unaware of their potential warning isolation. Moreover, the problem caused by warning isolation is not always immediately apparent to incident managers and warning providers. The challenges often become apparent only after an incident, when members of warning-isolated groups suffer death or serious injury.

Objective Lead: The EPI&W Program Manager and OA emergency managers.

Solution and Benefits: The Bay Area Program Manager will lead the EPI&W Work Group with support from the BAEPIN to reframe the issue of warning isolation stemming from access and functional needs and other causes. Special and unique warnings and warning-

education delivery channels, special technology, culturally appropriate language and translations for both warning and warning education will be addressed for isolated populations.

The traditional approach of addressing one isolation problem at a time (such as warning delivery isolation versus public warning education isolation), one group at a time (such as people who speak one particular language), and one disability at a time (such as the hearing impaired) will be replaced with a holistic approach that enables all warning isolation problems to be considered comprehensively. This general and comprehensive approach will address the isolation problem by being fully informed about all isolation problems and all approaches currently available to solve them as follows:

- First, the full set of reasons for warning isolation will be integrated so that all the types of people who are warning-isolated are known. This will include people isolated by social position, activity, impairments, language, location, and more. Different methods of reaching these isolated populations will likely emerge as they have, for example, in the emergency planning zones around nuclear power plants.[40]

- Second, relationships will be built with local CBOs to develop outreach assistance to individuals within each of the warning-isolated groups (see Objective 1.4). These CBOs will use their connectivity with their constituents to develop warning education outreach procedures. Some of these CBOs' outreach efforts may be specific to individual OAs, while others will be Bay Area-wide. For example, some CBOs operate with limited geographical service areas, while others may have service areas that include all Bay Area OAs. Approaches to reach warning isolated people without community groups will be considered as they arise.

- Third, the Bay Area will then develop dedicated methods to communicate warnings to key decision-makers in congregate-care institutions that go beyond the standard warnings issued to the general population. People in institutionalized settings do not typically respond to warnings as individuals. Instead, the facility responds as a whole, under the direction of facility decision-makers. However, experience shows that these decision-makers may be isolated from generally issued warnings and that this isolation sometimes has consequences for the people they are responsible for.

The Bay Area EPI&W Work Group will then develop an approach that builds on an economy of scale and avoids duplication of effort across OAs. For example, existing successful outreach activities for other non-warning topics, such as general preparedness and mitigation, will be leveraged to reach isolated populations regarding warning and warning education. Moreover, some CBOs and advocacy groups may serve constituents across different OAs. Therefore, successes and lessons learned regarding specific isolation abatement activities and solutions that have worked in some OAs will be shared across all OAs through the EPI&W Work Group.

[40] Best practices are likely readily available in county emergency notification procedures for nuclear power plant emergencies that exist across the country, including in California.

OBJECTIVE 2.5 ESTABLISH A REGIONAL OPERATIONAL SUPPORT CELL FOR EFFECTIVE PUBLIC WARNING

Challenge: Many potentially valuable public warnings are never issued because the field command personnel who have the information and the responsibility don't have the time or training to compose warning messages or activate warning systems. This is an operational problem, not a technical one.

Causes: Most real-world initial public warnings originate from incident commanders (ICs) in the field who are faced with an imminent threat to human life or health and need the public's prompt cooperation in taking protective action. ICs are generally field-level officers: Sergeants and lieutenants in law agencies, captains and battalion chiefs in fire departments, and comparable ranks in other disciplines. Individually, most of these officers will be called upon to issue a public warning a relatively few times in their entire careers. At the same time, promotions and turnover make it impractical to train every possible warning-originator fully in the science and practice of effective warning message composition and dissemination.

In addition, responders in the field rarely have time or space to craft a warning message text or to operate a computer application to issue one. Field officers are accustomed to delegating tasks to trained staff through concise voice interactions over radio or telephone. In the case of warning, however, most ICs in the Bay Area don't have anyone sufficiently skilled to assist them in composing and disseminating a warning. Dispatchers are already fully tasked, if not overloaded, and can't readily take on an additional duty that would distract them from answering calls and managing radio traffic. Emergency managers generally aren't staffed or trained to provide 24/7 warning support to ICs. Advancing warning technology and growing public expectations are amplifying this challenge, and the deployment of near-universal public alerting over cellular telephones by the CMAS program will only accelerate this trend.

Objective Lead: The Program Manager.

Solution and Benefits: Establish a regional warning officer program on the model of the Contra Costa County Sheriff's existing Community Warning System (CWS) through a single regional operating framework. Currently in Contra Costa County the CWS maintains a small dedicated staff of warning duty officers/specialists, at least one of whom is on call at all times. This does not mean the duty officer is in the EOC or even awake at all hours; they simply must be reachable.

Any IC from any agency in Contra Costa may request support from the on-call warning officer, who then attaches to the ICS structure as a technical specialist. The duty warning officer confers with the IC or designee (frequently the operations chief) to obtain relevant details, clarify the protective action strategy, compose a warning message, plan the distribution of the warning, and then activate the appropriate warning technologies at the IC's instruction. In almost all cases this coordination is done by radio or cellular telephone;

however, in case of an extended response the warning duty officer may, at the ICs request, physically respond to the incident command post.[41] This entire process should be replicated at the regional level by drawing (on a part-time basis) from existing warning staff within and across OAs in the region to support all of the region's ICs and other warning originators. This will leverage local subject matter expertise and reduce costs, as no new staff will be required. Members of the program would be trained in warning social science, best practices, technical functionality and the role of public warning within the ICS.

Whether on-scene or "virtually", the warning duty officer would remain attached to the incident until released by the IC, typically either when the incident closes or when the immediate warning phase is over and a PIO has arrived and/or a JIC is established to deal with follow-on information and the media. This arrangement will enable ICs throughout the region to concentrate on the safety of people at risk without being distracted by the details and subtleties of warning technology and practice. At the same time, it will allow a core staff of warning specialists to accumulate an unprecedented level of real-world public warning experience, in addition to attaining a level of specialized training that would not be feasible to achieve for every potential IC.

Even with Contra Costa County's very active public warning program, its three warning officers are arguably not always fully utilized; the current staffing is the minimum required to ensure continuous coverage, not a reflection of the warning workload for a single OA. It is estimated that a team of five or six warning specialists could provide reliable 24/7/365 service to the entire Bay Area. This would improve quality and reduce duplication, particularly since most OAs have less complex and extensive warning programs than Contra Costa. Once the regional warning officer program is in place, it will serve as a critical means by which public warning technologies are integrated (see Objective 3.1).

Training for additional warning staff could be done in a matter of weeks, with coaching of those new personnel by more experienced warning officers continuing over a period of months. This training would be simplified to the extent that the OAs and local agencies choose to integrate their warning output sub-systems into a regional coordination system. In addition, this program would include a consistent training framework for ICs on warning best-practices and operational procedures. Equipment requirements would be minimal; most modern warning systems can be activated using a standard laptop computer with encrypted wirelessly transmitted data.

The regional warning cell would not deny any OA or local agency control of its own warning systems. The proposed joint regional cooperation would increase the capability of OA warning personnel through training and experience, while ensuring that any future shared regional systems are operated consistently and in line with best-warning practice. The regional support cell aligns public warning with the general mutual aid strategy embodied in ICS, SEMS and NIMS, while at the same time reducing the need for duplication of effort by cash-strapped OAs and local agencies.

[41] In Contra Costa County's experience, an on-scene warning officer is almost never requested, especially as even minimal response time would span the most likely period for a public warning.

GOAL 3: ACQUIRE TOOLS AND TECHNOLOGY NECESSARY TO PROVIDE EMERGENCY PUBLIC INFORMATION AND WARNING BEFORE, DURING AND AFTER AN INCIDENT

With the appropriate standards, structures, and plans in place, the Bay Area will be in a much stronger position to integrate its existing tools and acquire new interoperable tools and technology for use across the region in the delivery of emergency public information and warnings. A key element to integrating OA technologies is the CAP standard, which should guide all future technology procurements. Today's tools and technology, coupled with existing tools, provide new and ever expanding opportunities to reach the public with emergency information and warnings. These tools include text messages through mobile devices, telephone notification devices, sirens, message signs, social media, and many more. Finally, while technology and tools play a vital role in building the Bay Area's "system of systems", these tools and technology are but one piece of the puzzle.

OBJECTIVE 3.1 INTEGRATE EXISTING AND FUTURE WARNING TOOLS IN THE BAY AREA

Challenge: Public warning systems in the Bay Area are a patchwork quilt of technologies, personnel, media, vendors, and policies, and there are both duplications and gaps in their coverage. This has resulted not only in uneven service to the public, but also inefficiencies in procurement and operations.

Causes: To some extent, this patchwork approach is typical of the specialization and division of labor that characterized the 20th century. Like public safety communications, individual warning systems sprang up ad-hoc to address various threats (civil defense, weather, fire, hazmat, etc.), using various output/delivery sub-systems (sirens, broadcast radio and TV, indoor bells, etc.) under the auspices of a variety of agencies and authorities and funded from various sources. There was no emphasis on coordinated development, nor were there technical or organizational mechanisms for coordination.

While having separate systems was the norm in the 20th century, the introduction of digital controls into all sorts of devices, including warning systems, triggered a broad movement toward interconnection and interoperability in the 21st century. Along with the Internet, several factors have now converged into a new integrated, all-hazard approach to public warning practice. Social science research on warning effectiveness and public behavior was collected and brought to the forefront. The CAP technical standard has made it feasible for the first time to control a wide variety of different warning output sub-systems with a single digital input. The Federal Communications Commission, FEMA, and the NWS adopted CAP as a way to leverage federal warning systems through better coordination and all-hazard use.

Even so, during the post-9/11 and post-Virginia Tech periods, powerful pressure toward fragmentation continued to come from the competitive marketing of commercial warning products. Driven by a need to maximize market share, many vendors began aggressive marketing of single-medium specialized systems, and much of the marketing was targeted

at potential customers with the least market power and the least access to independent expertise, e.g., municipalities and school districts. Thus, while the trend toward integration and efficient use of finite warning capabilities has been firmly established at the international and federal level, and in a few pockets of local technical sophistication, the 20th century trend toward fragmentation and duplication of warning capabilities has only gradually slowed at the local level.

Objective Lead: The Program Manager.

Solution and Benefits: The state of the art in public warning uses a single standard message in the CAP format from any authorized source. Messages are aggregated through a shared "clearinghouse" server that implements the open CAP standard to activate multiple warning output sub-systems concurrently with a common message. In this way, the reach, reliability, and increased persuasiveness of multi-modal warning delivery is achieved without duplication of effort or the risk of inconsistency in messaging inherent in operating multiple separate input and output sub-systems. Such is the design of the FEMA IPAWS program, of the State of California's EDIS, of state-level systems in at least a dozen other states, and of the Contra Costa CWS in the Bay Area.

A CAP-based technical warning approach has three basic components:

- **Input Sub-System.** Computer applications (usually software) for creating the master CAP alert messages that will, in turn, activate all appropriate warning output sub-systems. Such tools can be general purpose or they can be specialized for a particular hazard or agency. Such tools typically provide pre-scripted templates for common hazards and protective actions (shelter-in-place, evacuate, etc.). In most cases, a mapping tool is provided to allow the targeting of alerts to ad-hoc warning areas. The input tools can connect to the CAP control sub-system via encrypted internet protocol connections over commercial, wireless or agency-restricted networks and can operate on mobile wireless devices (smartphones and tablets), as well as laptop or desktop computers.

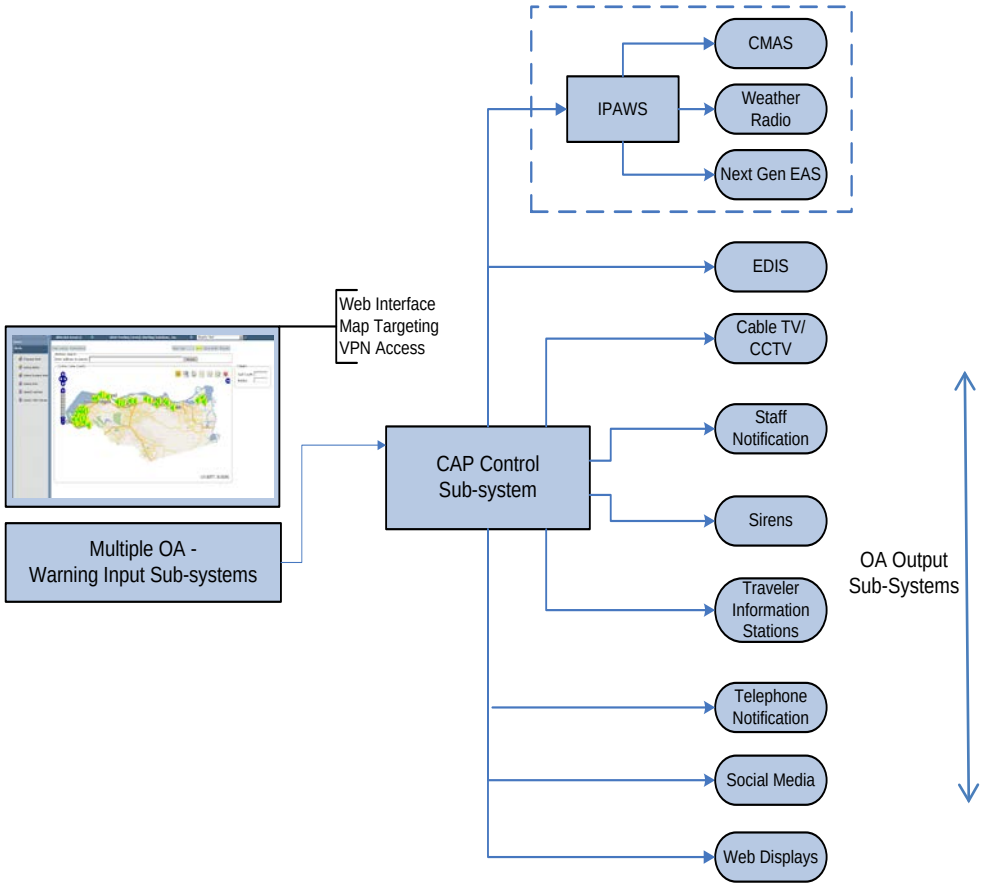
- **Control Sub-System.** The CAP control sub-system (sometimes called the "aggregator" or "server") is a redundant, high-reliability application running simultaneously on two or more computers. The primary purpose of the control sub-system is to authenticate alerts as coming from sources authorized to use the overall warning system. The control sub-system maintains a current collection of alerts that are currently in effect, as well as logs of all prior system activity. On receipt of an authenticated CAP message, the control sub-system "pushes" the alert to the various connected output sub-systems through a Delivery System Interface (DSI).

- **Output Sub-System.** For each output/delivery sub-system (telephone notification system, sirens, social media, alternative media for those with access and functional needs, etc.) a DSI evaluates CAP messages to determine whether they meet usage rules set by the output sub-system's owner. Such rules may restrict the use of a

particular system on the basis of geography, severity, and urgency of the hazard, source of the alert, or other elements and parameters in a CAP message. Provided an individual alert message passes the "policy filter" for a particular output sub-system, the DSI then converts the content into an appropriate format for the output sub-system (e.g., via text-to-speech conversion[42] for telephone or other audio delivery system, to a brief text string for social media, to video[43] for cable-interrupt systems, etc.).

Such a clearinghouse will bind all the existing technical warning capabilities of OAs, municipalities and districts into a comprehensive "system of systems." Using such a system, an authorized warning originator will input a single message, which is rendered in the CAP format and automatically distributed to all appropriate output sub-systems for simultaneous delivery in a form particular to each medium, while remaining consistent in content across all media. Figure 7 below outlines how such a regional system of systems could be structured.

Figure 7: Integrated CAP Based System of Systems



42 Modern text-to-speech technology is widely used in warning systems such as the NOAA weather radio system and the EAS. It is also a feature of many telephone notification systems and has, for example, been used successfully in the Contra Costa system for a number of years.

43 Video presentations could include simple text "crawls," automatically-generated maps visualizing the alert area, or even attached photographs or other images, such as those that might be attached to AMBER alerts.

Among the benefits of such an approach, four are particularly noteworthy:

- In combination with inter-agency reciprocity under the Bay Area Emergency Public Information and Warning Framework it will provide a simple consistent mechanism for managing warnings when a hazard extends across OA boundaries;

- It will simplify the implementation of IPAWS by providing a single activation tool for both smaller emergencies and those of such scope and severity as to require automatic forwarding to federal warning systems (i.e., EAS broadcast interrupt, cellular alerting via CMAS, National Weather Radio) via IPAWS;

- It will simplify training, as alert originators need only master one alerting tool, which will be controlled by the users rather than by a warning system vendor; and

- It will provide a "plug and play" architecture that minimizes the cost of changing warning output sub-systems, thus ensuring competitive procurements initially and in the future, as old output sub-systems are retired and new ones introduced.

As discussed below, there are several CAP control sub-system platforms already in operation in California, and those generally provide activation tools to registered users. There would be no immediate benefit from creating another such sub-system and doing so would be costly and difficult to manage and sustain.[44] Aside from any funding contributions or fees for shared use of an existing control sub-subsystem, which would need to be negotiated with its operator, the main cost of CAP origination is for alert-originator training, which could be minimized by providing an operational "warning support cell program" function to incident commanders (discussed in Objective 2.5).

Any existing OA warning system can become part of the coordinated regional system of systems by the activation of a DSI. Most major commercial warning technology providers already include CAP interfaces to their products. For products not already CAP-capable, the cost of installing DSIs is typically on the order of a few thousand dollars per output sub-system, with maintenance typically in the range of 10-15% per year. This cost could be offset over time by migrating toward joint regional procurements for "commodity" capabilities such as telephone notification.

These benefits can be achieved even without the creation of a large new regional program or facility. Three alternatives are available, in order of preference:

[44] Current estimates are that a new CAP server for the entire region would cost approximately $50,000 to procure. This does not include maintenance costs or the time and effort needed to establish management responsibilities.

- Contract with the existing operator of a local CAP-based warning system, the Office of the Sheriff of Contra Costa County, to make its server facilities available on a regional level; or
- Partner with the CalEMA to make its existing CAP-based EDIS network available as part of its next-generation Response Information Management System (RIMS) deployment; or
- Rely on the new federal IPAWS program to provide the aggregation service for local as well as federal warning systems.

Of these three options, an expansion of the existing Contra Costa County CAP control system appears the most attractive. It is already in place, has been in stable operation for more than a decade, has already been integrated with a wide array of local warning output sub-systems, and already has both redundant servers and considerable spare capacity. By comparison, the state's EDIS system has been in CAP-based operation even longer, but the state has very little experience in interfacing its CAP server to local warning output sub-systems and state funding for EDIS may not be reliable.

Finally, while IPAWS plans to enable "the interoperable routing of messages between public safety organizations to enhance situational awareness and collaboration"[45] this capability remains in its infancy. According to FEMA, the goal is for state and local agencies to choose the incident management software that best fits their needs and to use different software to exchange messages, as long as each state or local system is compatible with IPAWS and each organization is established as an IPAWS COG.[46] However, the federal IPAWS system remains untested in this area and is operated by an office within FEMA that has no inherent programmatic responsibility for state or local emergency response. Also, FEMA has no direct experience with integrating local warning output sub-systems.

