FIRESCOPE

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TO: FIRESCOPE Board of Directors
23300 Castle Street
Riverside, CA 92518-2200

FROM: CAD-to-CAD Subcommittee / Emerging Information Technologies Specialist Group

SUBJECT: RESOURCE DEPLOYMENT AND INFORMATION SHARING INTEROPERABILITY

SUMMARY

The California Fire Service has seen a significant increase in the use of the mutual aid system over the last decade in response to large scale disasters. The ability to track and deploy resources and to share critical incident information amongst the responding agencies has significant capability gaps.

Knowledge of the real-time location of available and responding fire resources is often fragmented and siloed by agencies. Decision-makers and incident managers do not have full access to view the location and status of all resources responding or assigned to an incident. This information should be viewable in a common platform or on the incident management tool. This capability would increase the understanding of resource strength, location of responding resources, and location of resources while assigned to an incident.

The current ability for decision-makers and first responders to understand the essential elements of information about an incident is often difficult to locate when responding to a mutual aid incident. Many first responders obtain critical information from mobile data computers connected to computer-aided dispatch systems during normal operations within their jurisdiction. First responders do not always have the same level of situational awareness about an incident when responding outside their normal operating area. Access to improved situational awareness would increase understanding of the incident and improve the safety of both first responders and the public.

Both of these capability gaps have technology solutions available to support the mutual aid system. Solutions include existing Computer-Aided Dispatch (CAD) systems, CAD-to-CAD connections, Hub to Hub systems, standardized emergency incident data exchange, and situational awareness mapping applications. There are many challenges to developing a shared approach to real-time resource status and location services and improving access to shared situational awareness. Challenges include fiscal issues, policy development, sustainment of technology, interoperability of technology solutions. As changes are implemented, end-users understand that complete interoperability occurs along a continuum that allows individual agencies to adapt at a feasible pace for their agency.

RECOMMENDATIONS

1. Develop the capability to share real-time resource type, status, and location of all fire resources in a format that can be viewed in either a shared or compatible platform.

2. Adopt a standard data exchange format for sharing emergency incident data between CAD systems. For example, the NENA/APCO Emergency Incident Data Exchange Document.
3. Identify solutions for interagency network connectivity to share emergency incident data. For example, investigate the feasibility of using the ESInet network (State 911) to connect CAD systems.
4. Develop standards for interoperability between situational awareness applications for enhanced information such as incident management details and other map services.
5. Work with CAL OES to investigate the feasibility of AB911 to support the use of the ESInet network to support data sharing.

IMPLEMENTATION PLAN

After review by the FIRESCOPE Board of Directors, strategies for implementation of the recommendations should be identified. This could include a steering committee with appropriate stakeholders to develop a work plan for implementation.

FINDINGS

A review of the various technology solutions and information sharing systems has identified the following components and systems that could significantly reduce the current capability gaps.

RESOURCE DEPLOYMENT AND INFORMATION SHARING INTEROPERABILITY

A modern CAD architecture with a combination of situational awareness tools increases interoperability among agencies and provides a higher level of service and a safer delivery model. Options to increase the level of information sharing and resource deployment amongst agencies exist but are restricted by a set of challenges. Some of these challenges are unique to each agency, and some are outside of their control. The solution to overcoming these issues comes from a combination of fiscal, policy, governance, technological, and cultural navigation by responding agencies and private sector vendors. This transition from the current state to the future state must occur along a continuum as both emergency service providers and private sector vendors' transition from a legacy to a modern CAD architecture.

CAD

A CAD system is a resource deployment tool that is responsible for dispatching resources and maintaining records of an event through a combination of human input and automation. Information shared with responding units can vary, but generally includes a predefined template of information. Any additional information provided is often the product of a situational awareness tool.

The most basic CAD system receives input into a console before transmitting data to the responding unit terminal. This transmission of data can occur across a variety of methods ranging from radio frequencies to cellular networks. A more robust CAD system takes advantage of technologies such as GIS/AVL integration to monitor vehicle location, a mobile client, and a bi-directional data feed. Information shared from the CAD system can be sent directly to any combination of tablets, phones, or personal computers. These advances enable the ability to monitor vehicle location, dispatch the closest resource, and generate two-way communication between the dispatching and responding entities.

