Current Status of Computer-Aided Dispatch Interoperability

Final Report

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
NATIONAL 911 PROGRAM

July 2022

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Executive Summary

Improved data communications between emergency communications centers (ECCs) and first responders, and across jurisdictions, are vital to agency response and improved life-safety outcomes. There is little data sharing between jurisdictions, which has had a detrimental effect on emergency response. Particularly with multijurisdictional events, the lack of data sharing affects surrounding communications centers' abilities to provide coordinated responses and assistance.

The National 911 Program (Program), housed within the National Highway Traffic Safety Administration (NHTSA) Office of Emergency Medical Services, recognizes there are challenges to achieving computer-aided dispatch (CAD) system interoperability and seamless data sharing. The Program commissioned the CAD Interoperability Project to study CAD interoperability and determine what solutions might be implemented to further seamless data sharing nationwide. Mission Critical Partners, LLC (MCP) was awarded this project.

To study this problem, the Program gathered a group of stakeholders representing ECCs from across North America to participate in a symposium and discuss their experiences, successes, and challenges concerning CAD data interoperability. The stakeholders identified many obstacles to seamless interoperability, including the overall cost and complexity of building a bi-directional interface to another CAD, but also identified the following as primary obstacles to interoperability:

- Funding
- Lack of standards and standards enforcement
- Political reasons/jurisdictional boundaries
- Lack of a common language, policies, or procedures
- Resistance to change
- Refusal to share data
- Poor governance or a lack of governance

To further study the interoperability problem, a diverse group of industry representatives (i.e., solution providers) was invited for a second symposium to gain their perspectives and discuss potential solutions. The stakeholders participated in this second symposium as well. Like the stakeholders, the solution providers identified many obstacles to data interoperability. Some of the primary obstacles identified by the solution providers are:

- Lack of standards and standards enforcement
- Disparate CAD systems
- Unique operational requirements
- Agencies refusal to share data
- Resistance to change
- Poor governance or a lack of governance

Lack of standards and standards enforcement was a frequent topic of discussion during both symposiums. Although most solution providers believe that standards are needed, the solution providers were clear that standards alone are not enough. The solution providers and stakeholders agree that applying a standard to every ECC in the country is unrealistic in the near term.

An open discussion was conducted regarding the use of data exchange hubs. Many solution providers agreed that, at the very least, it would be a good start or had a strong possibility of enabling data sharing. Most of the solution providers also agreed that a state-sponsored data exchange hub could be a potential solution and that a federally sponsored vendor-agnostic solution would be an acceptable solution to the vendor community as opposed to a vendor-supplied hub.

Although the stakeholders and solution providers had differing views on many subjects, both groups were in alignment that the following are obstacles to data sharing:

- Public safety answering point (PSAP) leadership and the decision-making slow progress
- Lack of standards and standards enforcement
- Funding
- Lack of federal or state oversight to enforce standards
- Unwillingness of some agencies to share data
- Workflow expectations among agencies
- Politics and jurisdictions not getting along
- Disparate CAD systems with disparate levels of functionality

The groups' opinions were not aligned in the following areas, which were driven by the solution providers' experience in the CAD marketplace:

- Competing priorities among vendors
- Customer demand is not there
- Operational demands by clients are different for every CAD deployment
- Health Insurance Portability and Accountability Act (HIPAA) and Criminal Justice Information Services (CJIS) information—some agencies and their legal advisors have varying interpretations on complying with HIPPA and CJIS. Whether real or perceived, these interpretations can become a hinderance to seamless data exchange between jurisdictions

This report serves as the first in a series of reports for the Program’s CAD Interoperability Project, with the ultimate goal of having a strategic plan that identifies a path forward.

Background

A critical component in the evolution of 911 call services over the last several decades has been the ability to route calls to the correct emergency communications centers (ECCs), also known as public safety answering points (PSAPs), to ensure callers are speaking with the ECC that delivers services to that jurisdiction. As 911 matured, the ability to re-direct misrouted calls from one ECC to the correct ECC also improved greatly. However, as the interconnectivity between ECC 911 telephony technology has evolved, no such level of interconnectivity or data sharing interoperability has occurred between the computer-aided dispatch (CAD) systems to provide the ability for the ECCs to share data captured from each caller. During nearly every emergency incident, the caller relates vital details of the incident to the ECC that receives the call. This data is then captured in the agency's CAD system (if so equipped) and is critical to the subsequent emergency response to that incident, both for the caller and the emergency responder.