[45] A State Toolkit for Adopting IPAWS, Federal Emergency Management Agency, page 5, accessed at http://www.fema.gov/library/viewRecord.do?id=5830

[46] Id

OBJECTIVE 3.2 IMPLEMENT THE FEDERAL INTEGRATED PUBLIC ALERT AND WARNING SYSTEM (IPAWS).

Challenge: Most of the OAs in the UASI region have not yet begun the process of gaining access to IPAWS, and only one has completed the process. This new federal "umbrella" control sub-system, which became active in June, 2012, is the new gateway to federal warning systems, including the EAS, the new national CMAS and NOAA Weather Radio.

Causes: Although limited resources are frequently cited as a constraint, the primary reason for the current lack of IPAWS adoption appears to be a simple lack of awareness and information. In addition, uncertainty about technical aspects of the process appears to be a particular challenge for agencies not already using a CAP-based control sub-system.

Objective Lead: OA emergency managers**.**

Solution and Benefits: Bay Area OAs and allied agencies will move to rapidly implement IPAWS across the Bay Area. IPAWS is designed to enable federal, state, territorial, tribal, and local alert and warning officials to access multiple broadcast and other communications pathways for the purpose of creating and activating alert and warning messages related to any hazard impacting public health and safety. Implementation of IPAWS will create a one-stop-shop for OAs to access multiple federal warning input and output sub-systems such as EAS, NOAA Weather Radio, CMAS, etc. In the case of CMAS (discussed in Objective 3.3) implementation of IPAWS is required in order to use the new wireless mobile alert system.

Agencies with warning responsibilities in the Bay Area will gain access to IPAWS by completing each of the following steps as outlined in the FEMA Toolkit[47] for adopting IPAWS:

- Obtain an IPAWS-certified warning control software package. Access to IPAWS is free; however to send a message using IPAWS, an organization must procure its own IPAWS compatible software. Software should be successfully tested in the IPAWS-OPEN test environment. Each agency should consult its software developer to ensure that its system is IPAWS-OPEN compatible. For a list of private sector developers, go to: http://www.fema.gov/pdf/emergency/ipaws/open_developers.pdf

- Apply for a Memorandum of Agreement (MOA) for IPAWS Access with FEMA. To request becoming a COG, an MOA governing system security must be executed between the sponsoring organization and FEMA. Each MOA is specifically tailored to the sponsoring organization and interoperable software system. Agencies should download the MOA application, review the instructions, complete and return it to

[47] A State Toolkit for Adopting IPAWS, Federal Emergency Management Agency, page 4, accessed at http://www.fema.gov/library/viewRecord.do?id=5830

ipaws@dhs.gov. Agencies should write the following in the subject line of the email "Operational COG Application." To access the MOA Application, go to: http://www.fema.gov/pdf/emergency/ipaws/cog_moa_app.pdf

- Obtain State of California concurrence as to areas and types of warnings each agency will issue. Local authorities that want to send warnings to the public through IPAWS must complete an application defining the types of warnings they intend to issue and the extent of their geographic warning area. The application for IPAWS Public Alerting Authority is provided when an agency applies for a COG MOA, along with contact information for a designated state reviewer. In order to ensure consistency with appropriate state, territorial, or tribal public alerting plans, the application must be reviewed and signed by a designated State of California official before it is submitted to FEMA.

- Have all authorized warning originators complete a two-hour online course on IPAWS procedures and appropriate use. FEMA's Emergency Management Institute offers the independent study course, IS-247 "Integrated Public Alert and Warning System." The course is online at: http://training.fema.gov/EMIWeb/IS/is247.asp

As part of the process of gaining access to IPAWS, the Bay Area will host an online training workshop with supporting reference materials. The workshop should center on an introduction to IPAWS, what it can do, what it cannot do, and lessons learned from actual IPAWS users in the Bay Area, e.g., Contra Costa County. To the extent that it is practical, this workshop should also involve CalEMA and FEMA Region IX.

OBJECTIVE 3.3 IMPLEMENT THE COMMERCIAL MOBILE ALERTING SYSTEM (CMAS)

Challenge: More and more people are using mobile wireless devices as their primary and sometimes sole means of communication. In order for warning providers to keep pace with this technology and get warning information to the people who need it, a means to deliver effective alerts and warnings to wireless mobile devices is critical. To address this challenge, many jurisdictions, including those in the Bay Area, have developed text messaging capabilities for mobile devices. While these locally-owned and managed systems are a step forward, there remain gaps in their capabilities. Many of the locally managed systems are subject to network overload problems, the public must "opt-in" to receive the warning messages, and regular text message charges may apply. The CMAS is a capability that can overcome many of these challenges, but has not yet been used within the Bay Area.

Causes: Many agencies in the Bay Area are simply unaware of CMAS, what it can do and how to avail themselves of it. In addition, uncertainty about technical aspects of the process appears to be a particular challenge for agencies not already using a CAP-based control system.

Objective Lead: OA emergency managers.

Solution and Benefits: Bay Area OAs and allied agencies can use the CMAS to provide warning text messages to the public in appropriate cases.[48] CMAS allows warning authorities to use the IPAWS-OPEN platform to send geographically-targeted text messages of up to 90 characters down to the county level to members of the public through their wireless devices. CMAS messages cover three topic areas:

- Presidential messages
- America's Missing: Broadcast Emergency Response (AMBER)
- Imminent threat messages.

Unlike most subscription-based warning services, CMAS will enable warning messages to be sent to any cell phone within range of a particular cellular communications tower. CMAS messages can be sent even if cellular voice and data services are overloaded. CMAS also uses a unique signal and vibration designed to help those with access and functional needs to become aware of the message by attracting their attention.

Members of the public do not need to opt-in (sign-up) for CMAS messages, and, unlike most subscription-based cell phone alerting programs, individual members of the public and the local warning agencies will not be charged for the delivery of CMAS messages. While members of the public don't have to sign up for CMAS messages, the public can "opt-out" of receiving CMAS messages (except for presidential messages).

[48] Once an agency has been granted access to the IPAWS upon completing the four step sign-up process, that agency will be able to use CMAS.

While CMAS can be an effective tool for the Bay Area to use, it has limitations. Each message, for example, is limited to 90 characters. This *may* result in increased time delays for people to take protective actions as people take more time to find the information that is *not* in the 90 character message. Some of the additional information sought by people may end up being inaccurate. There is no current hard social science data on these possible negative results. However, social science experts in the field have hypothesized on these results and research may be forthcoming in the future. The Bay Area regional EPI&W Program Manager will follow and track the social science data on this topic to ensure that the region is kept fully informed.

In December 2011, FEMA and the DHS Science and Technology directorate partnered with the New York City Office of Emergency Management and participating wireless carriers to conduct an initial test of CMAS across New York City's five boroughs. The New York City test verified end-to-end connectivity of CMAS, and was specifically designed to examine the following points of warning delivery:

- Origination of a CAP message.
- Authentication of this message through the Federal Alert Aggregator, also known as the IPAWS Open Platform for Emergency Networks (IPAWS-OPEN).
- Delivery of the message through participating Commercial Mobile Service Provider Gateways.
- Dissemination of the message to mobile devices.

The Bay Area will work with its partners in New York City to understand best practices and lessons learned from the CMAS test and the efforts that led up to it.

GOAL 4: DEVELOP AND PROVIDE EMERGENCY PUBLIC INFORMATION AND WARNING TRAINING, EDUCATION AND EXERCISE PROGRAMS

Training, education, and exercises will be crucial to effectively develop and sustain an interoperable standards-based public information and warning "system of systems" across the Bay Area. This will include broad integration of public information and warning into regional training and exercise programs, as well more discreet training, education, and exercise steps that must be taken.

OBJECTIVE 4.1 FULLY INTEGRATE PUBLIC INFORMATION AND WARNING INTO REGIONAL TRAINING PROGRAMS

Challenge: Training on public information and warning at the local level in the Bay Area is sporadic, as it depends on available funding and time. While most OAs have JIC and a Crisis and Emergency Risk Communication training course available for PIOs, only about half of the OAs have training opportunities for potential incident commanders or other first-level field response supervisors regarding warning capabilities, policies, and procedures. While the Bay Area does have a Regional Training and Exercise Program, EPI&W does not have a significant role in it and few emergency public information and warning courses have been offered as a result.

Causes: The Bay Area Regional Training and Exercise Program manages regional training and exercises for the entire 12-county Bay Area region. Training and exercise initiatives are organized by discipline: Law, fire and health, etc. However, since the EPI&W capability spans multiple disciplines, there are few specific regional training efforts focused on EPI&W. In addition, dwindling resources and competition with other homeland security and public safety demands make emphasizing emergency public information and warning even more difficult. This is further compounded by the cost and time needed to deliver effective training across the region.

Objective Lead: Bay Area UASI Regional Training and Exercise Program Manager with support from the EPI&W Program Manager.

Solution and Benefits: The Bay Area will develop and adopt coordinated curricula for covering the full range of topics for EPI&W. Courses should include those listed in Table 2 below.

Table 2: EPI&W Training Courses

Courses
Basic Public Information Officers Course (G-290) http://training.fema.gov/stcourses/crsdesc.asp?courseid=G290
Advanced Public Information Officer (E-388) http://www.training.fema.gov/emicourses/crsdetail.asp?cid=E388&ctype=R

Introduction to Incident Command System (IS-100.b) http://training.fema.gov/EMIWeb/IS/is100b.asp National Incident Management Systems (NIMS), Public Information Systems (IS-702) http://training.fema.gov/EMIWeb/IS/is702.asp
Advanced Incident Command System (ICS-400) http://training.fema.gov/stcourses/crsdesc.asp?courseid=G400
National Incident Management System Communications and Information Management (IS-704) http://training.fema.gov/emiweb/is/is704.asp
National Response Framework (NRF), An Introduction (IS-800) http://training.fema.gov/EMIWeb/IS/is800a.asp
Community Warning Training for Incident Commanders
Developing Warning Messages that Motivate Public Behavior
Warning Systems and Technologies
Using Bay Area Message Templates to Issue Warnings
Using Social Media to Monitor Public Response and Refine Message Content
Incident Command System for Single Resources and Initial Action Incidents (IS-200.b) http://training.fema.gov/EMIWeb/is/is200b.asp
Emergency Support Function 15 External Affairs: A New Approach to Emergency Communication and Information Distribution http://training.fema.gov/EMIWeb/IS/is250a.asp
CDC Crisis and Emergency Risk Communication Basic http://emergency.cdc.gov/cerc/cerconline/index.html
CDC Crisis and Emergency Risk Communication for Pandemic Influenza http://www.bt.cdc.gov/cerc/panflu/index.asp
Emergency Management Institute G291-Joint Information System/JIC Planning for Tribal, State and Local Public Information Officers http://training.fema.gov/EMIGrams/gramdetails.asp?id=126

Specialized EPI&W training on access and functional needs, as well as limited English skills, should be incorporated into any program that is developed. Regional training efforts would also benefit from organized programs delivered online or at sub-regional sites to minimize

travel. To help achieve this, the PM for Training and Exercises and the newly designated PM for EPI&W will work together on an annual basis to update the Regional Training and Exercise Plan to ensure it adequately addresses EPI&W training (and exercise) needs.

With dwindling federal grant funds, the Bay Area will also seek to leverage partnerships between OAs and "allied agencies" in the region to include maritime ports, mass transit agencies and airports. These agencies have EPI&W responsibilities and capabilities of their own and the ports and mass transit agencies have access to federal grant funds that can be leveraged with UASI and State Homeland Security Program (SHSP) funding to promote and fund joint training (and exercises) between OAs and the allied agencies.

To foster collaboration among the OAs, ports, transit agencies, airports and other allied agencies, the EPI&W Program Manager will work to coordinate the development of federal investment justifications for each of the grant-related programs in order to jointly fund EPI&W training (and exercises) activities that will benefit all stakeholders. In doing so, the EPI&W Program Manager will engage the Bay Area leadership within the UASI, port security and transit security grant programs, and the SHSP. These collaboration efforts should also be fully integrated into and accounted for in the Regional Training and Exercise Plan.

Finally, not yet available new discoveries and knowledge in the social sciences are on the horizon. For example, a 2012 project is underway entitled "Setting the Standard in Risk Communication Trainings" to produce new knowledge about how to best train local emergency warning providers using the latest warning knowledge in the social sciences. This is being sponsored by the DHS Science and Technology directorate. A second project is titled "Comprehensive Testing of Imminent Threat Public Messages for Mobile Devices." This project will subject social science evidence-based short-text public alert and full-text public warning messages to rigorous empirical laboratory testing—something that has never been done before. The results of projects like these cannot be predicted. However, the Bay Area will pay special attention to these and other projects as they reach conclusion.

OBJECTIVE 4.2 FULLY INTEGRATE PUBLIC INFORMATION AND WARNING INTO REGIONAL EXERCISE PROGRAMS

Challenge: Large-scale, regional exercises do not always contain an EPI&W element or bring in EPI&W partners, and less than half of the Bay Area's OAs have participated in regional exercises that involve coordination of emergency public information activities or test regional plans. For example, only one of three recent major regional exercises included testing of JIC plans. The lack of regional exercises focused on emergency public information and warning prevents the Bay Area from fully understanding cross jurisdictional capabilities and policies and building toward a more integrated and coordinated regional approach to emergency public information and warning for major incidents.

Finally, many OAs and allied agencies do not include members of the mass media, such as radio and television personnel, in training and exercise events. While this is understandable and not uncommon nationwide, it represents a missed opportunity for members of government and the media to better understand each other's roles and responsibilities concerning EPI&W before, during, and after an incident.

Causes: The Bay Area Regional Training and Exercise Program involves regional training and exercises for the entire Bay Area region. As with training, exercise initiatives are organized by discipline: Law, fire and health, etc. Since the EPI&W capability spans multiple disciplines, there are few specific regional exercise efforts focused specifically on EPI&W. Moreover, the relative infrequency of major regional incidents results in few opportunities to test regional coordination in a real world environment.

Planning for regional exercises focuses primarily on security and tactical scenarios. The cost of planning and conducting exercises can be significant. Dwindling resources and competition with other homeland security and public safety demands make it even more difficult to conduct exercises to emphasize the importance of emergency public information and warning. Finally, government officials are often reticent to allow the media inside preparedness activities for fear of being exposed through "bad press" and the inherent adversarial nature between the press and government.

Objective Lead: Bay Area UASI Regional Training and Exercise Program Manager with support from the EPI&W Program Manager.

Solution and Benefits: The Bay Area will identify opportunities for coordinated cross-jurisdictional exercises and will expand other exercise efforts in the region to test and evaluate the EPI&W capability. This will include exercises that involve emergency public information and warning as part of a larger scenario and capabilities to be tested, as well as designing exercises specifically around testing and evaluating EPI&W exclusively. When exercising the EPI&W capability, designers should focus on testing and evaluating the ability to deliver emergency public information and warnings across multiple jurisdictions *and* the effectiveness of that information and warnings in getting those who received it to take appropriate action(s).

Collaboration between the Program Managers for EPI&W and Training and Exercises will also involve the design and execution of the annual Urban Shield Full Scale Exercise put on by the Bay Area UASI and administered by the Alameda County Sheriff's Department. Each year, Urban Shield exercises a multitude of capabilities from intelligence to urban search and rescue based on a wide array of hazards that pose a risk to the region. Urban Shield will provide an excellent setting in which to test and evaluate the region's ability to craft and deliver emergency public information and warnings based upon those differing hazards.

In addition to regional exercises, OAs across the region can also benefit from, "exercise mutual aid," such as sharing exercise templates and simulation resources to reduce the burdens on individual OAs in developing and putting on their own exercises. Also, most entities have an after-action analysis process, but the findings from these are not widely shared. To facilitate information-sharing in this area, the EPI&W Program Manager will develop, in coordination with the Regional Training and Exercise Program Manager, a password-protected database of after action reports that can be accessed by regional stakeholders. In order to save time and resources, this database should build from existing systems such as Lessons Learned Information-sharing, https://www.llis.dhs.gov/index.do.

Finally, members of the media, particularly local television and radio, should be invited to participate in OA and regional-level training and exercise events as role players. In doing so, it must be agreed upon upfront that this is not an opportunity for the media to develop a "story." Rather, it is an opportunity for the media and public safety agencies to increase their job proficiency before, during, and after an incident concerning EPI&W though each side enhancing their understanding of the roles, needs, and challenges of the other. For regional-level training and exercises, the EPI&W Program Manager will be responsible for coordinating with local media and for involving them in training and exercise events.

OBJECTIVE 4.3 INCLUDE REPRESENTATIVES OF THE ACCESS AND FUNCTIONAL NEEDS COMMUNITY IN EXERCISE PLANNING AND EXECUTION AT THE OA AND REGIONAL LEVELS

Challenge: Specialists and CBOs representing people with access and functional needs as well as people with limited English-language skills are often not engaged in the design of emergency exercises. During the assessment process, these CBOs expressed concern that the warning and public information needs of their constituents may not be adequately addressed in future exercises. At the same time, many of those CBO representatives have had only limited opportunities to become informed as to the details of existing emergency management and disaster response practices.

Causes: Emergency management offices and allied agencies struggle constantly to address the needs of the access and functional needs community and others whose personal circumstances may tend to isolate them from emergency services, including public warning and emergency public information. This has become particularly challenging in recent years, during which awareness of those needs has grown, even as dwindling public resources have made addressing them in meaningful ways more difficult.

Public expectations have also evolved under the influence of online and social media and the increased availability of advanced personal wireless devices. Government agencies are expected to move swiftly to embrace new technologies and paradigms, but government is by nature an inherently conservative institution, one better suited to continuity than to rapid change. Thus, many government agencies find themselves ill-equipped to meet expectations for the "mass personalization" of communication to address individual needs.

A final factor is the lack of standards for the application of the automated translation of alert messages. While this capability appears to be coming close to reality, presently, there is no clear benchmark by which emergency services agencies can determine when the quality of translation becomes "good enough" for critical applications. As a result, government officials often express concern that if they take the initiative to deploy a new technology, they may be held at fault if it fails during an incident.

Objective Lead: The Bay Area UASI Regional Training and Exercise Program Manager with support from the EPI&W Program Manager and OA and local emergency managers.

Solution and Benefits: Representatives from the Emergency Information Access Council (EIAC) and other organizations should become active in the design and execution of EPI&W exercises at the OA and regional level. These representatives should help set expectations and work with public safety and emergency management personnel on developing exercises jointly. The EAIC should be viewed not just as an advisory or advocacy group, but as an active emergency response organization in its own right, fully engaged in preparedness activities.

Specialists and CBOs can provide important expertise and resources in communicating with those who have access and functional needs and limited English proficiency. Including representatives of such groups in the design and execution of future exercises is a crucial strategy in the search for feasible and effective measures to eliminate isolation from the general flow of public warning and emergency public information. Such involvement should not be merely an "advocacy" presence by representatives, but an active and creative participation by access and functional needs communities in devising and exercising their own solutions to this problem. Finally, when including representatives in exercises, exercise coordinators should avoid using actors to role play. Involving community members with access and functional needs and limited English proficiency will provide a more realistic experience for all involved.