A CAD system should have a minimum set of elements of information shared between the CAD systems. The sharing of these elements information between CAD systems would allow responders to view the information within their standard mobile data computer (MDC) applications on their apparatus. Examples of the type of data shared include.

1. Incident number
2. Incident address
3. Incident type
4. Initial attack communication plan
5. Pertinent comments or notes
6. Premise information
7. Reporting party information
8. Radio ID's for responding units
9. Real-time resource location
10. Responding unit crew members
11. Messaging between units and dispatching entity

CAD-to-CAD

An effective way to increase interoperability via resource sharing is through a CAD-to-CAD interface. The two methods of linking disparate CAD systems together are Point-to-Point or through a Data Exchange HUB (DEH). In both scenarios, one CAD alerts another CAD with a list of pre-identified information to be shared. For these systems to integrate seamlessly, disparities in software, hardware, and servers must be overcome.

Point-to-Point

A Point-to-Point CAD system is the legacy method of connecting two CAD systems. This method has restrictions as it is difficult to connect more than two agencies. Point-to-Point CAD systems can operate as a one-way feed, or bi-directionally. The Point-to-Point method of connecting CAD systems is most practical when there are only two CAD's, and both are by the same vendor.

Data Exchange HUB

A data exchange HUB is the modern method of connecting multiple disparate CAD systems. All CAD systems exchange data, with the HUB being the central point of disbursement. This method allows the connection of disparate CAD systems, as well as bi-directional feeds. A HUB based system is the most practical and efficient way to increase interoperability amongst agencies.

HUB-to-HUB

The next step along the continuum of interoperability and resource deployment would be a HUB-to-HUB system. This type of architecture affords the ability to scale upwards and increase interoperability amongst multiple operational areas and statewide mobilizations.

Situational Awareness Mapping Applications

The CAD-to-CAD emergency incident data exchange in a CAD-to-CAD system only provides a minimum set of elements of information. Situational awareness mapping applications can provide a higher-level incident management detail and other relevant data. Examples of data that is typically found in situational awareness applications include:

Resource Deployment

Resource deployment is the primary function of a CAD system. The system captures information through automation and human input, then identifies the necessary resources needed to respond to a given incident type. Resource availability is accessed, and the appropriate resources are dispatched.

1. Incident Management Details

    a. Incident impact area (fire perimeter)
    b. Evacuation information
    c. Command Post location
    d. Staging location
    e. Divisions/Branches
    f. Base camp location
    g. Communications Plan
    h. Incident Action Plan

2. Other Map Services

    a. Resource location services
    b. Sensor data
    c. Jurisdictional Boundaries
    d. Fire Responsibility Areas
    e. Land ownership
    f. Cameras
    g. Fire progression models
    h. Weather
    i. Natural hazard data
    j. Pre-Incident Planning

The efficiency of resource deployment varies both locally and across operational areas as agencies have a variety of factors that influence the deployment of resources.

Historically, responsibility areas within a given geographical area are divided into sectors of emergency and administrative responsibility. Divided sectors create a shared load and account for variables such as population density, response time, call types, and call frequency. As agencies integrate a GIS/AVL functionality into their CAD system, sector responsibility areas are traded in for closest available resource. Closest available resource dispatch provides a better service to the community by enabling the closest appropriate resources to respond, ultimately reducing response times.

Integrated CAD-to-CAD systems use a combination of response profiles to shorten emergency response times in an operational area that is comprised of multiple agencies. These profiles take advantage of dropped jurisdictional boundaries and tiered response priorities to determine the closest and most

appropriate resources to respond. Dropped boundaries and closest resource response criteria have created a response time savings on average of up to two minutes in the case of the San Diego County Operational Area.

Information Sharing

FIRESCOPE ICS-1401 outlines minimum standards and expectations for common operating picture and data sharing within the fire service. This document references, “Standards set forth by the National Emergency Number Association and the Association of Public-Safety Communications Officials (NENA/APCO) Emergency Incident Data Document (EIDD) working group, which is established to initiate the process of creating a National Information Exchange Model (NIEM) conformant, American National Standard (ANS) that will be used to share emergency incident information between and among authorized entities and systems.” It also recommends a common minimum data set to share regardless of what software platform is being used.