The National 911 Program (Program), housed within the National Highway Traffic Safety Administration (NHTSA) Office of Emergency Medical Services, is keenly aware of this disparity between the two technology platforms and understands that improved data communications between ECCs and first responders, and across jurisdictions, are vital to agency response and improved life-safety outcomes. Information captured about an incident in one jurisdiction can make the difference between the life or death of a citizen or first responder in another.

Considering the lack of integration between CAD systems across jurisdictions, the Program initiated this project by hiring Mission Critical Partners, LLC (MCP) to determine the status of CAD interoperability and what can be done to improve interoperability nationally moving forward.

The first phase of the CAD Interoperability Project was to hear directly from ECC practitioners—those directors or supervisors who work on the front lines—in a face-to-face ECC practitioner symposium. Then, following the practitioner symposium, a second symposium was conducted with the practitioners from the first and representatives of the CAD solution provider community to better understand the solution providers' perspectives on CAD interoperability.

This initial report in the CAD Interoperability Project is the result of those meetings and the feedback obtained on the current state of CAD system interoperability in the United States. This report serves as the foundation for later reports in the Program's CAD Interoperability Project, which seeks to drive toward practical solutions for nationwide CAD system interoperability.

1 Symposium Participants

1.1 ECC Practitioners

The Program gathered a group of stakeholders representing ECCs from across North America to participate in a symposium and discuss their experiences, successes, and challenges concerning CAD data interoperability or lack thereof. An open invitation was distributed via a press release to solicit volunteers to participate in this project. Over 80 people volunteered for the symposium. The volunteers were asked to provide specific information to enable the Program to make final selections. The final selections were based on multiple criteria to obtain a good cross-section of representatives. The criteria utilized to select volunteers included:

- Geographical region
- ECC size (seats)
- Jurisdiction geographical area
- Jurisdiction population
- Role in their organization
- Ability to participate in two symposiums and dedicate their time fully to both symposiums
- Willingness to be an active participant and able to articulate successes and/or challenges with CAD interoperability across borders
- Able to bring fresh, innovative ideas to the discussion, lessons learned, and past experiences related to CAD interoperability

After careful consideration, ECC stakeholders were identified, listed in Table 1, to participate in the symposiums.

Table 1: ECC Stakeholders

Name	Position/Title	Organization	City	State/ Province
Jim Fogarty	Bureau Director	Pinellas County Safety and Emergency Services	Largo	FL
Shauna Henrie	Emergency Communications Manager	City of Goodyear Police Department	Goodyear	AZ

Name	Position/Title	Organization	City	State/ Province
Tracy Klingbyle[1]	Supervisor 911 Communications	Windsor Police Service	Windsor	ON
Deann Macleod	Communications Center Manager	Kingman Fire Department	Kingman	AZ
Stephen Mette	Operations Manager	Northwest Regional Emergency Communications Center	Dublin	OH
Dave Mulholland	Administrator	Arlington County Emergency Communications Center	Arlington	VA
Dale Murray	Operations Manager	Will County 911 Emergency Telephone System	Joliet	IL
Jennifer Pelayo	CAD System Manager	Northwest Central Dispatch System	Arlington Heights	IL
Michael Smith	Regional Projects Coordinator	Portland Dispatch Center Consortium/Clackamas County	Oregon City	OR
Val Sprynczynatyk	Director	Anoka County Emergency Communications	Anoka	MN
Lance Terry	911 Coordinator	State of Oklahoma	Oklahoma City	OK
David Turner	CAD2CAD Administrator	Orange County Fire Authority	Irvine	CA
Robert Verdone	Executive Director	Southeastern Massachusetts Regional 911 District	Foxborough	MA

[1] Virtual Participant

1.2 Solution Providers

Solution providers were solicited to ensure a diverse representation of the industry, including large and small providers, long-standing legacy providers, and newer entities in the CAD marketplace. The solution providers who were selected are listed in Table 2.