OBJECTIVE 4.4 INCREASE TRAINING OPPORTUNITIES IN SOCIAL MEDIA USE, AND ESTABLISH A REGIONAL PLATFORM TO EXCHANGE BEST PRACTICES AND DEVELOP REGIONAL AWARENESS AROUND EXISTING SOCIAL MEDIA CAPABILITIES

Challenge: There is a need for specialized training to adapt to technological advancements and the use of social media. Additionally, lessons learned and best practices around the use of social media to support EPI&W are not readily shared throughout the region.

Causes: Not all OAs are monitoring social media or using their social media accounts. Consequently, experience and comfort levels with using social media-related technologies also vary across the region. Opportunities for training and specialization to adapt to technological advancements have not been provided. Furthermore, a mechanism for regional information-sharing and best practice exchange around social media use does not exist.

Objective Lead: The Bay Area UASI Regional Training and Exercise Program Manager with support from the EPI&W Program Manager.

Solution and Benefits: Personnel who use social media platforms to support EPI&W should be identified and provided with opportunities to attend training-specific to the use of these tools. Several training opportunities are available through emergency management stakeholder organizations at the national level that can either be attended in person or virtually. Organizations that have provided webinars or conference related opportunities in the past have included the National Emergency Management Association, the Industrial Council of Emergency Technologies, and the Emergency Management Institute, the latter of which offered a webinar on social media use in emergency management in December 2011. Furthermore, websites such as www.sm4em.org and http://idisaster.wordpress.com provide numerous resources for self-directed learning.

By providing personnel with the time to attend webinars, or exploring the wealth of available materials related to the topic, general knowledge levels can be rapidly enhanced, leading to better use of the technologies within an organization. In addition to the many publicly available training opportunities, OAs should also consider having organization-specific training developed and delivered to their personnel. For example, one training consultant can provide tailored training at a rate of $200 per registrant.[49]

In addition, many of the skills necessary to effectively utilize social media tools during a response event can be developed in a "no-fault" environment by providing personnel the opportunity to use the relevant tools on a day-to-day basis. For instance, relevant personnel should be encouraged to participate in the weekly "#smemchat" conversations that occur on Twitter every Friday at Noon EST. This type of self-directed learning, or "learning by doing," can significantly increase personnel comfort with these tools.

[49] See: http://www.engagingothers.com/social-media-training/

In addition to increased training opportunities, opportunities for knowledge-sharing across the region should be provided. This can be done through the establishment of a virtual platform for regional information exchange—similar to the Department of Homeland Security First Responders Communities of Practice Portal,[50] which is a medium where responders can share information around social media best practices for emergency management. Such a platform could be implemented at no cost and take the form of an e-mail group or discussion board comprised of regional stakeholders. This platform will not only provide a space to share best practices and lessons learned among relevant personnel, but it will contribute to providing increased awareness of the capabilities of OAs within the region. The dialogue generated through the platform will help enhance coordination and situational awareness during regional response efforts.

[50] See: https://communities.firstresponder.gov/web/guest

OBJECTIVE 4.5 TRAIN AND EDUCATE ELECTED AND SENIOR OFFICIALS ON ADVANCES IN EMERGENCY PUBLIC INFORMATION AND WARNING PRACTICE

Challenge: Most elected and other senior officials within the region are not consistently familiar with the benefits and requirements of the transition to CAP and, in particular, the CAP-based IPAWS. As a result, the delivery of warning messages to the public is somewhat haphazard and inconsistent across the region, and there is considerable duplication of investment, as well as duplicate effort in warning system activation.

In addition to technology, many elected officials are often unfamiliar with the details of SEMS and the role of JICs in a multi-jurisdictional incident. For example, during a single-jurisdiction incident, elected officials and their PIOs are accustomed to managing the media and public affairs on their own. However, when multiple jurisdictions and associated elected officials get involved, it becomes more challenging to coordinate emergency public information and warnings among those jurisdictions in accordance with SEMS.

Causes: Unlike proprietary commercial offerings, there has been relatively little money spent on the marketing of the CAP and IPAWS. Additionally, most elected officials and their PIOs are not accustomed to having to coordinate with other officials from other jurisdictions when providing public information through the news media. This is compounded by a lack of training on JICs, ICS, and the role of elected officials during a multi-jurisdictional incident. In addition, inter-jurisdictional rivalries, which are common among cities, counties and states across the United States, can create further complications.

Objective Lead: The EPI&W Program Manager with support from OA and local emergency managers.

Solution and Benefits: The region should take advantage of the introduction of the cellular telephone-based CMAS during 2012 as part of the IPAWS deployment. This will serve as a highly visible public occasion for focusing policymaker and public attention on public warning issues. The IPAWS/CMAS "rollout" will provide a significant opportunity for mobilizing public and political support for regional collaboration in building a system of systems and for leveraging the experience of OAs that are already taking advantage of IPAWS and CAP.

As an immediate action, the OAs, municipalities and other entities of the UASI region should bring the proposed EPI&W Framework to the attention of their governing bodies. In addition to educating elected and other senior officials on the benefits of the Framework, this will serve as an opportunity to update those elected officials on modern public warning practice and inform them about regional issues and opportunities.

California's Senior Officials Workshop provides a forum to discuss strategic- and executive-level issues related to disaster preparedness and response, share proven strategies and best practices, and enhance coordination among officials responsible for emergency

response to a disaster. Participants[51] receive an Executive Handbook outlining the emergency management framework, as well as information on other key senior-level issues and discussions topics. In delivering this workshop, participants should be educated on how warning messages need to serve the whole community to include those with access and functional needs and limited English proficiency. In addition, special focus should be given to the role of JICs and senior officials in coordinating the distribution of emergency information to the public through the media before, during, and after an incident.

[51] Participants focused on EPI&W training should include local elected officials (such as mayors, members of the board of supervisors, city council members, agency heads), the heads of independent living centers, and other senior officials in the region.

OBJECTIVE 4.6 SHARE AND COORDINATE PUBLIC WARNING SYSTEM TESTING SCHEDULES

Challenge: The frequency and schedule of testing for public warning systems varies greatly among the OAs, municipalities and other warning-system operators in the Bay Area. Some systems are tested weekly, while others are tested monthly or not at all, but rely instead on actual use for continuing operator training and verification of reliability. In addition, some systems are not tested end-to-end but only partially.

As a result of disjointed testing, there is broad variation in the public's experience of warning tests and exercises from location to location, and system to system, across the region. This, in turn, has tended to confuse public expectations and hinder support for public warning systems. This lack of consistent practice has led to inconsistent training and procedures for warning system operators, and varying levels of confidence in the actual effectiveness of different systems and procedures.

Causes: A number of factors have contributed to the current situation. Historically, warning systems in different OAs and municipalities have developed independently with no mechanism or incentive for coordination. Some warning systems are subject to regulatory or procedural constraints on testing and exercise. For example, telephone notification systems utilizing 9-1-1 data are, by some interpretations of state law, prohibited from being exercised end-to-end in the absence of an actual emergency. Some warning systems (the broadcast EAS, for example) are tested by system operators who do not have actual responsibility for public warning; significant parts of the actual warning procedure are therefore omitted from the test process. Finally, several OAs and municipalities in the region have multiple systems for delivering warnings and must follow separate activation procedures for each.

Objective Lead: The EPI&W Program Manager and OA emergency managers.

Solution and Benefits: OAs and municipalities and other alert system operators (such as broadcasters participating in the EAS) in the Bay Area should share their testing schedules. This could be done either peer-to-peer or through a shared clearinghouse overseen by the EPI&W Program Manager as regional coordination advances. Further, where opportunities exist for coordinated testing schedules, they should be exploited. Such coordination will improve the calibration of public expectations regarding warning capabilities across OAs to inform the adoption of exercise standards for equipment and systems. This may also lead to additional opportunities for regional exercises of warning procedures and policies.

OBJECTIVE 4.7 DEVELOP REGIONAL PUBLIC EDUCATION FOR WARNING AND PROTECTIVE ACTIONS

Challenge: There is no established and coordinated strategy for public education on warnings (local system capabilities, common practices) and protective action-taking for all the major hazards that could impact the Bay Area. Members of the public may be unaware of changes in warning practices associated with recent innovations such as the CAP, IPAWS, and CMAS. Others may be unaware of how they would receive warnings, where warnings would come from, and details about the protective actions they might need to take for different hazards when warnings are issued. Lack of familiarity with topics like these can increase public warning response delay and, for some particular hazards, reduce appropriate public protective actions.

The research record shows that it takes time, perhaps years, to penetrate and educate a target population on a topic such as public warning. However, the same research record shows that education campaigns eventually accomplish their mission, at least in part, particularly when multiple distribution channels are used, such as direct mailed brochures, newspaper inserts, web sites, and more. The bulk of this evidence is provided by the best practice found in the required 10 mile emergency planning zones around the nation's nuclear power plants.

Causes: Until recently, most public warning education activities (to the extent any public education is done at all) have been conducted on a hazard by hazard basis. However, modernization of the public warning enterprise has recently re-formulated public warnings with an all hazards perspective. For example, innovations such as CAP, IPAWS, and CMAS now provide the opportunity for a standardized public warning approach across all hazards. Today, public warning education is more cost-effective because it can be provided for all hazards at once rather than for one hazard at a time. Moreover, there are many ongoing public education efforts underway in the Bay Area that seek to provide the public with other hazard-related information that could be used in conjunction with this topic.

Objective Lead: The EPI&W Program Manager with support from OA and local emergency managers.

Solution and Benefits: The EPI&W PM will help coordinate activities across Bay Area OAs, municipalities, and allied agencies regarding public education for warnings. This will first involve developing a consensus on a regional template for public warning education focused on generic information applicable across the Bay Area. This must include OAs, regional and state stakeholders, such as BART, CalEMA, and Caltrans, and Bay Area CBOs that play or could play roles in pubic hazard warning education and outreach. The public warning education template that is developed will constitute a standardized outline of topics which should include:

- A list and description of the hazards for which public warnings could be issued, and a full description of likely protective actions for each hazard that people could be

asked to take with an emphasis on details too numerous to put in a warning. For example, the steps to take to appropriately shelter once inside a building following an improvised nuclear device incident, and how to shower if contaminated by radiation.

- An explanation of how the public would receive alerts and warnings, how to sign up for alerts delivered over mobile communication devices, and what emergency alert radio and TV stations to turn to for more information during an actual warning event.

- Instructions on the appropriate use of social media during warning events.

- What people with access and functional needs can do to receive warnings over special devices to reduce their warning isolation.

- Recommendations and information for people with functional needs about what they can do to obtain any needed protective action assistance and from whom, including what the government can and cannot do to support them and what they can do to get assistance from others if necessary.

- What to do with pets.

- How evacuation routes and destinations might vary depending on the hazard, and planned public evacuation transportation.

- What could happen with children in schools and day care facilities, etc.

All such outreach material and training should be ADA Section 508-compliant. TV ads should include captioning and ASL interpreters assisting in delivering the messages to demonstrate that this addresses the whole community. A commercial that has an ASL interpreter signing the message will grab the attention of the deaf and hard of hearing, while large print will get the attention of those with difficultly seeing, etc. Ads and print that have pictures or actors should also include people with actual disabilities (not just actors). Such simple actions go a long way in fostering communication and trust and making the campaign more effective for those with access and functional needs.

Development of the template will be informed by existing public warning education "documents" that others throughout the nation have already prepared. For example, there are documents like this in each county in each of the emergency planning zones around each of the nation's 104 operating nuclear power plants. This existing material offers ideas, information, approaches, and techniques used elsewhere.

Once this standardized template of public warning education topics is created, generic information applicable across Bay Area OAs will be developed by consensus across the OAs of the Bay Area thereby providing an economy of scale. Each OA will then produce an OA-

specific public education "document" conforming to the consensus-based regional template. These OA "documents" will then be made available to the public. At a minimum, each OA will make them available on web sites and inform the public of their availability.

Once this baseline is established, innovative ways to fund more aggressive, multiple channel public education and outreach will be explored, developed, and used, including public service announcements and distribution by advocacy groups to public warning-isolated people. In addition, those who view or print the document from OA websites will be able to forward copies to people they know. More possibilities will develop post-baseline. This diverse effort will be performed keeping in mind that no public hazards education and outreach effort has ever been fully effective and that such efforts must be maintained over time. The documents will be updated based on changes in warning technology, planning, and practice.

SECTION 6: STRATEGY IMPLEMENTATION

The *Strategy* Implementation section describes how to meet the goals and objectives established for this multi-year program. To achieve the goals and objectives requires resources that may or may not be available. As such, implementation is contingent upon available funds and other resources. In the event the *Strategy* is not implemented, the capability gaps identified leading up to the *Strategy's* development will remain.

The regional EPI&W Program Manager will have overall responsibility for managing and tracking execution and implementation of the *Strategy*. This includes working with appropriate stakeholders and through BAEPIN, the EPI&W Work Group and other such organizations and agencies as needed. The Program Manager will also be responsible for reporting to the Bay Area UASI Approval Authority and Advisory Group and other regional entities as needed on specific implementation tasks to ensure that the *EPI&W Strategy* is followed and updated annually.

6.1 Sustainment and Integration

Recent years have seen reductions in DHS grant programs. While the *EPI&W Strategy* is not a grant-specific initiative, grants will likely play a vital role in building the regional capabilities called for in the *Strategy*. Given the current fiscal reality, the Bay Area's investment plan is to integrate and leverage all available funding sources. This is especially true as it relates to federal grant programs, most of which drive toward a common purpose of enhanced preparedness and security in a given jurisdiction, region, or state, but often do so through independent management and administration processes, which creates artificial barriers to collaboration.

In order to better leverage scarce resources, it is the intent of the Bay Area to overcome these barriers and find ways to integrate programs, while respecting the responsibilities and authorities vested in grantees. The Bay Area has received federal grant funds each year from multiple programs that have a nexus to building EPI&W capabilities, including, but not limited to:

- Urban Areas Security Initiative (UASI)
- State Homeland Security Program (SHSP)
- Metropolitan Medical Response System (MMRS)
- Citizen Corps Program (CCP)
- Port Security Grant Program (PSGP)
- Transit Security Grant Program (TSGP)
- Assistance to Firefighters Grant Program (AFG)
- Public Health Emergency Preparedness Program (PHEPP)
- Hospital Preparedness Program (HPP)

- Regional Catastrophic Preparedness Grant Program (RCPGP)

Through the regional EPI&W Program Manager, the Bay Area will work to coordinate the investments generated under these and other relevant programs to generate greater regional impacts, allowing each grantee to implement investments and improve the interoperability of the EPI&W capability in ways that could not be done independently. The intent is to do this through pre-existing planning structures already required by many of the grant programs. The integration of these programs and the EPI&W capability is outlined in Figure 8 below.

Figure 8: Program and Capability Integration Model

Finally, as part of the process to generate resources for the *Strategy's* implementation, the Bay Area leadership will explore with the CalEMA the opportunity of using a portion of the State of California's 20% hold back of UASI grant funds to help fund elements of the *Strategy*.

6.2 Projects for Implementation

Each objective in the *Strategy* will serve as a project, along with several implementing steps or tasks and associated costs, timelines, primary participants, grant eligibility, etc. The projects and implementing steps are based on the following sequence:

1. Getting properly organized.
2. Having the appropriate plans and procedures in place.

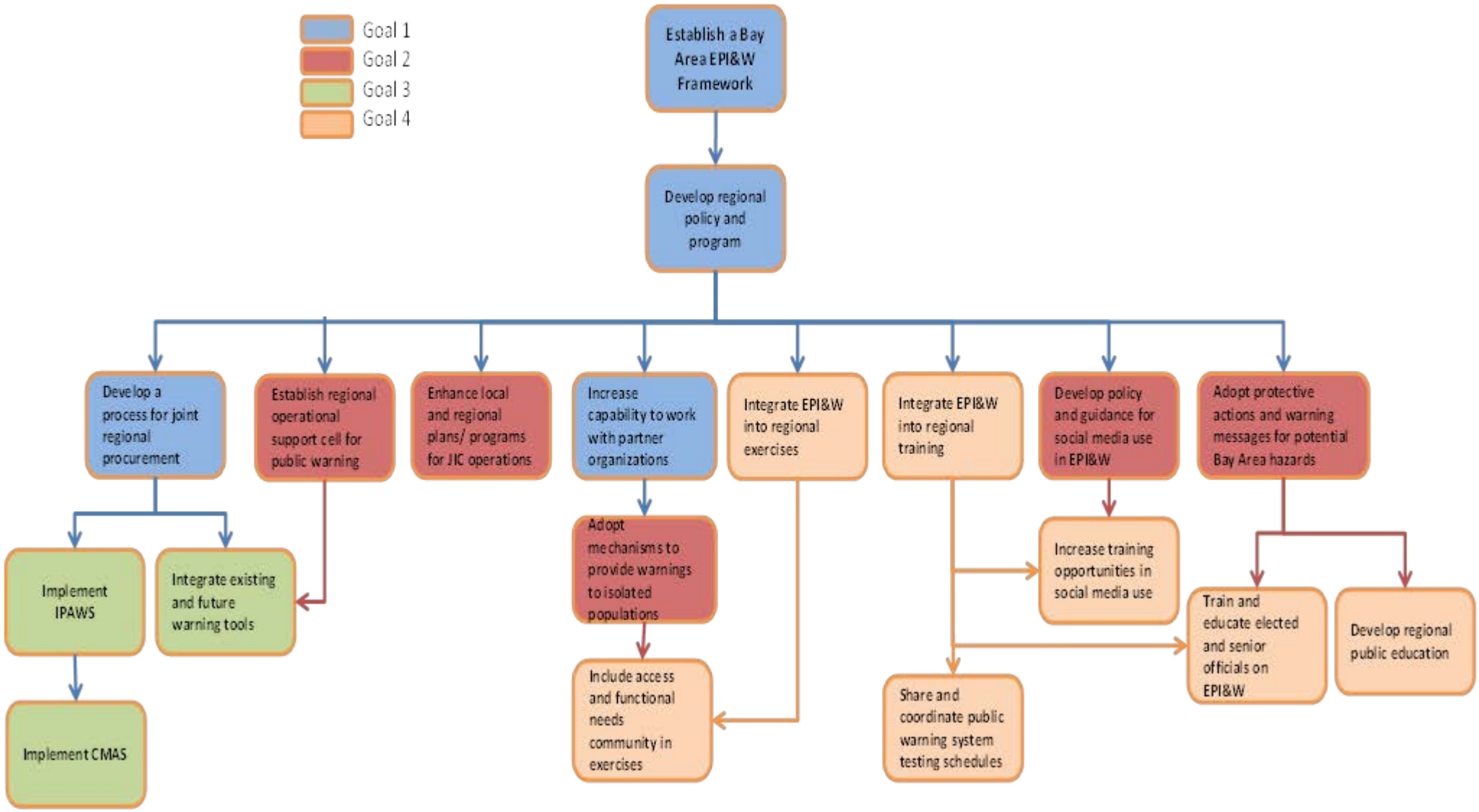
3. Acquiring the appropriate technology and tools.
4. Testing and evaluating the plans, organization, and equipment through training and exercises.