Agencies and vendors should continue to work towards conforming to these standards and expectations. As uniformity and agnostic data platforms increase, the continuum of interoperability will move further forward.

Challenges

Progression along the continuum of resource deployment and information sharing interoperability presents challenges. Fiscal, cultural, policy, governance, and technological challenges are shared by responding agencies, and private vendors. These challenges exist at the local, state, and federal levels.

As CAD systems become antiquated, it is costly for agencies to fund the purchase of an entire CAD replacement. Modern CAD architecture includes hardware, software, and servers, often with the added expense of device licensing and subscription costs. Local agencies have to budget for the capital expenditure of a CAD system through normal or creative fiscal channels. As the continuum progresses, agencies that are part of an operational area and regional CAD systems will have to establish a cost-sharing plan.

Policies drive operational decisions and can become convoluted as multiple agencies begin to respond to adjoining jurisdictions. Neighboring agencies may have different terminology, response profiles, operational policies, and standards. Coordination amongst agencies requires flexibility and a willingness to change long-standing policies and procedures.

With the ultimate goal of interoperability, governance and sustainment prove to be a recurring draw on time and resources. Program ownership, maintenance, responsibility, contribution, and cost-sharing are decision points that present challenges as interoperability scales up from the local level to the operational area, and then to the state level.

Challenges associated with technology and interoperability exist but can be resolved. There are several different CAD and situational awareness solutions to overcome the challenge of interoperability, but these systems are proprietary and lack a set of common data standards. There are currently no agnostic solutions that will allow the architecture of one CAD to operate seamlessly with a disparate CAD system.

The solutions that exist to connect disparate CAD systems come with a high cost as there is not currently a demand for private industry to accommodate an agnostic solution.

Solutions to these challenges exist in varying degrees. A bottom-up approach is the most efficient way to limit drag on agencies that are already implementing successful systems. It is essential to understand that these challenges can be addressed independently but will gain exponential momentum towards interoperability with a wholesome approach.

CONCLUSION

Resource deployment and information sharing are fundamental components in the pursuit of increased interoperability amongst fire emergency service agencies. A modern CAD architecture with a combination of situational awareness tools increases interoperability amongst agencies, as well as provides a higher level of service and a safer delivery model. Options to increase the level of information sharing and resource deployment amongst agencies exist but are restricted by a set of challenges. Some of these challenges are unique to each agency, and some are outside of their control. The solution to overcoming these issues comes from a combination of fiscal, policy, governance, technological, and cultural navigation by responding agencies and private sector vendors. This transition from the current state to the future state must occur along a continuum as both emergency service providers and private sector vendors work to transition from a legacy to a modern CAD architecture.

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Incident Information Interoperability Continuum

Governance	Limited Leadership, Planning, and Collaboration Among Areas with Minimal Investment in the Sustainability of Systems and Documenation.		Indivdual Agencies Working Independently	Informal Coordination Between Agencies	Key Multi Discipline Staff Collaboration on a Regular Basis	Regional Committee Working within a Statewide Information Interoperability Plan Framework		High Degree of Leadership, Planning, and Collaboration Among Areas.
SOP's			Individual Agency SOP	Joint SOPs for Emergencies	Regional Set of SOPs	Statewide SOPs		
Technoloy		CAD	Individual Agency Dispatch	Multi-Agency Dispatch Center	CAD-to-CAD Op Area	CAD-to-CAD Region to Region		
		SA	Individual Deployment	Agency Deployment	Op Area / Region Deployment	Statewide Deployment		
Training & Exercise			Individual Agency Training	Joint Training Amongst Op Area	Regional Training	Statewide Training		
Usage			Notification Only	Localized Emergency Incidents	Regional Incident Management	State Incident Management	Federal Incident Management	
Fiscal			No Identiifed Funding Source	Local Funding	Regional Funding	State Funding Source	Federal Funding Source