Table 2: Solution Providers

Name	Position/Title	Company	City	State/ Province
Kenny Cottrell	Software Architect, CAD-to-CAD	Central Square	Lake Mary	FL
Rachel Ferguson	Product Manager CAD & Mobile Solutions	Caliber Public Safety	Winston-Salem	NC
Bill Hall	Sales Director	Ryzyliant, Inc. d/b/a/ ez911	Hoover	AL
Earl Karcher	Product Manager	Tyler Technologies	Plano	TX
Tom Koundry	Director, CAD & RMS Division	CSI Technology Group	Keasbey	NJ
Juan Pedro Martinez	CAD Product Manager	Versaterm Public Safety	Ottawa	ON
Christopher Ogando	Lead Product Manager CAD	Mark 43	New York	NY
Joel Rosenblum	Senior Product Management Consultant	Motorola Solutions	Chicago	IL
Eric Smith	Director, Product Enablement & Pre-Sales Engineering	Hexagon Safety and Infrastructure	Madison	AL

2 Symposium I – ECC Practitioners

2.1 Introduction

Before the ECC symposium, 30-minute virtual introductory sessions were conducted with the stakeholders to ensure they had a proper understanding of the CAD Interoperability Project as well as what would be expected of them as they participated in the first symposium. The ECC practitioner symposium was conducted to gain an understanding of the consequences and barriers to seamless data sharing from the point of view of the ECC stakeholders. It was apparent to the MCP facilitators and Program participants that the ECC practitioners came ready to engage and provide valuable feedback.

2.2 Venue and Agenda

The ECC practitioners' symposium was held on January 19, 2022, at the Executive Conference & Training Center, 23685 Holiday Park Drive, Dulles, Virginia. The symposium was divided into four sessions from 9:00 a.m. to 3:00 p.m.:

- Session 1 – Introductions, Background, and Objectives
- Session 2 – Round Table Discussion: Successes, Failures, and Lessons Learned
- Session 3 – Interactive Whiteboard
- Session 4 – Solutions Discussion

2.3 Consequences of Inability to Share Data Across Jurisdictions

ECC stakeholders were quick to provide feedback on the detrimental impact that the lack of data sharing across jurisdictions has on emergency response. The fact that ECCs have valuable information in their possession obtained from callers in distress that they cannot easily share with their ECC counterparts in neighboring jurisdictions is a systemic problem throughout the country. Although these ECC practitioners can transfer a caller over the 911 phone system or via an Emergency Services Internet Protocol (IP) network (ESInet), where available, most cannot transfer any of the data captured within their CAD system from that caller. This data includes the nature of the incident, more precise location data of where the incident occurred, evolving characteristics of the incident, people involved, and the ECC's preliminary assessment of whether police, fire, or EMS resources or all three are warranted. The ECC stakeholders advised that they have experienced serious emergency response issues due to the absence of data sharing. Figure 1 below details some of the issues the ECC stakeholders encounter.