While all of the projects outlined in the *Strategy* cannot be done at once, there are some projects that need to be completed before others can start. The chart in Figure 9 below highlights those dependencies. In Figure 9, all of the projects outlined in the *Strategy* are listed, color-coded to their corresponding *Strategy* Goal, with the arrows linking those projects that are directly dependent on the completion of another project. This approach prioritizes projects for implementation based on sequencing.

All projects are dependent, first, on the adoption of the Bay Area EPI&W Framework and then on the development of a regional policy and program, to include the staffing of the EPI&W Program Manager. Once that is accomplished, there are eight projects that can be undertaken, several of which have further dependencies. For example, the objective to develop mechanisms to provide warning information to isolated populations (objective 2.4) is dependent on completing the project to increase the capability to work with partner organizations.

In addition, there are several projects whose completion is dependent on multiple other projects. For example, completing the project to increase training opportunities in social media use is dependent on both the project to develop policy and guidance for social media use in EPI&W and the project to integrate EPI&W into regional training.

Figure 9: Project Dependencies



The total estimated cost for implementing the *Strategy* over five years is approximately $2.5 million, with $643 thousand in year one; $511 thousand in year two; $598 thousand in year three; $359 thousand in year four, and $345 thousand in year five. These costs *only* account for new expenses beyond current ones. For example, time devoted by current staff for planning is accounted for as a current expense and not counted as part of the $2.5 million, but the hiring of new staff is accounted for as a new cost under the $2.5 million.

Table 3 below shows the estimated new costs for each project in each year. The cost for each project is an aggregate of the new costs required to complete the individual tasks associated with each project (the task level detail is outlined in the EPI&W Program Manager project spreadsheet). Projects with only existing expenses are marked as "internal."[52] Cells with "n/a" imply that there should be no effort for a particular project in that given year. Costs are estimates and were calculated based on several assumptions, including:

- The Bay Area will hire an EPI&W Program Manager. Aside from the annual salary, there are no additional costs to complete those tasks that fall under the responsibility of the Program Manager.

- Certain tasks that would be completed by current staff are estimated to have no new cost beyond the time of individual(s) involved. These are accounted for as additional duties.

- Certain tasks that require additional hours/overtime include just the new costs for that additional time (e.g. for training and exercises).

- Costs for additional time/backfill were calculated based on national average salaries of specified personnel (e.g. PIO, emergency managers, and incident commanders).[53]

- An inflation rate of 3 percent was assumed for tasks with recurring costs.

- Current personnel only need to complete proposed training courses once during the five-year period of the implementation plan. In subsequent years, only new staff will be required to complete training courses, which will be 10 percent of the original number of personnel. Costs for refresher trainings were not included.

- No travel or per diem costs were included.

[52] It should be noted that projects with new costs may also have internal costs associated with them.

[53] See http://www.payscale.com/research/US/Country=United_States/Salary for national average salaries of specified personnel types.

Table 3: Bay Area EPI&W Strategic Plan Project Costs

PROJECT	Year 1	Year 2	Year 3	Year 4	Year 5	Total Cost
Project 1.1: Establish a Bay Area Emergency Public Information and Warning (EPI&W) Framework as a baseline agreement for inter-agency and regional cooperation and coordination.	internal	n/a	n/a	n/a	n/a	Internal
Project 1.2: Develop regional policy and program structures and assign a regional program manager for EPI&W initiatives and programs.	$128,228	$132,068	$136,023	$140,097	$144,293	$680,709
Project 1.3: Develop a process for joint regional procurement of future EPI&W tools and for sustaining current EPI&W capabilities.	$90	$90	$90	$90	$90	$450
Project 1.4: Increase capability to work with partner organizations to reach people with access and functional needs or limited English proficiency.	internal	internal	internal	internal	internal	internal
Project 2.1: Enhance local and regional plans/programs for Joint Information Center (JIC) operations, and develop network-based "virtual" JIC support.	$300,000	$48,000	$36,000	$36,000	$36,000	$456,000
Project 2.2: Develop policy and guidance for social media use in EPI&W and formally integrate social media activities into response plans, including the establishment of community partnerships.	internal	internal	internal	n/a	n/a	internal
Project 2.3: Adopt protective actions for all potential Bay Area hazards and develop science-based warning message templates to communicate effective protective actions to the public.	internal	internal	internal	internal	internal	internal
Project 2.4: Provide timely and effective warning information to isolated populations in the Bay Area.	n/a	$7,000	$259,000	$19,600	$19,600	$305,200
Project 2.5: Establish a regional operational support cell for effective public warning.	internal	$33,180	$10,080	$31,080	$10,080	$84,420
Project 3.1: Integrate existing and future warning tools in the Bay Area.	n/a	$30,000	$3,000	$3,000	$3,000	$39,000

PROJECT	Year 1	Year 2	Year 3	Year 4	Year 5	Total Cost
Project 3.2: Implement the federal Integrated Public Alert and Warning System (IPAWS).	n/a	$49,140	$35,840	$35,840	$35,840	$156,660
Project 3.3: Implement the Commercial Mobile Alerting System (CMAS).	n/a	internal	internal	internal	n/a	internal
Project 4.1: Fully integrate EPI&W into regional training programs.	$183,632	$175,401	$36,532	$37,628	$38,757	$471,950
Project 4.2: Fully integrate EPI&W into regional exercise programs.	$31,200	$32,136	$48,700	$50,161	$51,666	$213,863
Project 4.3: Include representatives of the access and functional needs community in exercise planning and execution at the OA and regional levels.	n/a	n/a	internal	internal	internal	internal
Project 4.4: Increase training opportunities in social media use and establish a regional platform to exchange best practices and develop regional awareness around existing social media capabilities.	n/a	internal	$29,476	$2,025	$2,086	$33,587
Project 4.5: Train and educate elected and senior officials on advances in EPI&W practice.	n/a	$4,000	$4,000	$4,000	$4,000	$16,000
Project 4.6: Share and coordinate public warning system testing schedules.	n/a	internal	internal	internal	internal	internal
Project 4.7: Develop regional public education for warning and protective actions.	n/a	internal	internal	internal	internal	internal
Total	**$643,150**	**$511,015**	**$598,741**	**$359,521**	**$345,412**	**$2,457,839**

6.3 Investment Justifications

Since FY 2006, DHS has required states and urban areas to submit investment justifications in order to apply for SHSP, TSGP, PSGP and UASI funding. Investment justifications will be a primary source of obtaining funds needed to implement the *Strategy's* projects. Both SHSP and UASI are part of the larger Homeland Security Grant Program and are very similar in terms of purpose and allowable spending areas. Investment justifications under all grant programs may include a single project or multiple projects under a general topic. In addition, the DHS grants are allowing and encouraging state and local efforts to address the needs of the access and functional needs community across a wide range of emergency preparedness areas. The following principles will help guide the Bay Area's approach to developing investment justifications:

- The investment justification process must be viewed as the culmination of a comprehensive homeland security planning and implementation process and not simply as a requirement in order to request money from DHS.

- The OAs, ports, mass transit agencies, and the Bay Area UASI will integrate to the maximum extent possible the investment-justification process when developing projects to sustain or enhance EPI&W. This approach will require significant upfront planning and coordination between all affected entities.

- EPI&W investment justifications that fall outside the goals and objectives of the *EPI&W Strategy* will not be submitted. To this end, the Bay Area will strive to develop UASI, TSGP, PSGP and SHSP-funded projects simultaneously through an integrated project planning and development structure, with the regional EPI&W Program Manager coordinating the process. While the overall time periods for each grant may be different, in most cases the timeline for each program *begins* at the same time even if the final deadlines for submitting investment justifications differ.

6.4 Role of the Program Manager

The EPI&W Program Manager will play a critical role in managing the overall implementation of each of the goals and objectives within the *EPI&W Strategy*. The Program Manager will be responsible for leading the vetting of projects developed by OAs, regional planning hubs, and other entities to ensure that they comply with the *Strategy*. Project vetting should be done through the BAEPIN and/or the EPI&W Work Group. The exact vetting process shall be left up to the Program Manager and members of BAEPIN and the EPI&W Work Group. The Program Manager will also be responsible for ensuring that project managers develop plans and completion dates for approved projects related to the relevant *Strategy* goals and objectives. Tracking projects will be critical to ensuring that goals and objectives within the *Strategy* are achieved.

SECTION 7: STRATEGY EVALUATION

Exercises are a critical means of determining whether the Bay Area is building towards its envisioned system of emergency public information and warning systems. As such, any assessment program must include a robust exercise and evaluation element to ensure data from simulated incidents are integrated with self-assessment data, and of course, real-world incident data collected both during and after the incident when available.

Figure 10: Planning and Evaluation Cycle

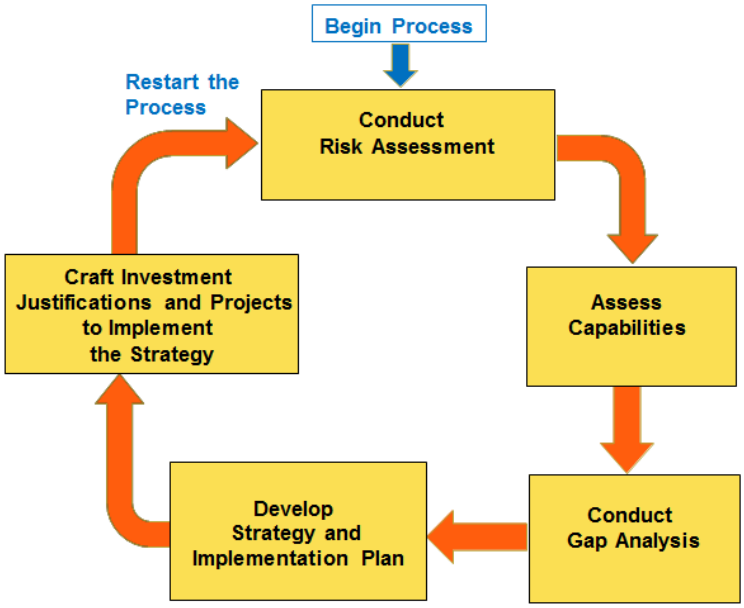


Figure 10 demonstrates the cyclical nature of the preparedness and risk management and planning process. This cycle demonstrates that the *EPI&W Strategy* is always evolving, as new data emerges and updates to the *Strategy* are put into place.

In order to truly understand what value the Bay Area is getting for its EPI&W investments, the region must have a consistent mechanism for measuring the effectiveness of the EPI&W activities – plans developed, personnel hired, equipment purchased, number of people trained, and exercises conducted – generated through those investments.

7.1 Methods for Evaluation

There is no single method to assess capabilities. Rather, there are a number of data sources and methodologies to help with this process, each of which the Bay Area will use in the evaluation process:

- Self-assessments
- Performance-based assessments (real world and exercise events)
- Modeling and simulation

7.1.1 Self-Assessments

Self-assessments are those assessments that involve local subject-matter experts answering a set of defined questions to determine the level of capability the region, or a part thereof, has relative to the risks faced by the region. The Bay Area and its component

jurisdictions have undergone a number of self-assessments over the last several years, using a wide array of methodologies. Self-assessments are a useful way for subject-matter experts to discuss and review data to make capability level determinations.

7.1.2 Performance Based Assessments

Performance-based assessments are most common in the form of exercises, although an ability to track and measure performance during a real world incident would provide the most accurate picture of capability. For the Bay Area, performance-based exercises should be predicated on testing the region's ability to effectively use a system of emergency public information and warning systems to help prevent, protect against, mitigate, respond to, and recover from those terrorism and natural hazard scenarios that pose the greatest risk to the region. The Urban Shield full scale exercise is the Bay Area's premier performance-based evaluation tool and will be a critical component in evaluating and testing improvements in EPI&W across the region.

7.1.3 Modeling and Simulation Assessments

Quantitative capability models can be used to assist with planning and resource allocation, and to help determine capability gaps. Models can provide an independent baseline estimate of required levels of capability for a given OA, jurisdiction, or the entire Bay Area region, based upon national averages, demographic information, and risk criteria. These models can use quantitative data to inform investment decisions by estimating the full life-cycle costs of achieving a given level of a capability, identifying capability gains from investments, and optimizing placement of new resources.

Appendix A

MESSAGE DELIVERY TOOLS

A variety of different alert and message delivery systems exist in the Bay Area. Different Operational Areas (OAs) have different mixes of systems, and system additions and upgrades are in varied states of development across OAs. No one of these systems is without shortcomings, but each has its own individual merits. Moreover, each system has a role to play in public alert, warning, and emergency information delivery. The following is a summary of those systems, presented in no particular order.

Route Alerting

Route alerting involves using emergency personnel going door-to-door or to groups of people to deliver a personal warning message. It can also be performed by slowly driving streets with loud speakers. This old fashioned, low-tech, and often forgotten warning delivery mechanism is available throughout the Bay Area and can be effectively used in sparsely populated areas, in areas with a large seasonal or diurnal population (such as recreation areas), in areas not covered by electronic warning capabilities, and in areas with inadequate numbers of emergency personnel. Route alerting is also a backup system to use when modern warning technology is not available -- for example, when electricity is no longer available.

The chief advantage of personal contact that route alerting provides is that people in the public are more willing to respond to a warning delivered personally because they are more likely to believe that a danger exists to them. However, this method is time-consuming and requires the commitment of many vehicles and persons. To support the implementation of this method, emergency personnel should develop a plan for systematically traversing the threatened area and should issue the warning, beginning with the highest risk zone, and proceeding to those of lower risk. A trial run as part of planning and training is useful for establishing the warning time needed to notify the population at risk in, for example, rural camp grounds or on beaches, and for determining warning time rates for different types of areas.

Loudspeakers and Public Address (PA) Systems

Existing public address (PA) systems exist throughout the Bay Area. It is feasible to use them to notify people in places which are covered by such systems. Schools, hospitals, prisons, nursing homes, sports arenas, theaters, or shopping centers often have PA systems. In addition, portable loudspeakers can be used from vehicles to warn nearby populations. These systems are best used in conjunction with other broader notification procedures. They are very useful in reaching small segments of the population in confined or institutionalized settings. To be effective, PA systems need a good communications link to the operators so that messages can be disseminated quickly and accurately. Portable loudspeakers increase the speed of warning populations lacking other means to receive the warning. They are particularly useful during night-time hours when most people are

asleep. Their chief disadvantages are that it is often difficult for people to hear a warning broadcast from a moving vehicle, that sometimes people only hear part of the message, and that it is difficult for people to confirm the warning.

The Emergency Alert System (EAS)

The EAS--which is currently being phased out and replaced with a third generation system--is a joint government-industry response to a presidential requirement to have the capability to address the entire nation on very short notice in case of a grave threat or national emergency. In 1994, EAS replaced the Emergency Broadcast System (EBS), which was in use since 1963. At the national level, EAS can only be activated by the president or his constitutional successor. At the direction of the president or his successor the Department of Homeland Security/FEMA is contacted to activate the national-level EAS. After the president has used the system, it may then be employed by federal agencies to provide official information such as disaster assistance, food availability, and other vital information.

The Integrated Alert and Warning System (IPAWS)

The IPAWS is currently changing warning practice because of its national-level adoption of the related Commercial Mobile Alert System (CMAS). Both systems are based on the Common Alerting Protocol (CAP). These systems are discussed at greater length elsewhere in the *Strategy* and facilitate standardizing alert and warning practices in the nation, and would do the same in the Bay Area. However, they do not solve all pubic alert and warning problems.

Radio

Radio is a major technology for disseminating warning information because it can quickly reach a large number of people, particularly drivers, during non-sleeping hours. FM carriers are required to have EAS capabilities. Certain EAS radio stations have been designated as local primary stations and usually have arrangements with local civil defense offices or other government agencies to broadcast emergency warnings for most hazards. In most situations, other radio stations broadcast warnings as well. The use of radio as a warning channel will continue to be a major practice in emergencies nationwide and should also be utilized in the Bay Area. Plans for notification and the use of standardized messages often accelerate the speed at which a warning can be issued over the radio. One disadvantage of the radio is that the broad area often covered by broadcasts may include areas not at risk. This underscores the need for warning messages to be clear about the boundaries of area at risk. Second, radio messages exclude the use of graphic materials. Third, radio reaches only a small portion of the population during late night hours.

Television

Warnings are also broadcast over commercial and cable television. All commercial and cable systems must be EAS compliant This can be done by interrupting normal programming or by displaying scrolled text on the bottom of the screen. Television reaches a large number of people, particularly in the evening hours. Like radio, it is a poor communication channel during sleeping hours. Television is a particularly good channel for warnings about slowly developing events. It is likely to take longer to issue a warning over

television stations except where prewritten scrolled messages are used. One major advantage of television is the ability to use graphic information such as maps or diagrams in the warning, making it an important tool to effectively reach people with mental disabilities if appropriate graphics are presented.

The popularity of cable television means that local commercial stations may reach less of the public in the Bay Area than once was the case. As a result, systems have been developed to issue scrolled or broadcast messages over all cable channels. Thus, a person in Oakland watching a Chicago station or a movie channel could still receive a warning for their county. Usually the override systems are operated by emergency officials in coordination with a cable television station. This requires pre-arranged agreements on the use of such a system. The advantages and disadvantages of non-cable television apply, such as loss of operability when a power outage occurs.

Additionally, television is often turned to as a major source of additional information by people after receipt of a first warning and before initiating a protective action. Moreover, during some events, people are likely to watch non-local coverage from such outlets as CNN instead of viewing local stations. Hence, in major events that are slow moving, it is important to distribute information to non-local stations as well as local ones.

Tone Alert and NOAA Weather Radio

The tone alert radio is a specialized warning device that can be remotely activated. These radios operate on a standby condition and provide a warning signal; some types can subsequently broadcast a verbal warning message. Upon receipt of a code, the radio emits a tone and broadcasts a prerecorded or read message. The code and message are broadcast from a radio transmitter, which typically has a range of 40 miles. The radio receivers operate on normal electric power; some have battery back-up power.

Tone alert radios remain one of the most effective ways to reach key decision-makers for institutionalized populations. For example, persons in positions of authority in congregate care facilities, such as nursing homes.

There are four basic types of tone alert receivers in current use nationally. It is possible that each of these may also be in use in the Bay Area. These include models that are fixed tuned to the local EAS station and activated by the familiar EAS dual tone. There are also models that are similar to EAS receivers but are tuned to the appropriate NOAA continuous broadcast radio station and that are activated by the special weather alert tone. Some models can be set to one of several commercial FM frequencies and then activated by a FM subcarrier frequency, if present. And finally, there are models that are fixed-tuned to a specific radio transmitter installed solely for the purpose of emergency warning.

NOAA weather radio covers a major portion of the population within the country and likely serves many in the Bay Area. Its chief function is to provide continuous weather forecasts. NWS can activate radio receivers to issue warnings regarding severe weather. This system can be used to issue warnings for other hazards when local emergency managers make arrangements with the NWS. The advantages of the tone-alert system include a quick

dissemination time, the combination of an alerting signal with specialized messages, and around-the-clock availability. Disadvantages include maintenance problems, availability during power failures, limited broadcast range, and the difficulty of outdoor use. The radio receivers are relatively inexpensive.