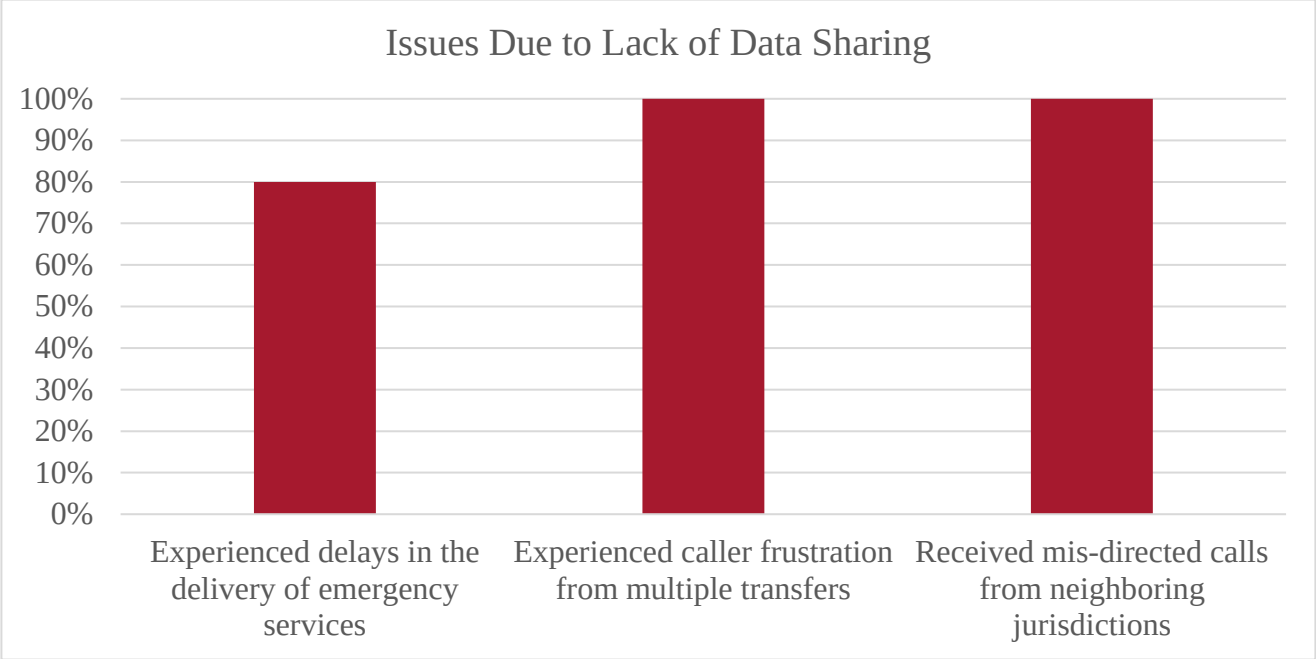

Figure 1: ECC Identified Issues Due to Lack of Data Sharing

2.4 Primary Obstacles to Seamless Data Sharing Between Jurisdictions

It bears noting that, well before computerization was mainstream in ECCs across the United States, the focus of funding the country's emergency call-taking was on the 911 telephony equipment and the 911 networks that transported calls. Some states still do not recognize CAD software as integral to 911 call-taking, and, as a result, 911 funds are not eligible for this software. Fortunately, that is not the norm, and most states recognize that CAD systems are an integrated component of the 911 emergency response ecosystem.

The ECC stakeholders cited several key challenges to CAD interoperability that hinder a jurisdiction's capability to integrate with neighboring ECCs or establish data exchange hubs to facilitate the integration of multiple ECCs. The leading impediments to data interoperability are summarized in Figure 2 below. Primarily, the stakeholders identified items such as a lack of funding, lack of standards and standards enforcement, the need for common terminology, disparate policies and procedures, political hurdles as well as other challenges. These areas are examined in greater detail in the sections that follow.