Telephone Automatic Dialers

Switching and automatic telephone dialing equipment that is currently available has the potential to reach a large number of people in a relatively short time frame. In most cases, current technology could allow a simultaneous call to about 20% to 30% of a local phone company's customers using the local system's resources and to a higher percentage by routing calls through distant switching stations. These systems make use of existing phone networks. Other systems can be specifically designed to issue emergency warnings. Most of the modifications and special equipment are installed at the phone company. These systems play prerecorded messages which can be updated fairly quickly to provide timely information. Advanced systems can automatically hang up phones in use or block out all incoming calls. It is also feasible to have them use a special ring that would act as an alerting function. They can also be combined with the use of telephone hotlines to provide specialized information.

Automatic dialing systems utilize a computer to make simultaneous calls using multiple lines. A system using 256 lines can presently make over 15,000 calls per hour. However, these systems can still serve only a fraction of local area phones at one time. Other problems exist. People are not always near a phone to receive a message, and busy phones would prevent warning if less expensive systems without the automatic hang-up feature are used. Cellular telephones can also be used to receive warning messages using automatic dialing technology.

Sirens and Alarms

The technology of siren and alarm systems is such that an audible signal could be provided to most populations at risk, although it can be expensive to implement the technology. These types of warning devices are designed to provide rapid alert to the threatened population. Electronic sirens have public address capabilities as well, although the quality of the message is usually poor. Siren systems are limited in their use by the lack of instructional messages. At best, they alert people to seek further information, unless there has been an intensive program of public education used to instruct people on what to do when the signal sounds. This is possible only in situations when the same response would be desired every time a warning is issued, which is not likely in the Bay Area.

Multiple signals, such as a wavering signal versus short blasts, whoops, and wails are rarely differentiated by the public. Consequently, reliance on different signals for diverse hazards is not supported. Other problems that constrain the use of sirens and alarms are false alarms because of technical failures, equipment failures in emergencies, maintenance problems, coverage problems (particularly in adverse weather), difficulties in propagating sounds into buildings, and sometimes public indifference to sirens in large urban areas such as the Bay Area. Nevertheless, siren systems remain a main component of warning

systems nationwide and in the Bay Area. Their main benefit is to create a signal that if heard interrupts a normal environment and is noticed by those who hear it.

Message Signs

Electronic message signs exist in the Bay Area and are particularly appropriate if there is a significant need to transmit remotely-controlled, changeable messages to motorists driving within or approaching the risk zone to provide them with instructions. Electronic signs can be permanently mounted over or beside major roadways or may be portable. Messages could be composed at a central location and transmitted to individual signs as needed to notify motorists of emergency situations and instruct them to take appropriate protective actions.

State-of-the-art changeable message signs use reflective disc message displays with fiber optic lighting. The highly reflective disc elements increase in visibility in bright ambient light conditions, unlike bulb signs that can become dim and unreadable in bright sunlight. The fiber optics collect light from redundant low-voltage halogen lamps and direct light to the individual reflective discs. Messages are generated and transmitted from a personal computer which can be located in a central control point. Messages can be transmitted to the individual signs via telephone lines, twisted pair cables, coaxial cables, microwave, radio, or fiber optic cable. The sign messages can travel left or right, scroll up or down, and flash.

Aircraft

In special cases, airplanes and helicopters can be used as part of the warning process. This may be particularly appropriate in rapid onset high consequence events that have interrupted electricity, e.g., the detonation of an improvised nuclear device. Low-flying aircraft can carry sirens or bullhorns to provide an alert or a warning message. In addition, they could drop prepared leaflets containing a warning message with detailed protective action instructions. This type of warning channel is also useful in reaching remote populations or populations that cannot be reached through normal communication channels. Disadvantages include access to aircraft, maintenance cost, and the risk of accident in difficult flight terrain. A further problem is obtaining sound systems that can broadcast messages audible over the noise of the aircraft itself.

Visual Alerting

The use of visual alerting devices (e.g., strobes, flares, smoke) may be appropriate in some extraordinary and unusual circumstances. No evidence of the use of such alerting channels in the Bay Area was reported during the assessment process. Elevated strobe lights focused on large bodies of water could be used to assist in attracting the attention of persons on boats with loud motors and unable to hear a siren signal. Hunters, fishermen, hikers, and campers in normally uninhabited areas could be alerted by columns of colored smoke in the daytime and by airborne flares at night.

Internet Protocol (IP) Based Technology

Internet based technology is available to deliver emergency warnings to electronic devices with IP addresses. These systems provide a reliable and scalable solution for emergency

alert notification and communication. These systems are device and carrier-agnostic and follow current Internet and wireless standards allowing interoperability with existing carriers and equipment. Reliable and fast alert delivery is made possible by simple web-browser based management

With these systems it is possible to send warnings and instructions to tens of thousands of citizens during an emergency via digital pagers, telephones, computers and personal digital assistants (PDA) through messaging and e-mail. Such systems have the capability to be scalable so one could deliver tens of thousands of alerts in minutes.

Social Media

The Bay Area is home to some of the largest and farthest-reaching social media companies in the world, e.g., Facebook, Twitter, Linkedln, Deaf Link, etc. Social media is a relatively new technology for use regarding public alert and warning messaging. It has two distinct alert and warning applications, and research evidence has only now begun to accumulate on its practical use in public alert and warnings.

First, social media is yet another tool and channel to distribute public alert and warning messages; however, some social media limit the length of posted messages, e.g., 140 characters, while others do not. Second, social media give alert and warning providers access to "view" what the people they have warned are thinking, doing, and not doing. As such, social media should be fully integrated into emergency operations plans and monitored after alerts and warnings have been issued to detect the presence of wrong information, the rate at which people have begun protective action-taking, and more. Problems in human perception and action or inaction could thereby be detected and then addressed in subsequent pubic messages to correct misinformation and public response deficiencies.

Appendix B

Bay Area Emergency Public Information and Warning Framework

Purpose, Scope and Eligibility

In order to maximize the effectiveness, efficiency and economy of public warning and public information during regional emergencies and disasters, the Bay Area Urban Area Security Initiative (UASI) and its twelve Operational Areas, Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, Monterey and San Benito and the cities of San Francisco, Oakland and San Jose agree mutually to the principles and goals set forth in this nonbinding Bay Area Emergency Public Information and Warning Framework (hereinafter referred to as the "Framework").

Recognizing the advances in technology, science and practice, and mindful of the need for increased efficiency and cost-effectiveness, the Bay Area UASI intends, through this Framework, to enhance cooperation and coordination in planning, training, organization, exercises, operations, and procurements of equipment and services related to emergency public information and warning. The Framework does not alter or impose any new statutory or regulatory authority or responsibility of any kind upon any agency or entity in the Bay Area UASI related to public safety, health, or security.

This Framework is intended to document a basic understanding among public safety, homeland security and allied agencies in the Bay Area UASI as regards to two closely related but distinct activities:

Public warning (hereinafter referred to as "warning"), which refers to more urgent communications intended to alert some or all of the public of an immediate threat or hazard and to recommend specific protective actions members of the public can take to reduce harm.

Emergency public information, which refers to communications covering more extensive releases of information through various modes of communication including from agency spokespersons and subject matter experts prior to, during, or following an incident, intended to educate and guide members of the public, reduce losses, speed recovery and enhance resilience.

References and Context

This Framework recognizes and is subject to existing frameworks including:

- The California Disaster and Civil Defense Mutual Aid Agreement;
- The California Standardized Emergency Management System (SEMS); and,
- The National Incident Management System (NIMS).

Key Principles

The Bay Area UASI recognizes the following as core principles of good public warning practice:

1. The effectiveness of public warning will be based upon the degree to which those people at risk take the recommended protective action(s).
2. Both message effectiveness and the reach and reliability of warnings are enhanced by the concurrent delivery of a consistent warning message through multiple channels of communication.
3. Once issued, warnings should be followed by updated warnings and/or emergency public information for the duration of the emergency, as many recipients may have missed the initial warning.
4. It is preferable to issue an imperfect warning promptly than to delay warning in hopes of obtaining perfect information. Revisions and corrections in warning information should be made public as soon as they become available.
5. The effectiveness of a warning is enhanced, and the risk of public annoyance or fatigue reduced, when individual warnings are delivered to people actually at risk and not to people for whom the warning is not relevant.
6. Well-crafted warning messages do not cause panic, but the lack or incompleteness of official guidance during an emergency can. Warning messages should always include a specific and actionable recommendation as to action recipients can take to protect themselves and an explanation of why that action will help.

The Bay Area UASI further recognizes the following as core principles of emergency public information practice:

1. During an emergency it is important that official public information be as consistent and coherent as possible, while frankly acknowledging the inherent uncertainties and changes that can arise under exigent circumstances.
2. Public information issued jointly from a panel of authoritative sources is more effective than information from a single source.
3. Emergency public information should focus on immediate and near-future concerns.
4. Emergency public information should, as far as possible, be tailored and targeted to specific audiences according to their local needs.

Guidelines for Regional Cooperation on Public Warning

The following are shared regional guidelines for public warning; provided that nothing in these guidelines shall be interpreted as restricting any agency or entity in the Bay Area UASI from making more extensive use of its own warning and notification capabilities within its own jurisdiction:

1. Under California law, warning is a discretionary activity of official government agencies.

2. The establishment of resourced regional planning structures is necessary to maximize regional coordination and policy development.
3. Public warnings should generally be issued in the event of an imminent threat to human life or health.
4. Warnings should be issued on the authority of an incident commander, a public health official or some equivalent responsible officer. In all cases an identifiable individual should be accountable for any warning message.
5. To the extent possible, given available technologies, warning messages should be delivered to people to whom the warnings are relevant and not to people for whom they are irrelevant, as repeated exposure to irrelevant warnings can adversely affect the effectiveness of warnings over time. However, emergency information for people not at risk in areas contiguous with an area being warned should be provided information that explains why those individuals are not at risk and why no protective action on their part is necessary.
6. Because hazards frequently cross jurisdictional boundaries, agencies that own or operate public warning systems should make advance arrangements for making them available to responsible officials in adjoining jurisdictions.
7. To maximize both technical interoperability and procurement economy, all warning and origination systems should utilize the OASIS Common Alerting Protocol standard version 1.2 or higher.

Guidelines for Regional Cooperation on Emergency Public Information

The following are shared regional guidelines for emergency public information; provided that nothing in these guidelines shall be interpreted as restricting any agency or entity within the Bay Area UASI from making more extensive use of its own emergency public information capabilities within its own jurisdiction:

1. The establishment of resourced regional planning structures is necessary to maximize regional coordination and policy development.

2. Whenever an emergency involves multiple agencies or jurisdictions and cannot be effectively managed at an Incident Command Post, a Joint Information Center (JIC) (or Joint Information System (JIS)) should be established for collaboration and coordination among public information officers.
3. A JIC (or JIS) should, at a minimum, support the following activities:
    - Joint public information policy formulation and promulgation;
    - Liaison with Incident Command Posts, emergency operations centers and other operational centers;
    - Information gathering and newswriting;
    - Briefings and other interface with the news media; and,

- Monitoring of mass media and social media coverage.

4. When a large or evolving emergency or disaster leads to the establishment of multiple JICs, efforts should be made to consolidate them to the greatest extent possible and to maintain liaisons among them when consolidation is not possible.
5. All news releases, fact sheets, multimedia and other products from a JIC should be made available promptly and consistently via a website or an accessible Joint Information System, to public information officers not located at the JIC.
6. All public affairs officers should receive regular training and exercise in JIC/JIS operations and should demonstrate understanding of the specialized roles they may be called upon to play in a structured JIC/JIS environment.

Actions

To enhance the effectiveness of regional emergency public information and warning, the Bay Area UASI will pursue the following actions; provided that nothing herein shall be interpreted as restricting any agency or entity within the Bay Area UASI from making more extensive use of its own emergency public information and warning capabilities within its own jurisdiction:

- Incorporate the key principles and guidelines into local emergency public information and public warning practices and plans;
- Pursue the development of a regional cooperation, coordination, planning and resource sharing framework for emergency public information and warning;
- Pursue the development of enhanced capabilities for warnings and emergency public information for people with access or functional needs and non-English speakers across the region;
- Pursue the development of a regular program of regional training and exercises focused on emergency public information and warning; and,
- Pursue the development of a regional public warning capability that fully integrates personnel and technology for emergencies that pose an imminent threat to human life and health across jurisdictional boundaries.

Appendix C
Key Public Warning Messaging Considerations and Message Templates

KEY MESSAGING CONSIDERATIONS

The process of message writing and the content of the message templates contained herein brought forward key considerations regarding communicating alert, warnings, and other emergency communication to the public in the Bay Area. These considerations are diverse in topic and include the link between response plans and message contents, the important role of messages in influencing change in public behavior, the role and character of pre-event public warning education, and more. These considerations are discussed below, followed by the message matrix, and then by 10 different types of message templates.

The purpose behind writing the 10 warning messages is to *increase the probability* that more people will take timely and effective protective action behavior. In other words, the warning messages are telling people what to do, e.g., the specific protective action they should take given the hazard. Messages that leave this out are less effective from a public response viewpoint, but putting that information in the messages outlined below presents an issue -- the particular circumstances of an individual incident often determine the exact appropriate protective action recommendation. Therefore, the messages herein are *templates* designed primarily to demonstrate *how* to write a warning message as opposed to delineating the exact content of the protective actions in a message for use during a future incident. *The latter is something nobody can predict and is best addressed in the realms of operational pre-planning and, at the time of the incident, by incident command.*

Furthermore, a single course of action should not be dictated to the incident commander, emergency manager, or elected official involved in the incident. For example, the shelter in-place message for use after an improvised nuclear detonation in the Bay Area is qualified with, *"if you decide that the public should shelter in-place here's a way in which to frame the message."*

<u>Protective Actions Drive Messages</u>

- Anticipated event consequences determine public protective actions that would result in consequence reduction for the population at risk. Those protective actions drive the content of communications (alerts, warning, press releases, and more) to the public during emergencies; the prime objective of those communications is to motivate public protective action-taking behavior.
- It is difficult to imagine any one single event in which identical public protective actions and messages would apply to the entire population of the Bay Area. A few

events might qualify, such as a large earthquake or the detonation of an improvised nuclear device.

- Message templates for an improvised nuclear devise were among those chosen because, among other reasons, that event comes close to one for which standardized Bay Area messages might apply.
- In the case of the detonation of an improvised nuclear device, detailed federal guidance exists for public protective actions over time as such an incident might unfold. The use of this guidance in the development of the messages is not a recommendation that the guidance be adopted by the Bay Area, nor is it an admission that the region agrees with everything that the federal government recommends. The federal guidance does provide a clear and relatively complete set of public protective actions the region's public health and safety professionals could apply to the entire Bay Area, assuming that the federal guidance is adopted.

Response Plans Drive Messages

- Emergency response plans should drive public alert and warning messages, not vice versa. Message content must include topics about community level response as it relates to the protective actions the public is being asked to take in a message. For example, the presence or absence of traffic guides in an evacuation is based in response planning and should be included in a public evacuation message.
- Differences in response plans, implementing procedures, and annexes for different hazards are an additional constraint to the development of standardized Bay Area-wide public messages.

Motivating Behavior is the Purpose

- Warning messages are mass communications about risk. Their purpose is to change the behavior of the people who receive them, to cause them to stop what they are doing when they hear a message and to take the protective actions outlined in the message.
- Regardless of background and experience, public warning providers step into the role of applied social psychologist whose goal is to influence the behavior of very large numbers of people.
- This goal is the foundation that guided the development of the five full-text messages for the improvised nuclear device hazard (IND). Each of these messages is "fully-loaded" with the motivators discovered by social and behavioral science research to increase the probability that message recipients might take the protective action contained in the message in an appropriate and timely manner. This does not mean that every individual would do so; it means that the probability is increased based on the state-of-knowledge in the social sciences. A theoretical list of these motivators was presented in the social science metric, and the IND messages illustrate what those same motivators look like in actual messages. Some of the motivators can easily be included in a message. Others are also clearly not as identifiable, since they require information that may not be known during an actual incident.

- A comparison of the named source in the first IND full-text message to the source in the IND message in IPAWS/CAP/EAS-compliant message shows a difference in source attribution. The full text message attributes source to maximize its motivating potential, while the latter attributes source based on current law and practice. Planning ahead of time could develop the agreement needed to include source attribution based on *maximizing its contribution as a public motivator.* Another example is illustrated by comparing these same two messages. One message calls for "mandatory" compliance (illegal in the State of California); the other does not.
- Each of the five full text messages were written to include a full set of social science motivators for each of the key public protective actions as called for in the federal guidance. However, this resulted in some messages being too long to actually use, one short message, and others in between.
- All messages were kept, regardless of length, to illustrate behavioral motivators linked to all the public protective actions recommended in the federal guidance. Some of these messages will need to be divided into shorter messages for use in actual practice.

Communication Planning Informs Message Development

- Consideration could be given to the idea that ad hoc approaches to writing public emergency communication messages do not work as well as messages based on pre-event communication planning augmented by actual incident factors. An important part of planning is the content of messages.
- Message content plans should be inventories or lists of the content of future messages written in appropriate style for all hazards that could impact the Bay Area and across protective action sequences as each hazard unfolds.
- The message content lists should blend three things: Likely appropriate public protective actions by hazard, elements of the appropriate response plan that applies, and public behavior motivators as documented in the social science research record.
- The five full-text improvised nuclear devise messages are examples of what such inventories might look like. They inventory the information the public needs at the time when different protective actions are to be taken. The more information of this kind that is disseminated to the public, the higher the probability of people performing protective action appropriately. This probability declines with less information disseminated.
- The public communication problem this presents is how to effectively get that information to the people who need it, given the constraints imposed by different public communication technologies and devices.
- If lists like those illustrated by the five full text IND message templates were developed long before an incident occurs, they could help to focus attention during incidents on what needs to be communicated as an event unfolds.

Some Specific Message Components can Be Written Now

- The IPAWS/CAP/EAS-compliant messages provide good examples of how preparing integrated message content inventories as discussed above can be a guide to identifying and filling gaps in message content inventories.
- The tsunami message suggests that in addition to the standard "get to high ground" public protective action recommendation, it would be useful to tell people in readily understandable terms about the run-up zones in the Bay Area. This could be achieved in a variety of ways in emergency messages during an event or before through other forms of public communication.
- Consideration should be given to identifying all gaps that can now be identified, and to take actions to fill them now. Message gaps are likely easiest to discover after message content lists are developed as part of communication planning.

Warning Education Reduces Protective Action Response Delay

- The following messages make it clear that public messaging should not wait until a hazard is pending or has begun. Many of the protective action details the public needs to perform to appropriately respond to an alert or warning may not be provided during an incident. For example, when the electricity is out or when time is very short between event detection and impact, and the only information people might receive is the brief information that can be provided over the EAS.
- The role of pre-event public education in helping to fill these gaps is critical.
- Public alert and warning education should include items such as how people will get alerts and warnings, from whom they will come, where to listen for more information, what the range of protective actions are that people might be asked to take regarding different hazard types, and more.
- Pre-event public education is never fully successful, and it is a task that will never be fully completed.
- Standard approaches to public warning education, such as, websites and brochures should be supplemented with non-traditional outreach approaches. For example, placing placards on buildings now to inform the public about which buildings have good shelter capacity in a radiological incident (not unlike the way it was done in the 1950s), placing pamphlets in building lobbies about what to do inside a building while seeking shelter after a nuclear attack and for other hazards, posting outdoor signs in communities to mark where tsunami run up zones end, and more.
- Additional outreach approaches are needed to reach people in populations isolated from educational materials. Working with advocacy groups to help distribute educational materials to isolated populations would be needed and would likely have good results. Additionally, and as was the case with alert and warning message templates, educational materials should be read and revised as needed to enhance understandability for people with access and functional needs.

Warning Delivery Systems Pose Challenges

- A comparison of the first full-text IND message to its IPAWS/ACP/EAS-compliant message template counterpart reveals that many protective actions in the full-text message could not fit into the EAS-compliant message. This does not mean the

nation's new alert and warning system is not useful. It does mean that a gap exists between what it can deliver and what the public needs to hear and know that should be filled in other ways.

- The CAP can be used as a format for post-EAS public information and distribution to the media and other public warning partners. This application is not constrained by word or character length. The standardized format it offers covers many important topics and is good reason to use it for post-EAS public messaging. However, the freedom the CAP format offers regarding, for example, public instructions about protective actions should be supplemented with either training in public motivators, the use of public message inventories discussed above, or both.
- Consideration should be given to the gaps these and other systems leave regarding the overall public alert and warning enterprise. Steps should then be taken to fill those gaps. For example, one possible gap is that these systems target people at risk. But people not at risk also need information in emergencies. "Shadow evacuation" is a well-documented phenomenon that refers to safe people evacuating when there is no real reason for them to do so. This can be a problem when shadow evacuees slow evacuation time for people at risk and delay their reaching safety. This can only be addressed by emergency communications to people not at risk that explains why they are safe and no action on their part is needed.

There are No Guarantees

- Research findings in the social sciences are categorically different from those in other fields of knowledge, such as engineering, in the following way: Application of social science knowledge comes with ***no guarantees***. For example, there will always be organizational warning system actors who make mistakes, and people in the public who do not appropriately respond to even the best crafted warning messages. Application of the elements herein can, at best, only *"increase the probability"* of organization actors including emergency public information providers making fewer errors, and that more members of the public *might* take timely and appropriate protective action than *might* otherwise be the case.

Table 1
MESSAGE TEMPLATE DEVELOPMENT MATRIX

PROTECTIVE ACTIONS[1]	HAZARDS[2,3]					
	1	**2**	**3**	**4**	**5**	**6**
Shelter: in place	X	n/a	n/a	n/a	O	X
Shelter: in another place	X	n/a	n/a	n/a	n/a	O
Evacuate: leave area	X	X	X	O	O	O
Evacuate: leave site	X	n/a	n/a	n/a	n/a	O
Evacuate: leave building	X	n/a	n/a	n/a	n/a	O
Evacuate: vertical	n/a	n/a	X	O	n/a	n/a
Protect breathing: while sheltering	X	n/a	n/a	n/a	O	O
Protect breathing: while evacuating	X	n/a	n/a	n/a	O	O
Decontaminate: self	X	n/a	n/a	n/a	O	n/a
Decontaminate: objects	O	n/a	n/a	n/a	O	n/a
Refrain: do not evacuate	X	X	O	O	O	O
Refrain: do not return after evacuation	X	O	X	O	O	n/a
Refrain: do not pick up kids at school	X	O	O	n/a	O	n/a
Avoid: do not enter area	X	X	X	O	X	n/a
Avoid: do not enter site	n/a	n/a	n/a	n/a	n/a	n/a
Avoid: do not enter building	n/a	n/a	n/a	n/a	n/a	O
Contain: contaminated clothing	X	n/a	n/a	n/a	O	n/a
Contain: other contaminated items	O	n/a	n/a	n/a	O	n/a
Listen: for more information	X	O	X	O	X	X
All clear: resume normal activities	O	O	O	O	O	O
Abandon: area temporarily	X	O	O	O	O	n/a
Abandon: area permanently	X	n/a	n/a	n/a	n/a	n/a

[1] Protective actions could be single actions (one action), overlapping actions (different actions at the same time), or sequenced actions (different actions in a sequence); messages could address a single audience (one population) or multiple audiences (different populations and actions at the same time); and the time available for public action taking varies by hazard and event (none, minutes, hours, days). Where X = in a prototype message in this report, n/a = not applicable, and O = applicable to hazard but prototype message not written.

[2]The warning hazards represented in this matrix are 1= improvised nuclear device, 2 = mudflow, 3 = tsunamis, 4 = dam failure, 5 = anthrax release, and 6 = earthquake.

[3]A more complete list of hazards from a public message viewpoint that could be represented in such a matrix include: (1) natural hazards: asteroid impact 17 days, asteroid impact 30 years, avalanche watch, avalanche warning, blizzard,, dust storm, earthquake: aftershocks, earthquake: secondary hazards, earthquake: as foreshock, earthquake: post initiation early warning, earthquake: bogus psychic prediction, flood: flash flood watch, flood: flash flood warning, flood: coastal storm surge watch, flood: coastal storm surge warning, flood: river flood watch, flood: river flood warning, fog, hail, high wind: watch, high wind: warning, hurricane watch, hurricane warning, ice, landslide/ground failure: coastal erosion, landslide/ground failure: mud/debris flow, landslide/ground failure: rock fall, landslide/ground failure: sink hole, severe storm, severe thunderstorm watch, severe thunderstorm warning, snow: urban, temperature: extreme cold, temperature: extreme heat, tornado: watch, tornado: warning, tropical storm: watch, tropical storm: warning, tsunami: far field watch, tsunami: far field warning, tsunami: intermediate field watch, tsunami: intermediate field warning, tsunamis: near field, volcanic eruption, wildfire: wild land,

wildfire: urban wild land interface, winter storm: watch, winter storm: warning, other; (2) terrorism hazards: cyber terrorism, detonation of IED: improvised nuclear device, detonation of IED: other explosive device, dispersal of radiological material, dispersal of biological agents: aerosol anthrax, dispersal of biological agents: other, sabotage, other; (3) technological hazards: dam failure, explosion: natural gas pipeline, explosion: other non-terrorist, hazardous material release: fixed land site, hazardous materials release: transportation land, hazardous materials release: transportation sea, levy failure, nuclear power plant, other; (4) civil disturbance hazards: riot, law enforcement activity with area closure: conventional attack shooter, law enforcement activity with area closure: conventional attack other, other; and (5) biological hazards: human disease: pandemic influenza, human disease: other, livestock disease, crop disease, other.

PROTOTYPE BAY AREA MESSAGES

Improvised Nuclear Device Shelter Full Text Message

NOTE: This message assumes that the Bay Area region adopts the protective action guidelines in: National Security Staff Interagency Policy Coordination Subcommittee for Preparedness & Response to Radiological and Nuclear Threats, 2nd Ed., June 2010 Planning Guidance for Response to a Nuclear Detonation. Washington, D.C. (Note: little if any Federal guidance was provided for the content of this message.) The scenario is based upon the Department of Homeland Security's National Planning Scenario #1, Nuclear Detonation – 10-Kiloton Improvised Nuclear Device.

A nuclear explosion occurred at *[insert time here]* in *[insert location here]*. Radiation levels in the warning area are extremely dangerous now. They may decline in a few hours to days. Radiation is in the air, blowing in the direction of the wind, and falling to the ground. Exposure to radiation can cause illness and even death.

This "Mandatory Order to Take Shelter" is issued from the chiefs of the Bay Area's fire and police departments, health departments, and city and county government officials. It is based on plans for an event like this from some of our nation's best scientists and health professionals.

Everyone, including people in vehicles, in *[insert an easily understood description of the geographical boundaries]* can increase their chances of surviving if they immediately:

GO DEEP INSIDE

- The nearest accessible and stable appearing building and stay there.
- Good shelters include tall buildings, basements, underground garages, or tunnels. Look for buildings made of brick, concrete, or are covered by earth since they will give you the most protection.
- Current radiation levels are now extremely dangerous. They will not decline for a few hours to days.
- Radiation doses received will be lower inside than outside.
- If you are in a building, stay there unless you can reach a better shelter in a few minutes.

ONCE INSIDE

- Close all windows and doors.
- Turn off heaters, air conditioners, and all ventilation systems.
- Put out fires in fireplaces and close dampers.
- Go to the basement. If there isn't one, go to a middle floor such as floors 3-8 in a 10 story building.
- If there's only one floor in the building, stay there.
- Go in an inside room. Stay far away from outside walls and windows.
- These actions will reduce your exposure to radiation that gets in through the walls, windows, and roof.
- Keep listening to this and other media for information and instructions about other actions we will ask you to take in about an hour [*insert the time it will happen here]*.

DO NOT GO OUTSIDE

- Until we tell you to.
- Do not leave the building you are in or evacuate unless told to do so by public officials. You are safer inside even if you drive fast.
- *[Only If Schools are in Session: Do not go to schools or day care facilities to get your children. Doing so will increase your radiation exposure; schools are in lockdown and children will not be allowed to leave. School children are being sheltered and cared for by their teachers. We will provide you with information later about how to reunite with your children.]*

REGARDING FOOD AND WATER

- Only bottled water may be free of contamination. Use a towel to wipe off the bottle to remove radiation on the outside.
- Water from your taps likely has a slight amount of radiation in it.
- If you have water pressure, save extra drinking water in clean containers.
- Sealed, packaged, and frozen foods are safe to eat.
- Rinse the package before opening.
- Wash your hands with soap and water before handling any food to remove radiation.
- Keep food off counters or anything else that could have radiation on it.

IF YOU AREN'T IN *[insert an easily understood description of the geographical boundaries]*,

- There's no reason for you to do anything since harmful amounts of radiation will not reach you. We will let you know if conditions change.
- But please stay out of the area.
- Going there will not be safe, and stay off the roads since unnecessary traffic will delay emergency response.
- Keep listening to this and other media for information and instructions.

USE TELEPHONES ONLY IF YOU HAVE A MEDICAL EMERGENCY

- (*This assumes the Bay Area OA's have plans, equipment and capability to conduct rescue operations during such an incident both in and around the impacted area*.)
- Call 911 *[insert the conditions under which people should call]*.
- Otherwise, avoid using telephones, including cell phones, to prevent overloading the system and interfering with emergency use.

Improvised Nuclear Device Re-shelter Full Text Message

NOTE: This message assumes that the Bay Area region adopts the protective action guidelines in: National Security Staff Interagency Policy Coordination Subcommittee for Preparedness & Response to Radiological and Nuclear Threats, 2nd Ed., June 2010 Planning Guidance for Response to a Nuclear Detonation. Washington, D.C. (Note: little if any Federal guidance was provided for the content of this message.) The scenario is based upon the Department of Homeland Security's National Planning Scenario #1, Nuclear Detonation – 10-Kiloton Improvised Nuclear Device.

Radiation levels remain high *[If possible, insert by whom current radiation levels were determined.]* Radiation is still in the air and continues to fall to the ground. The "Mandatory Order to Shelter" from the chiefs of the Bay Area's fire and police departments, health departments, and city and county government officials remains in effect.

DO NOT EVACUATE

- Sheltering remains the best way to reduce your exposure to radiation.

BUT IF YOU ARE NOT ALREADY IN ONE, RELOCATE

- Into a tall building, a basement, an underground garage, or a tunnel.
- Only relocate if you can do it without spending more than 30 minutes outside.
- While outside, always move in the direction away from the site of the explosion.
- Cover your nose and mouth with a cloth or mask while outside.
- Do not remove any clothing while outside.
- Do not go to schools and day care centers. They are still in lockdown. Children will not be allowed to leave and are still being cared for by their teachers.
- Relocating to a good shelter will reduce your overall radiation dose even though you will be exposed to higher levels of radiation while outside.
- Stay where you are if you can't get into a better structure in less than 30 minutes.

DECONTAMINATE WHEN YOU GET THERE

- Once you are under something so radiation has stopped falling on you, gently brush off any visible dust being careful not to breathe or swallow it.
- Once inside, remove your clothing and shoes.
- If you can't remove all your clothing, at least remove your jacket or coat and shoes.
- If you don't have an outer layer of clothing that can be removed, remove your shoes and keep dusting off your outer layer of upper clothing until you have a replacement.
- Put your shoes and clothing in a bag and place the bag far away from people and animals.
- If available, shower at the earliest possible time from head to feet with warm water and soap. Use shampoo but not hair conditioner because it will make radiation stick to your hair.
- If a shower isn't available, use a sink and wash as best you can. Pay particular attention to your hair and areas around your mouth, nostrils, and eyes. If no water is available, use moist wipes to clean your hands and face.
- Regarding pets
    - Dust off your pet outside while standing upwind to partially remove contamination

- Wear a dust mask when brushing animals to avoid inhaling radioactive particles.
- Bathe pets thoroughly to remove additional contamination.
- Put your pet in a cage or on a leash if there is any risk of them becoming re-contaminated.

AND DO NOT FORGET TO

- Close all windows and doors.
- Turn off heaters, air conditioners, and all ventilation systems.
- Extinguish fires in fireplaces and close dampers.
- Go to the basement if there is one. If not, go to a middle floor such as floors 3-8 in a 10 story building.
- Then go in an inside room. Stay far away from outside walls and windows.

IF YOU AREN'T IN *[insert an easily understood description of the geographical boundaries]*,

- There's no reason for you to do anything since harmful amounts of radiation will not reach you. We will let you know if conditions change.
- But please stay out of the affected area. Going there will expose you to radiation.
- Stay off the roads since unnecessary traffic will delay emergency response.

USE TELEPHONES ONLY IF YOU HAVE A MEDICAL EMERGENCY

- (*This assumes the Bay Area OA's have plans, equipment and capability to conduct rescue operations during such an incident both in and around the impacted area*.)
- Call 911 *[insert the conditions under which people should call]*.
- Otherwise, avoid using telephones, including cell phones, to prevent overloading the system and interfering with emergency use.

EVERYONE SHOULD

- Keep listening to this and other media for information and instructions about other actions we will ask you to take in about an hour *[insert the time it will happen here]*. Current radiation levels remain high and are extremely dangerous. They will decline in anywhere from a few hours to a few days.

Improvised Nuclear Device Early Evacuation Full Text Message

NOTE: At least four evacuation messages are needed based on Federal guidance to address: (a) pre-mature evacuation which is people who are evacuating voluntarily while they should be sheltering, (b) early evacuation of people with high vulnerabilities, (c) general evacuation, and (d) late evacuation of people who would be asked to leave last. We prepared one evacuation message and it is for early evacuation of people with high vulnerabilities as defined by the guidance.

NOTE: This message assumes that the Bay Area region adopts the protective action guidelines in: National Security Staff Interagency Policy Coordination Subcommittee for Preparedness & Response to Radiological and Nuclear Threats, 2nd Ed., June 2010 Planning Guidance for Response to a Nuclear Detonation. Washington, D.C. (Note: little if any Federal guidance was provided for the content of this message.) The scenario is based upon the Department of Homeland Security's National Planning Scenario #1, Nuclear Detonation – 10-Kiloton Improvised Nuclear Device.

We will start to evacuate a small number of people who are especially vulnerable to radiation, in extreme risk, or in dire need of medical attention. Radiation levels have somewhat declined, but not enough to start a general evacuation. Radiation is still in the air. The "Mandatory Order to Shelter" from the chiefs of the Bay Area's fire and police departments, health departments, and city and county government officials remains in effect for everyone else.

EVACUATE NOW BUT ONLY IF YOU ARE

- In critical need of medical attention.
- Threatened with the collapse of the building you are in.
- In one of the following groups:
    - Children *[insert age here]* years of age or younger if accompanied by a parent or guardian.
    - *[Pregnant women early evacuation is not in Federal guidance. Bay Area planners should decide if they want to include pregnant women in early evacuation.]*
    - If you are elderly, *[insert age here]* years of age or older.
- Or not in a good shelter such as a tall building, a basement, an underground garage, or a tunnel protected by materials like brick, concrete, and earth.

OTHERWISE STAY WHERE YOU ARE

- If you evacuate now, it would increase the time it takes to evacuate people with greater vulnerability and urgent medical needs.

EVERYONE EVACUATING SHOULD

- Protect your breathing while outside until you reach safety by covering your nose and mouth with a cloth or mask.
- Do not take off any clothing until you reach safety.
- Depending on where you are, here are the directions and routes you should take that go in directions away from the site of the explosion, are not blocked, and get you out of the radiation in the shortest amount of time.
    - People in *[insert a geographical description of a sub-section of the area under the plume in clear and simple language]* should evacuate by going *[insert the direction here)* using *[insert the road they should use here]*. You'll be out of the radiation when you reach *[insert a clear description of when safety is reached*]

- *[Provide area and evacuation roads descriptions until the entire area is covered.]*

IF YOU EVACUATE IN A PRIVATE VEHICLE

- Keep the windows in your vehicle closed.
- Only use air circulation systems while in the re-circulate mode.
- If your vehicle is not equipped with re-circulating air, keep air conditioners and heaters off.
- Keep your radio on and tuned to *[insert station here.]*

IF YOU EVACUATE ON PUBLIC TRANSPORTATION

- Public transportation inside the area affected by radiation is *[insert a description of available public transportation inside the radiation zones which will be influenced by circumstance; say if it is not available; tell people where they can and cannot get on it if it is available]*.
- Once you reach safety, public transportation to take you to reception/decontamination centers is *[insert a description of available public transportation to take people to reception/decontamination centers here which will be influenced by circumstance; tell people if it is not available, and where they can and cannot get on it if it is available]*.

ONLY EVACUATE ON FOOT

- If it's the quickest or only transportation option available to you.

IF YOU NEED EVACUATION ASSISTANCE

- For example, because you can't walk, can't see, or are injured
- *(Bay Area planners should decide which of the following two options can be inserted here based on planning decisions and/or conditions of circumstance)*
  - *Option 1: We are not able to provide you with special evacuation assistance at this time. Ask others around you for help.*
  - *Option 2: [Describe what special evacuation assistance can be provided and clearly explain to people how they might go about obtaining it.]*

IF YOU EVACUATE OR ARE BEING EVACUATED FROM A FACILITY

- Such as a nursing home or hospital,
- Follow the instructions provided to you by facility personnel.

CHILDREN IN SCHOOLS AND DAY CARE CENTERS

- Under the age of *[insert the age here]* are now being evacuated.
- Do not go to schools or day care centers to get your children.
- The younger children being evacuated now won't be there when you arrive.
- Older children are still in lockdown and will not be allowed to leave.
- Some children are being evacuated from schools and day care centers. Here is a list of schools and day care centers that are evacuating and where the children will be taken, checked for contamination, decontaminated if needed, and taken care of until joined by a parent or guardian.

  - *[Insert a complete list of school and day care center names and a clear address and location of the reception/decontamination center to which children at that school or day care center will be taken.]*
- If you did not hear the name of your child's school, that's because that school is still in full lockdown and no one there is being evacuated.