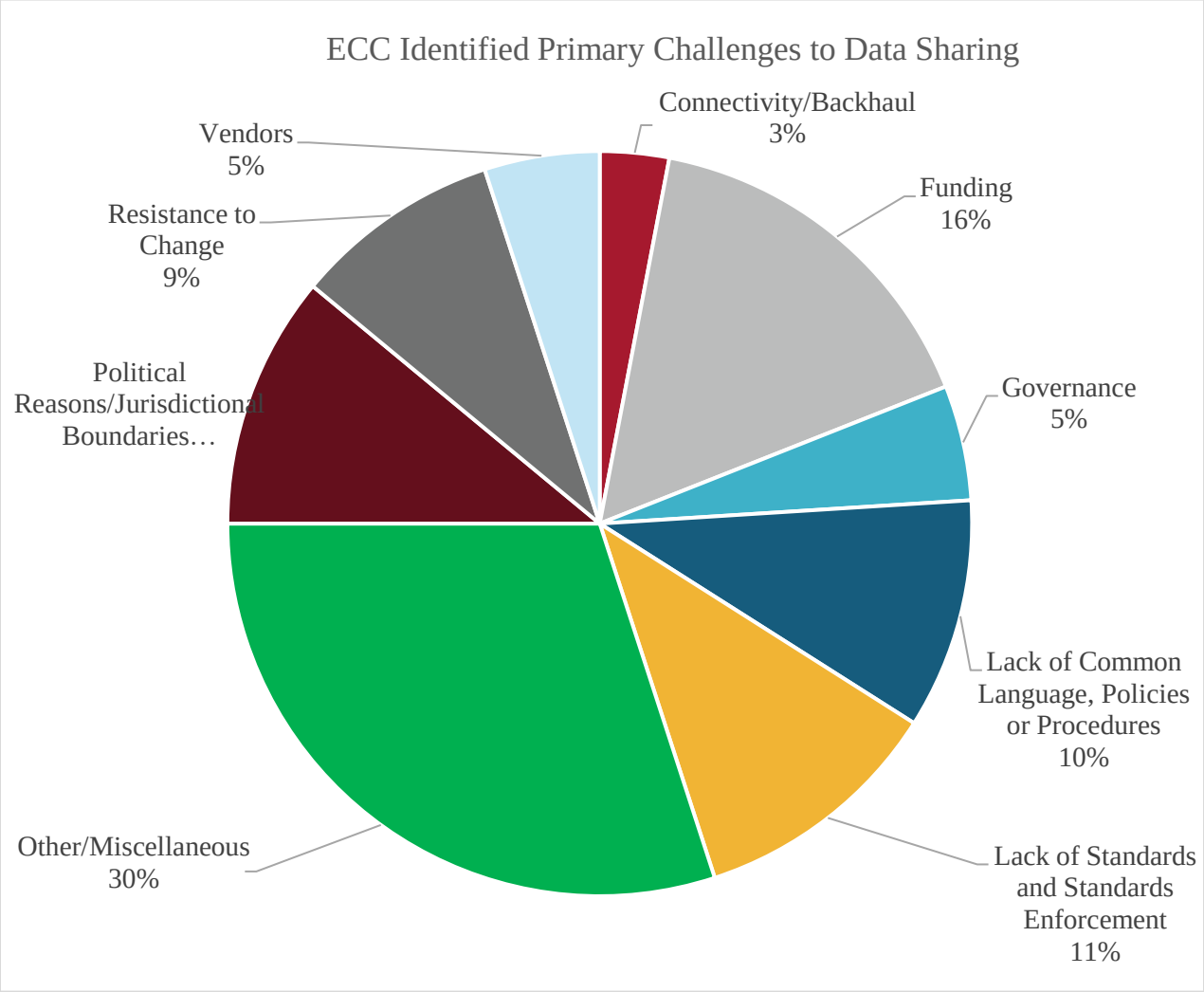

Figure 2: ECC Identified Primary Challenges to Data Sharing

2.4.1 Funding

The ECC stakeholders noted that one of the most significant obstacles to data sharing is cost and securing appropriate funding. The cost to add data sharing capabilities on top of the already prohibitive cost of a new CAD system, including start-up and long-term maintenance costs, is beyond the financial ability of many agencies. In many cases, there is a lack of support to provide additional funding to extend data capabilities beyond jurisdictional boundaries. One stakeholder, who is part of a successful data exchange hub that interconnects several CAD systems, advised that the solution provider of their data exchange hub previously charged $100,000 to connect a new agency to the hub, which did not include the ongoing maintenance to support the connection. It should be noted that this does not cover the cost for the initial implementation of a data exchange hub, the $100,000 noted here is to connect an agency to a pre-existing hub and translate their data into a consumable format by other agencies.

The stakeholders also observed that many ECCs are cost-conscious, with other budgetary items to consider (e.g., personnel costs, other systems) and are unwilling to spend for the necessary technology enhancements required for data sharing. It was also noted that many small ECCs simply do not have the budget to implement data sharing with their neighboring ECCs. A majority of ECC stakeholders believe that funding at a national level would help alleviate budgetary deficiencies across ECCs.

2.4.2 CAD Interoperability Requires Standards

The stakeholders agreed that there is no national body or 911 authority to enforce national standards such as those published by the Association of Public-Safety Communications Officials (APCO) International or the National Emergency Number Association (NENA).

In October 2022, NENA published the Emergency Incident Data Object (EIDO)[2] standard, which has become the de facto standard for emergency incident data exchange. NENA notes the information that can be contained in an EIDO as follows:

> ***An EIDO contains information about a single incident including: the calls related to that incident, the responders assigned to the incident, the participants and vehicles involved in the incident, etc. EIDOs will often include the caller's information like name, number, and location. EIDOs can also include agents' notes, information about responder equipment, agencies involved in the incident, and lots of other incident information.[3]***

Moving forward, both APCO and NENA believe that a standards-driven approach will be the best way to bridge the data interoperability void by creating a common language that all ECCs can understand. However, the stakeholders noted that APCO and NENA are good for setting standards but have no enforcement authority to ensure they are adopted by ECCs and solution providers. The overwhelming majority of stakeholders believe some entity or government authority (most likely state) should be responsible for standards enforcement (see Figure 3 below).

[2] https://www.nena.org/page/EIDO
[3] NENA-REF-011.2-2019_EIDO_&_I.pdf (ymaws.com)

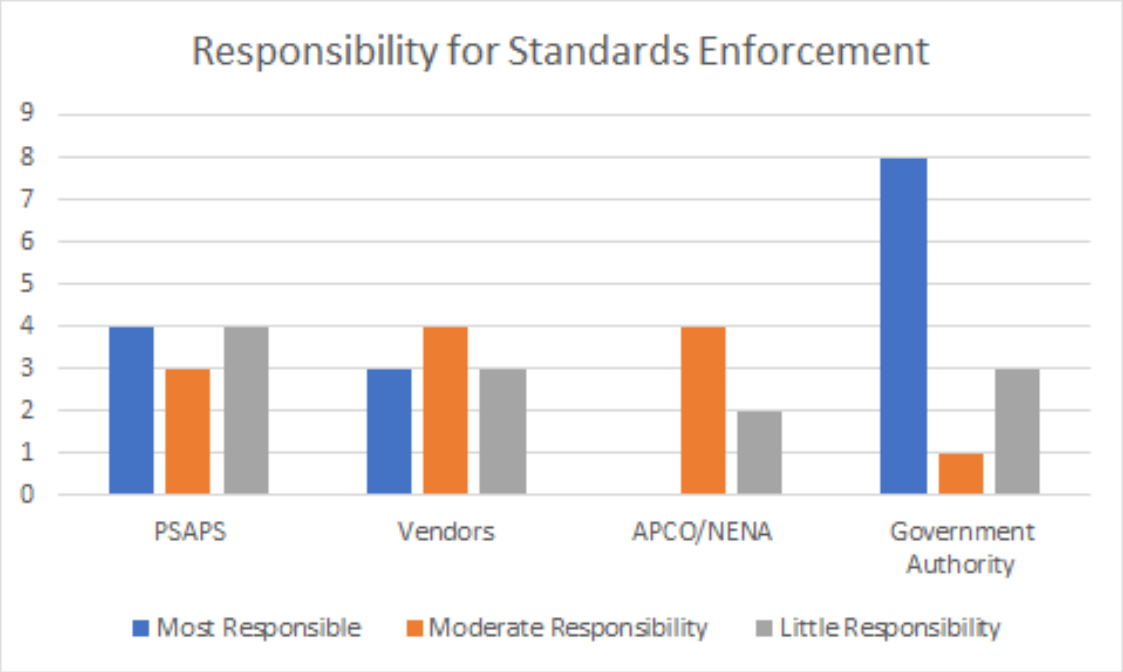

Figure 3: ECC Opinion on Responsibility for Standards Enforcement

Some stakeholders believe that there is a need for umbrella standards at the federal level and more refined standards at the state level, and if these federal and state standards are not in place, no one will play by the rules. Other stakeholders believe that government involvement could take too long to put standards in place and could result in inadequate outcomes. Some stakeholders noted that there are already far too many agencies involved in 911 operations, which leads to confusion rather than clarity, and cited as an example the National Incident-based Reporting System (NIBRS)[4] for reporting criminal offenses to the Federal Bureau of Investigation (FBI). While there is a national standard to which all police agencies must adhere, NBIRS allows states to apply other data elements to the standard that are specific to the state beyond what the FBI wants to collect. Such a national standard for emergency incident reporting, if adopted by ECCs and the CAD solution providers, could be of great benefit in correcting the disparities that exist today.