EVERYONE EVACUATING

- Without medical injuries should go to one of the decontamination facilities that have been set up in safe areas.
- You need to be checked for contamination and decontaminated, if needed, by professionals.
- If your journey to a decontamination center is interrupted, we will tell you later things to do to partially decontaminate yourself until you can get to a decontamination center.
- These facilities can be found at the following locations.
  - *[Insert a clear description of where decontamination facilities are located here.]*
- If you need immediate medical attention for non-radiation injuries, you should go to a hospital that can provide both medical and decontamination services. These are:
  - *[Insert a list of such hospitals and their addresses here.]*

ONCE AGAIN, DO NOT EVACUATE

- If you are not among the very vulnerable or those in dire need of medical attention being evacuated at this time.
- It is safer for you to remain in a tall building, a basement, an underground garage, or in a tunnel made of materials like brick, concrete, and earth until radiation levels decline substantially.

IF YOU AREN'T IN *[insert an easily understood description of the geographical boundaries.]*

- There's no reason for you to do anything since harmful amounts of radiation will not reach you. We will let you know if conditions change.
- But please stay out of the area. Going there will expose you to radiation.
- Stay off the roads since unnecessary traffic will delay emergency response.

USE TELEPHONES ONLY IF YOU HAVE A MEDICAL EMERGENCY

- (*This assumes the Bay Area OA's have plans, equipment and capability to conduct rescue operations during such an incident*.)
- Call 911 [*insert the conditions under which people should call.]*.
- Otherwise, avoid using telephones, including cell phones, to prevent overloading the system and interfering with emergency use.

EVERYONE SHOULD

- Keep listening to this and other media for information and instructions about other actions we will ask you to take in about an hour *[insert the time it will happen here.]* Current radiation levels have only somewhat declined and remain dangerous. They will decline more in anywhere from a few hours to a few days.

Improvised Nuclear Device Decontamination Full Text Message

NOTE: Variations of this message are needed to customize the text to fit four different evacuating groups based on Federal guidance. These groups are: (a) pre-mature evacuees who are people evacuating voluntarily while they should be sheltering, (b) early evacuees with high vulnerabilities, (c) general evacuees, and (d) late evacuees who are people asked to leave last. We prepared one decontamination message for early evacuees with high vulnerabilities.

NOTE: This message assumes that the Bay Area region adopts the protective action guidelines in: National Security Staff Interagency Policy Coordination Subcommittee for Preparedness & Response to Radiological and Nuclear Threats, 2nd Ed., June 2010 Planning Guidance for Response to a Nuclear Detonation. Washington, D.C. (Note: little if any Federal guidance was provided for the content of this message.) The scenario is based upon the Department of Homeland Security's National Planning Scenario #1, Nuclear Detonation – 10-Kiloton Improvised Nuclear Device.

Everyone evacuating now should be decontaminated when they reach safety. The "Mandatory Order to Shelter" from the chiefs of the Bay Area's fire and police departments, health departments, and city and county government officials remains in effect for everyone else.

EVERYONE EVACUATING

- Should go to one of the decontamination facilities that have been set up in safe areas to be checked for contamination and decontaminated, if needed, by professionals.
- Decontamination facilities can be found at the following locations.
    - *[Insert a clear description of where decontamination facilities are located here.]*
- If you need immediate medical attention, you should go to a hospital that can provide both medical and decontamination services. These are:
    - *[Insert a list of such hospitals and their addresses here.]*
- If you do not need medical attention, and if your journey to a decontamination center is interrupted, go somewhere safe that has a shower.

DECONTAMINATE YOURSELF AS SOON AS YOU REACH THAT SAFE PLACE

- The radiation on you and your clothing is causing harm to you and to people and pets near you.
- Remove your shoes and clothing.
- Put your shoes and removed clothing in a bag. Place the bag far away from people and animals.
- Someone will come to collect your bag of contaminated clothing later.
- Shower at the earliest possible time from head to toe with warm water and mild soap. Cover open wounds to keep wash water out. Use a sponge, wash cloth or soft brush. Wash your head first. Bend your head forward to direct wash water away from your body. Keep wash water out of your eyes, nose, mouth and wounds. Don't damage your skin: keep water temperature on medium, rub gently, and use mild soap. Use shampoo but not hair conditioner because it will make radiation stick to your hair.
- Put on clean clothes.
- If a shower is not available, use a sink and wash as best you can. Pay particular attention to your hair and areas around your mouth, nostrils, and eyes. If no water is available, use moist wipes to clean your hands and face.

DECONTAMINATE YOUR PETS

- Dust off your pet outside while standing upwind to partially remove contamination.
- Wear a dust mask when brushing animals to avoid inhaling radioactive particles.
- Bathe pets thoroughly to remove additional contamination.
- Put your pet in a cage or on a leash if there is any risk of them becoming re-contaminated.

DECONTAMINATE YOUR VEHICLE

- Rinse or wash down your vehicle once out of the danger area.
- *(We recommend that more details about vehicle decontamination be provided here if Bay Area planners decide that the Federal guidance statement here provided is insufficient.)*

THEN GO TO A DECONTAMINATION CENTER

- As soon as possible to be checked for any remaining contamination and further decontamination, if needed, by professionals.

USE TELEPHONES ONLY IF YOU HAVE A MEDICAL EMERGENCY

- (*This assumes the Bay Area OA's have plans, equipment and capability to conduct rescue operations during such an incident both in and around the impacted area*.)
- Call 911 *[insert the conditions under which people should call.]*
- Otherwise, avoid using telephones, including cell phones, to prevent overloading the system and interfering with emergency use.

EVERYONE SHOULD

- Keep listening to this and other media for information and instructions about other actions we will ask you to take in about an hour *[insert the time it will happen here.]* Current radiation levels remain extremely high. They will decline in anywhere from a few hours to a few days.

Improvised Nuclear Device Area Abandonment Full Text Message

NOTE: This message assumes that the Bay Area region adopts the protective action guidelines in: National Security Staff Interagency Policy Coordination Subcommittee for Preparedness & Response to Radiological and Nuclear Threats, 2nd Ed., June 2010 Planning Guidance for Response to a Nuclear Detonation. Washington, D.C. (Note: little if any Federal guidance was provided for the content of this message.) The scenario is based upon the Department of Homeland Security's National Planning Scenario #1, Nuclear Detonation – 10-Kiloton Improvised Nuclear Device.

This is a "Do Not Enter Order" from the chiefs of the Bay Area's fire and police departments, health departments, and city and county government officials.

DO NOT ENTER

- The area affected by radiation from the nuclear explosion that occurred on *[insert date here]* in *[insert location here.]*
- The "Do Not Enter Zone" is defined by the following borders.
    - *[Insert clear and easily identified boarders here.]*
- Stay out of this area until further notice.
- The boundary of this zone is sealed off. The do not enter order is being enforced by *[insert the name of the law enforcement agencies on the zone perimeters.]*

HERE'S WHAT WE CAN TELL YOU NOW

- Some of our nation's best scientists are examining the radioactive contamination in the zone, and they will provide us with their results as they have them.
- Parts of the Do Not Enter Zone are more contaminated than others.
- Areas close to the Do Not Enter Zone are not contaminated and there is no need to avoid them.
- We will keep you informed with up-to-date information as soon as more is learned.

Initial Shelter Improvised Nuclear Device Message

*NOTE: This message is in the Common Alerting Protocol format. When encoded using the CAP 1.2 specification this message should be compliant with the IPAWS Profile version 1.0 (but see Note 1 below). Additional valid CAP 1.2 elements may also be included in the message, but additional **info** blocks should be included only to support multiple languages, not for alternate timeframes or target areas. **Info** blocks in languages other than English should include the corresponding CAP specified language code (e.g., "es-US" for Spanish) in the language element.*

ALERT		
identifier	*[unique message id – automatically assigned by authoring tool]*	
sender	*[unique sender id – pre-assigned to sending agency]*	
sent	*[time message sent – set automatically by authoring tool]*	
status	Actual	
Msg. Type	Alert	
scope	Public	
code	IPAWSv1.0	
		INFO
language	en-US	
category	CBRNE	
event	Nuclear explosion	
Response Type	Shelter	
urgency	Immediate	
severity	Extreme	
certainty	Observed	
Event Code	**Value Name**	SAME
	value	RHW
expires	*[sent time plus three hours]*	
Sender Name	*[Name of agency or entity responsible for this message]* - see NOTE 1	

headline	Nuclear explosion in *[insert location]* – Take shelter indoors!
description	A nuclear explosion occurred at *[insert time of event]* in *[insert jurisdiction where event occurred].* Radiation is in the air, blowing in the direction of the wind, and is falling to the ground. Exposure to radiation can cause illness and even death.
instruction	You can increase your chance of surviving and avoiding injury by going inside the nearest tall building, basement, underground garage or tunnel IMMEDIATELY and staying there until you receive further official instructions. Shelters made of brick, concrete, and earth will give you the most protection. If you are in a different kind of building, stay there unless you can reach a better shelter in a few minutes.

	DO NOT EVACUATE. If you are driving, stop your car and take shelter. You will receive less radiation inside than outside no matter how fast you drive. If you are not in the take-shelter area, STAY OUT. Keep listening to this and other media for official news and instructions, as we will be asking you to take other actions later. Radiation levels are extremely dangerous right now, but they will decline in anywhere from a few hours to a few days. This "Shelter Order" is based on expert advice from nuclear scientists and local, state, and Federal emergency managers. -see NOTE 2	
Parameter	**Value Name**	EAS-ORG
	Value	CIV
		AREA
Area Description	*[Text description of area for which this message is valid]* – see NOTE 3	
polygon	*[Optional CAP-formatted lat/lon polygon describing area for which this message is valid.]*	
circle	*[Optional CAP-formatted circle centered on explosion location, radius to include area for which this message is valid.]*	
geocode	**Value Name**	SAME
	value	*[6-digit FIPS code for county in which this message is vali*

NOTE 1 – FEMA guidance regarding the form of this element for IPAWS is unfinished at the time of this writing. Therefore this template should be reviewed from time to time for current compliance with the IPAWS as implemented.

NOTE 2 – This message does not contain all the known motivators to maximize the probability of timely and appropriate public response. Nor does it contain all the protective actions people should take at this point in time. These gaps should be filled with pre-event public education and the provision of rapid supplemental information after this message is disseminated.

NOTE 3 – This area should be defined in clear and simple language and should include the best available estimate of the fallout area for the initial period until more detailed information becomes available.

NOTE 4 - The message may include multiple geocode elements as required.

Evacuation for Mudflows after Wildfire Message

NOTE: This message is in the Common Alerting Protocol format. When encoded using the CAP 1.2 specification this message should be compliant with the IPAWS Profile version 1.0 (but see Note 1 below). Additional valid CAP 1.2 elements may also be included in the message, but additional info blocks should be included only to support multiple languages, not for alternate timeframes or target areas. Info blocks in languages other than English should include the corresponding CAP specified language code (e.g., "es-US" for Spanish) in the language element.

ALERT		
identifier	*[unique message id – automatically assigned by authoring tool]*	
sender	*[unique sender id – pre-assigned to sending agency]*	
sent	*[time message sent – set automatically by authoring tool]*	
status	Actual	
Msg. Type	Alert	
scope	Public	
code	IPAWSv1.0	
INFO		
language	en-US	
category	Geo	
event	Mudslides	
response type	Evacuate	
urgency	Immediate	
severity	Severe	
certainty	Likely	
Event Code	**Value Name**	SAME
	value	EVI
expires	*[as specified by detection agencies]*	
Sender Name	*[Name of agency or entity responsible for this message]* - see NOTE 1	

headline	Catastrophic Mudflows Imminent in *[location]* - Evacuate Now
description	Heavy rains over the last *[timeframe]* on burnt slopes in *[location]* have destabilized the ground above and beneath buildings and people. Rapidly moving mudslides and debris flows could occur now – large enough to bury homes, roads and people.
instruction	EVACUATE HILLSIDE AREAS under burnt slopes in the warning area NOW to increase your chance of surviving and avoiding injury. Do not delay your departure out of the area for long. Mudslides could occur now and without notice. The amount of rain that has already fallen in the area is enough to start

	catastrophic mudslides. Do not think you are safe if it is not raining where you are now. If you are not in the warning area, STAY OUT. Keep listening to this and other media for official news and information updates. This "Evacuation Order" is from local emergency managers in consultation with weather experts and geologists. -See Note 2	
Parameter	**Value Name**	EAS-ORG
	value	CIV
AREA		
Area Description	*[Text description of area for which this message is valid]* – see Note 3	
polygon	*[Optional CAP-formatted lat/lon polygon describing area for which this message is valid.]*	
circle	*[Optional CAP-formatted circle centered on explosion location, radius to include area for which this message is valid.]*	
geocode	**Value Name**	SAME
	value	*[6-digit FIPS code for county in which this message is valid*

NOTE 1 – FEMA guidance regarding the form of this element for IPAWS is unfinished at the time of this writing. Therefore this template should be reviewed from time to time for current compliance with the IPAWS as implemented.

NOTE 2 – This message does not contain all the known motivators to maximize the probability of timely and appropriate public response. This gap should be filled with pre-event public education and the provision of rapid supplemental information after this message is disseminated.

NOTE 3 – This area should be defined in clear and simple language. If possible use familiar landmarks to communicate unsafe and safe areas.

NOTE 4 - The message may include multiple geocode elements as required.

Evacuation for Near Source Tsunami Message

NOTE: This is in the Common Alerting Protocol format. When encoded using the CAP 1.2 specification this message should be compliant with the IPAWS Profile version 1.0 (but see Note 1 below). Additional valid CAP 1.2 elements may also be included in the message, but additional info blocks should be included only to support multiple languages, not for alternate timeframes or target areas. Info blocks in languages other than English should include the corresponding CAP specified language code (e.g., "es-US" for Spanish) in the language element.

ALERT		
identifier	*[unique message id – automatically assigned by authoring tool]*	
sender	*[unique sender id – pre-assigned to sending agency]*	
sent	*[time message sent – set automatically by authoring tool]*	
status	Actual	
Msg. Type	Alert	
scope	Public	
code	IPAWSv1.0	
INFO		
language	en-US	
category	Geo	
event	Tsunami	
response type	Evacuate	
urgency	Expected	
severity	Extreme	
certainty	Observed	
Event Code	**value Name**	SAME
	value	EVI
expires	*[sent time plus three hours]*	
Sender Name	*[Name of agency or entity responsible for this message]* - see NOTE 1	

headline	Tsunami Waves Imminent in Bay Area - go to high ground now & stay there
description	A large earthquake at *[time]* near *(insert location, e.g., off the coast of Oregon,*

	Washington State, or the Pacific Northwest) has generated a tsunami. The first wave will hit the Bay Area at *(insert time, e.g., which will be in under an hour after the quake)* and will not be the largest. Other waves will strike over many hours. The waves will move onshore very fast, and may reach heights of *(insert heights here, e.g., 20 to 50 feet)* above sea level or higher.	
instruction	GET TO HIGH GROUND NOW of at least *[insert height estimate here]* if you are on a beach or anywhere near a coastline. EVACUATE OUT OF THE AREA if you can reach a safe area that a tsunami will not hit *[insert description of safe area/distance here]* by *[insert time tsunami will hit].* Otherwise, EVACUATE TO AN UPPER FLOOR of a high rise building. If you see the ocean water pull back and expose the sea floor, RUN to high ground as fast as you can since a tsunami will strike in few moments. Once you are in a safe location or at a safe height, STAY THERE until advised it's safe to leave by officials since multiple waves are expected over many hours. If you are not in a tsunami impact area, STAY OUT. Keep listening to this and other media for official news and information updates. This "RELOCATION ORDER" is from local emergency managers based on information from scientists at the Pacific Tsunami Warning Center. -see NOTE 2	
Parameter	**Value Name**	EAS-ORG
	Value	CIV
AREA		
Area Description	*[Text description of area for which this message is valid]* – see Note 3	
polygon	*[Optional CAP-formatted lat/lon polygon describing area for which this message is valid.]*	
circle	*[Optional CAP-formatted circle centered on explosion location, radius to include area for which this message is valid.]*	
geocode	**Value Name**	SAME
	Value	*[6-digit FIPS code for county in which this message is valid*

NOTE 1 – FEMA guidance regarding the form of this element for IPAWS is unfinished at the time of this writing. Therefore this template should be reviewed from time to time for current compliance with the IPAWS as implemented.

NOTE 2 – This message does not contain all the known motivators to maximize the probability of timely and appropriate public response. This gap should be filled with pre-event public education and the provision of rapid supplemental information after this message is disseminated.

NOTE 3 – This area should be defined in clear and simple language. It would be different for each Bay Area county/OA. County-specific run up zones are available on-line with CalEMA and clear descriptions of these for each county should be prepared now and inserted into county-specific message templates as

follows: If you are in *[insert county name here]* the tsunamis will likely strike the following areas *[insert a simple description of county-specific run up zones]*.

NOTE 4 - The message may include multiple geocode elements as required.

Explosion at a Dam (possible sabotage) Initial Message

NOTE: This message is in the Common Alerting Protocol format. When encoded using the CAP 1.2 specification this message should be compliant with the IPAWS Profile version 1.0 (but see Note 1 below). Additional valid CAP 1.2 elements may also be included in the message, but additional info blocks should be included only to support multiple languages, not for alternate timeframes or target areas. Info blocks in languages other than English should include the corresponding CAP specified language code (e.g., "es-US" for Spanish) in the language element.

ALERT		
identifier	*[unique message id – automatically assigned by authoring tool]*	
sender	*[unique sender id – pre-assigned to sending agency]*	
sent	*[time message sent – set automatically by authoring tool]*	
status	Actual	
Msg. Type	Alert	
scope	Public	
code	IPAWSv1.0	
INFO		
language	en-US	
category	CBRNE	
event	Explosion at Dam	
response type	Monitor	
urgency	Immediate	
severity	Likely	
certainty	Observed	
Event Code	**Value Name**	SAME
	value	CEM
expires	*[sent time plus three hours]*	
Sender Name	*[Name of agency or entity responsible for this message]* - see NOTE 1	

headline	Explosion at *[insert name]* Dam – People in possible flood area should listen for urgent information updates
Description	An unexpected explosion occurred at *[insert time]* at *[insert the name of the dam and where it is located]*. The explosion may have damaged the dam. The dam is being examined by engineers to determine if it is in danger of failing. If the dam fails, it could result in a catastrophic and fast moving flood.
Instruction	There is no need to evacuate at this time, but people immediately downstream from the dam should PREPARE TO EVACUATE if necessary by gathering items that you will want to take with you if it becomes necessary. These items include medicines, food and water, prescription information, baby and pet supplies, clothing, personal hygiene items, cash, identification and important papers, bedding, and other items such as a portable radio, and insurance papers. KEEP LISTENING to this and other media for urgent information updates. You

	will be given new information about the condition of the dam as it becomes available. If an evacuation becomes necessary, you will be notified immediately and given important evacuation information about what to take with you and how to get to safe areas. If you are not in the potential flood zone, STAY OUT. This "Advisory" is from the dam operators and local emergency managers. -see NOTE 2	
Parameter	**Value Name**	EAS-ORG
	Value	CIV
AREA		
Area Description	*[Text description of area for which this message is valid]* – see Note 3	
polygon	*[Optional CAP-formatted lat/lon polygon describing area for which this message is valid.]*	
circle	*[Optional CAP-formatted circle centered on explosion location, radius to include area for which this message is valid.]*	
geocode	**Value Name**	SAME
	Value	*[6-digit FIPS code for county in which this message is va*

NOTE 1 – FEMA guidance regarding the form of this element for IPAWS is unfinished at the time of this writing. Therefore this template should be reviewed from time to time for current compliance with the IPAWS as implemented.

NOTE 2 – This message does not contain all the known motivators to maximize the probability of timely and appropriate public response. Pre-event public education containing a public evacuation checklist would enhance public compliance were such an instruction issued during an actual event.

NOTE 3 – This area should be defined in clear and simple language based on existing maps of the area that could flood in the event of dam failure.

NOTE 4 - The message may include multiple geocode elements as required.

Anthrax Release Shelter Message

NOTE: This message is in the Common Alerting Protocol format. When encoded using the CAP 1.2 specification this message should be compliant with the IPAWS Profile version 1.0 (but see Note 1 below). Additional valid CAP 1.2 elements may also be included in the message, but additional info blocks should be included only to support multiple languages, not for alternate timeframes or target areas. Info blocks in languages other than English should include the corresponding CAP specified language code (e.g., "es-US" for Spanish) in the language element.

ALERT		
Identifier	*[unique message id – automatically assigned by authoring tool]*	
Sender	*[unique sender id – pre-assigned to sending agency]*	
Sent	*[time message sent – set automatically by authoring tool]*	
Status	Actual	
Msg. Type	Alert	
Scope	Public	
Code	IPAWSv1.0	
INFO		
Language	en-US	
Category	CBRNE	
Event	Anthrax – dispersal	
Response Type	Monitor	
Urgency	Immediate	
Severity	Extreme	
Certainty	Observed	
Event Code	**Value Name**	SAME
	Value	SPW
Expires	*[sent time plus three hours]*	
Sender Name	*[Name of agency or entity responsible for this message]* - see NOTE 1	

Headline	Anthrax disease is in the air – Follow instructions about getting medication! – see NOTE 2	
Description	Anthrax is in the air in the Bay Area. It is a deadly disease if not treated. Infection can occur if it is breathed in, contaminated food is eaten, or through an open cut or wound. People sick with anthrax have flu-like symptoms. You cannot catch anthrax from people who are sick.	
Instruction	EVERYONE IN THE BAY AREA SHOULD FOLLOW INSTRUCTIONS ABOUT GETTING AND TAKING ANTHRAX MEDICINE. This includes everyone in *[insert county names here].* Anthrax is a deadly disease. We do not know how it got in the air, or if some areas are more dangerous than others. Public health departments will give free medicine to EVERYONE. You could get very sick or die if you do not take the medicine. Listen to the media for instructions about how to get medicine for yourself and family members. If you have been in the affected counties over the last [*insert number of hours here]* but are not there now, *[insert clear but brief instructions about what these people should do here—perhaps call the local county health department in their current location.]* If you leave the area and go somewhere else before you get the medicine *[insert clear but brief instructions about what these people should do here.]* If you are not in the area now, STAY OUT. Going there could expose you to anthrax. This "Get Medicine and Take It Order" is based on advice from the Centers for Disease Control, the Office of Homeland Security, County health officials and local emergency managers. -see NOTE 3	
Parameter	**Value Name**	EAS-ORG
	Value	CIV
AREA		
Area Description	*[Text description of area for which this message is valid]*	
Polygon	*[Optional CAP-formatted lat/lon polygon describing area for which this message is valid.]*	
circle	*[Optional CAP-formatted circle centered on explosion location, radius to include area for which this message is valid.]*	
Geocode	**Value Name**	SAME
	Value	*[6-digit FIPS code for county in which this message is valid]*

		-see NOTE 4

NOTE 1 – FEMA guidance regarding the form of this element for IPAWS is unfinished at the time of this writing. Therefore this template should be reviewed from time to time for current compliance with the IPAWS as implemented.

NOTE 2 – Different anthrax scenarios may require different public protective actions sequences. This message was written based one of these scenarios and information we were provided by Bay Area public health officials.

NOTE 3 – This message does not contain all the known motivators to maximize the probability of timely and appropriate public response. Nor does it contain all the protective actions people should take at this point in time. These gaps should be filled with pre-event public education and the provision of rapid supplemental information after this message is disseminated.

NOTE 4 – The message may include multiple geocode elements as required.

Earthquake as Foreshock Warning Message

NOTE: This is in the Common Alerting Protocol format. It is not formatted for distribution over the IPAWS/EAS system. Additional valid CAP 1.2 elements may also be included in the message, but additional info blocks should be included only to support multiple languages, not for alternate timeframes or target areas. Info blocks in languages other than English should include the corresponding CAP specified language code (e.g., "es-US" for Spanish) in the language element.

ALERT	
identifier	*[unique message id – automatically assigned by authoring tool]*
sender	*[unique sender id – pre-assigned to sending agency]*
sent	*[time message sent – set automatically by authoring tool]*
status	Actual
msg. type	Alert
scope	Public
INFO	
language	en-US
category	Geo
event	Earthquake
response type	Prepare
urgency	Expected
severity	Extreme
certainty	Observed
expires	*[sent time plus three hours]*
Sender Name	*[Name of agency or entity responsible for this message]* - see NOTE 1

headline	Today's Earthquake Raises Odds of a Great Quake Happening Sometime in Next 72 Hours – get ready now
description	Today's *[insert magnitude]* magnitude earthquake has raised the probability of a Great Earthquake of *[insert estimated magnitude here]* in the Bay Area sometime within the next *[insert number of hours here]*. The odds of such a quake are typically 1 in *[insert estimated number reported buy UGSG here].* Scientists have raised those odds to 1 in *(insert estimated number reported by the USGS here)* for the next *[insert number here]* days.
instruction	PREPARE FOR A LARGER EARTHQUAKE in the next *[insert estimated number here]* days. Even if doesn't occur, there will be aftershocks from today's quake and some of them will be large. There are many things that you should do to get ready for a larger quake and aftershocks from today's earthquake. Here are some of them. Identify objects that

	could injure you in your home and sources of gas and electrical fires and fix them. Gather emergency supplies and water. Check for weakened parts of your house or building from today's quake and avoid them. PROTECT YOURSELF during aftershocks and the bigger earthquake with DROP, COVER, AND HOLD ON. A larger quake would affect a larger area than today's quake and cause more extensive damage. Keep listening to this and other media for official news and information updates. This "Advisory" is from earthquake scientists and local emergency managers. -see NOTE 2	
AREA		
Area Description	*[The entire Bay Area and beyond]* – see Note 3	
polygon	*[Optional CAP-formatted lat/lon polygon describing area for which this message is valid.]*	
circle	*[Optional CAP-formatted circle centered on explosion location, radius to include area for which this message is valid.]*	

NOTE 1 – FEMA guidance regarding the form of this element for IPAWS is unfinished at the time of this writing. Therefore this template should be reviewed from time to time for current compliance with the IPAWS as implemented.

NOTE 2 – This message does not contain all the known motivators to maximize the probability of timely and appropriate public response. Nor does it contain all the protective actions people should take at this point in time. These gaps should be filled with continued pre-event public education and the provision of rapid supplemental information after this message is disseminated.

NOTE 3 – This area would include a much larger geographical area than was affected by the earthquake just experienced. It would include all of the OAs in the Bay Area.

NOTE 4 - The message may include multiple geocode elements as required.

Appendix D
Warning Practices

The following warning practices section provides background information on the complex process of issuing public warnings. These practices do not set out a prescriptive set of actions and do not impose any affirmative duty to take any particular action or inaction when it comes to issuing warnings to the public. These practices are not an operational guide. They are for situational awareness purposes only.

Where Warnings Come From

Requirements and messages for particular warnings come from two types of sources: external and internal.

External: These are agencies or entities outside the immediate community that have expert knowledge of some particular hazard and an established relationship of expectations with local agencies. Examples include the National Weather Service, the Alaska Tsunami Warning Center, the National Counter Terrorism Center, petrochemical and other hazardous industrial operators, and numerous others. External sources provide information about impending hazards and frequently also supply recommended warning messages. They generally have well-developed operating procedures for warning within their particular domain of expertise. They may have their own warning dissemination channels, in addition to local or regional warning systems. However, they do not have authority over local warning systems, nor are they responsible for local public safety beyond their notification responsibilities. A special case of an external warning source is an adjacent jurisdiction. Neither natural nor man-made hazards can be counted on to respect political or administrative boundaries. As a result, an instantaneous capability for warning across multiple jurisdictions is often required.

Internal: These are "insiders" within an agency, an incident command, or an emergency operations center. Frequently, these are response personnel in the field from police, fire or public health agencies. Internal sources generally have direct responsibility for the public welfare well beyond the activity of warning. They may have a detailed understanding of local conditions and first-hand knowledge of events and trends. However, they are only rarely expert in public warning practice and may need immediate assistance in order to use available warning capabilities effectively.

Many long-standing warning systems, particularly ones that rely on broadcast media, are designed primarily for the dissemination of warnings from external sources. More recent warning systems (e.g., many telephone notification systems) tend to be oriented toward distributing warnings from internal sources. The absence of an active effort to integrate both types of warning sources across all warning output sub-systems, can create inconsistencies in messaging that can undermine warning effectiveness.

Why Warnings Fail

Warning systems are complex systems that weave together different organizations and the people who work in them and often use multiple technologies. When combined, the organizations, people, and technologies have the end goal of reaching and motivating an at-risk public to take timely and effective protective actions. Research has documented that warning systems have a high probability of experiencing failures since they are inherently unreliable. This is because it is inherently difficult to effectively weave together the behavior of disparate organizations and agencies--and the people who work in them--across an often complex web of varied government levels.

To complicate matters further, in order to effectively communicate with others across organization boundaries, warning systems tend to rely on people who may rarely communicate with each other. Many of the individual actors in the system may focus on their individual jobs alone, and more often than not no one is in charge of viewing and managing the multi-organizational, multi-agency, multi-government level warning system as a whole. The result is that effective communication links between organizations and people in the system break down or fail completely, with the unfortunate result of increased loss and injury among the at-risk public.

The probability of warning system failures increase as the complexity of the system increases. A warning system that weaves together multiple warning input, output and control sub-systems across multiple jurisdictions for multiple hazards complicates things exponentially, as does the probability of such a system experiencing a failure somewhere when used. Enhanced technology coupled with robust incident management systems such as the Standardized Emergency Management System and related and tested multi-jurisdictional operational plans, e.g. the Bay Area's Regional Emergency Coordination Plan, may decrease the odds of failure, but the inherent complexity of such warning systems creates inherent risk of failure in a multi-jurisdictional emergency response.

The research record on communication from risk detectors—those who detect a hazard such as the National Weather Service, an intelligence officer, a county health officer, etc. -- to local warning managers in the warning system, catalogues a set of historical reasons for communication failures between these two types of actors, regardless of the involved type of hazard:

- **Failures involving the communication link**:
    - Risk detectors do not know with whom to communicate at the local level and/or do not perceive that they have the authority to do so.
    - Fail safe, mutually exclusive, and redundant channels of communication between detectors and local warning managers do not exist and the existing communication channel(s) fails.

  - Mutually agreed-to and complete protocols are absent, resulting in less than optimal communication.
  - Communication protocols exist but inadequate training for risk detectors results in sub-optimal communication.
  - The communication link is based on incompatible technology.
  - The communication link is one directional and flows from risk detectors to local warning managers without an effective way for warning managers to ask and get answers to questions.
- **Failures involving bypassing the established link**:
  - Risk detectors bypass local warning managers and directly communicate with the local public with conflicting public information.
- **Failures involving what is communicated and when**:
  - Risk detectors communicate to local warning managers using words, jargon and/or in ways that local warning managers find difficult to understand.
  - Risk detectors communicate less (or more) information than local warning managers require in order to make informed decisions.
  - Risk detectors communicate too late providing local warning managers too little time to do their job.

A warning must first be issued in order to have an effect. Yet recent history is full of examples, from the Virginia Tech shootings to the Indian Ocean Tsunami, in which a potentially life-saving alert was possible and yet was not delivered to the people at risk.

Through experience, a number of recurrent "failure patterns" have emerged that can render the most advanced and expensive warning technology useless. None of these involve personal failures by irresponsible or incompetent individuals. Instead, they represent systemic failures that make effective warning difficult or even impossible. They include:

- Tall Chains of Execution: So many levels of approval and review are required that a warning is delayed until it is no longer useful.

- Lack of Policy Top Cover: Fearful of the ramifications for themselves, and lacking clear guidance on when a warning should be issued, responsible officials elect not to take the risk.

- Undefined Authority: There being no clear assignment of responsibility for issuing warnings, the personnel with information about an immediate hazard take no action, assuming that somebody else will take care of the warning aspect.

- Multiple and/or Changeable Activation Procedures: While striving to follow science-based policy by using multiple warning output sub-systems, responsible

officials are confronted with a time-consuming and complex array of redundant procedures for activating individual systems, or find that the tools they expected to use have changed due to vendor upgrades or new additions.

- Lack of Expertise and Support: Although they would like to issue a warning, the responsible personnel lack confidence in their ability to use the available warning capabilities properly and have nowhere to turn for immediate assistance.

- Confusion of Mechanics with Policy: Warning system procedures address the mechanical steps of issuing a warning, but are unclear or silent on questions of when and how the warning system should be used.

- Uncertainty Anxiety: Concerned about appearing indecisive or uninformed, responsible officials delay issuing warning because there is some degree of uncertainty about the situation, or they inflate the certainty of the hazard information in their messages.

- Inflexible Procedures / Lack of Basic Principles: Warning system policy is expressed in terms of specific scenarios, which leaves the responsible officials without guidance when a different or unexpected situation arises.

Defining Warning Success

In any cooperative effort, it is crucial to have a shared understanding of "what success looks like." Discussions of warning system strategy often get sidetracked because different participants have different objectives or are using different metrics to evaluate options and activities.

Public warning systems are often evaluated in one of three ways. The first perspective holds that the appropriate measure of success is an improved outcome for the community; this is a laudable ideal but can be difficult to evaluate objectively. A second view takes information transfer to the target audience as the standard of performance; this metric is relatively easy to measure but doesn't necessarily satisfy those who aspire to actually reduce losses.

A third, more pragmatic approach treats public compliance with protective action recommendations as the practical goal of public warning. People evacuating when they're asked to evacuate, sheltering in place when that's the recommendation, or even just refraining from some activity for a time—these are observable behaviors that incident commanders and emergency managers hope to elicit in service of the larger goals of reducing harm and improving outcomes. Warnings that achieve this pragmatic objective can be described as "effective."

When to Warn

Local emergency communication plans should contain clear procedures for emergency public information and warning providers to follow. These plans should include trigger points *when warning information containing protective action recommendations* would be made public by emergency public information and warning providers. Trigger points for public protective action recommendations may be similar across some hazards, but different for others. The public protective action trigger point may indicate a single action, for example, in the case of evacuation for a mudslide, or sequenced actions as in the case of radiation exposure reduction after a nuclear detonation. For example, shelter in-place for the first hour, then shelter in a particular building type for the first day, and then evacuate.

Plans should outline a process by which information from risk detectors is converted to information that can be used by local emergency public information and warning personnel to inform the public regarding an array of hazards – terrorist incidents, natural disasters and human-caused accidents, etc. Local emergency public communication plans should also contain clearly specified criteria about when public warnings recommending each different, but possible, public protective action for each hazard should be issued.

Appropriate protective actions should be made by technical experts, e.g., radiation health physicists in the case of hazards involving radiation. However, the social science research record is filled with cases in which public warnings containing protective action recommendations have been delayed because planned trigger points for public warning dissemination were absent from emergency public communication plans, resulting in increased loss and injury.

Finally, when determining when to issue a warning, emergency public communication personnel must also consider those not at risk from the hazard. People not at risk also need information in emergencies. For example, "shadow evacuation" is a well-documented phenomenon that refers to safe people evacuating when there is no real reason for them to do so. This can be a problem when shadow evacuees slow evacuation time for people at risk and delay their reaching safety. This can only be addressed by emergency communications to people not at risk that explains why they are safe and no action on their part is needed.

How Warnings Are Generated

The increasing variety of warning delivery options in recent years has had several beneficial effects on how warning systems are used. There has been a broad trend away from building hazard-specific warning systems and toward all-hazard utilization. This has been driven largely by the need to pool resources in order to afford new warning system investments. However, it has led to greater consistency in how warnings of all types are presented to people in any given community.

Warning messages increasingly are written to fit a wide variety of warning output sub-systems rather than being tailored to a particular warning technology or product. This is

another regard in which the growing adoption of the CAP for generating warnings has increased the interoperability of warning systems by providing a template for an "ideal" warning message that can be adapted in real time to the particular character of each particular delivery medium.

Warning delivery sub-systems are increasingly able to target warnings to relatively small geographic areas, sometimes as small as a city block. This has had the effect of making public warning systems, once reserved for the most dire and extreme threats, usable on a much more frequent basis for less severe localized hazards.

The growing variety of primary warning media has created both an opportunity and a challenge for warning managers. Quick, concurrent delivery of a consistent message through multiple primary media can enhance warning effectiveness, mitigate the risk of warning system failure, and help inform secondary dissemination. On the other hand, effective use of public warning systems is no longer a simple checklist-driven procedure.

How Warnings Get Delivered

Once the decision is made to issue a warning to the public, or to some segment of the public, and the warning message is generated, there are a variety of ways that warnings can be distributed to the public. Capabilities vary from place to place and new methods of warning delivery are constantly emerging. However, these can all be gathered into two general classes:

Primary Media: Sometimes called "official" warning output sub-systems, these are means by which a single source can get a message to a relatively large number of recipients. Examples include the Emergency Alert System and NOAA Weather Radio, sirens and in-building devices, etc. Although these mechanisms vary greatly, they all take a common message and deliver it to a number of recipients.

Secondary Media: Also known as "word of mouth" or "milling," this is the dissemination of warnings one-to-one among the public, frequently in person, by telephone or via "social media." This secondary sharing of warning messages is of crucial importance. Not only can it enhance the effectiveness of warnings delivered through primary media, it can be of great importance in extending the reach of warning messages to people who didn't get the "direct" warning, including non-English speakers and people isolated from conventional media by sensory disability.

Appendix E
Record of Changes

The primary responsibility for recording changes to the *Strategy* will rest with the regional EPI&W Program Manager or his/her designee. Until such time as there is such a Program Manager the responsibility to update the *Strategy* will reside with the Bay Area UASI General Manager or his or her designee. In all cases, regardless of the individual making a change, the EPI&W Program Manager shall maintain the master copy of the *Strategy*.

The following table tracks the significant changes made to the *Strategy*. Revisions that should be documented include the following:

- Completion of a project or addition of a new project.
- Addition or re-prioritization of goals and objectives following a capabilities assessment or similar analysis.
- Changes in regional organization.
- Changes in purpose, vision, or mission.
- Other necessary changes.

Date of Change	Brief Description of change	Individual making the change