2.4.3 Standard Business Practices - Common Protocols and Procedures

Feedback from the stakeholders indicates that many believe that some business practices contribute to the lack of data sharing. For example, many ECCs are reluctant to change their operations, embrace new technologies, or adopt practices that do not align with their operational model. Some ECCs are just risk-averse and are reticent to do things differently from the institutional norm that has been

[4] https://www.fbi.gov/services/cjis/ucr/nibrs

inculcated into their operations. In the stakeholders' experiences, they have seen ECCs or government authorities that are simply unwilling to share data or relinquish control. Others cited the sensitive nature of some CAD data—the Health Insurance Portability and Accountability Act (HIPAA) protecting medical information and the FBI's Criminal Justice Information Services (CJIS) policy protecting CJIS-specific information were also noted as barriers to data sharing.

Poor governance, or a lack of governance, is another area prohibiting seamless data sharing. ECCs can be under the domain of multiple entities (e.g., sheriff's offices, police departments, county boards, and other groups), resulting in both operational and political barriers. The differing entities that control ECCs have varied response standards, further contributing to the lack of data sharing. The ECC stakeholders noted that a lack of standard policies and procedures across jurisdictions creates a significant obstacle to data sharing.

2.4.4 Need for Common Terminology

Most stakeholders agreed that the lack of common terminology across jurisdictions is a major impediment to uniformity and seamless data sharing. Data exchange hubs serve as the middleware in several jurisdictions to translate incident types in one jurisdiction into an understandable incident type in a neighboring jurisdiction. In 2019, APCO updated its *Public Safety Communications Common Incident Types for Data Exchange* (APCO 2.103.2-2019).[5] Using an excerpt from the document, refer to Figure 4 below, one can see that five motor vehicle crash types have been utilized in the standard. If ECC #1 subscribes to the standard, it may communicate to ECC#2 that it needs assistance with a motor vehicle accident with injuries (MVAINJ) at a location near their shared jurisdictional boundary. If ECC#2 does not subscribe to the standard, the same accident is identified as a crash with injuries (CINJ) in their system, and the code must be transformed or translated (MVAINJ = CINJ). ECC stakeholders who have existing data exchange hubs advised that this is precisely the way their hubs operate and allow many disparate CAD systems to communicate with one another, despite the fact they use different terminology.

[5] https://www.apcointl.org/~documents/standard/21032-2019-common-incident-type-for-data-exchange/?layout=default

MVA	MOTOR VEHICLE ACCIDENT, NO INJURY - CAN BE RECEIVED AS AUTOMATED CRASH NOTIFICATION	Motor vehicle accident, no injury - can be received as automated crash notification
MVAHR	HIT & RUN	Vehicle accident hit & run
MVAINJY	MOTOR VEHICLE ACCIDENT WITH INJURY - CAN BE RECEIVED AS AUTOMATED CRASH NOTIFICATION, INCLUDES CAR, PEDESTRIAN, ATV ACCIDENTS	Motor vehicle accident with injury - can be received as automated crash notification, includes car, pedestrian, ATV accidents
MVAUNK	MVA UNK	Motor vehicle accident unknown injury can be received as automated crash notification crash notification
MVCP	MOTOR VEHICLE COLLISION ON PRIVATE PROPERTY	

Figure 4: Motor Vehicle Accident Types

APCO has also published a standard for status codes, *Public Safety Communications Common Status Codes for Data Exchange* (ANSI/APCO 1.116.2-2020)[6], which provides ECCs with common terminology for emergency responders who are en route, on scene, or cleared from an emergency incident. APCO notes within its standard that "*Creating a common status code does NOT mean that an agency must change the codes they use internally. The intent is to have each agency map their internal codes to the standardized list."*[7] APCO and NENA have addressed these issues with precision and determination; however, both ECCs and CAD solution providers have been slow to adopt or ignore the standards altogether.

Stakeholders who are part of a CAD data exchange hub noted that there are significant challenges in establishing a hub—financial, governance, and political reluctance, to name a few—but the benefits for emergency response are invaluable.

Most stakeholders agreed that a significant issue inhibiting data sharing is not just the lack of common terminology, which APCO and NENA are trying to overcome, but the reluctance of stakeholders and solution providers to adhere to the standards. The need for standards goes beyond common incident types and status codes; stakeholders noted that there is a lack of common nomenclature for resources, units, and other non-standard data elements.

APCO and NENA, as well as the emergency communications professionals who volunteered to write these standards, should be lauded for their efforts to advance interoperability. These groups, among others, are striving to improve emergency response outcomes nationally, but stakeholders agreed that

[6] https://www.apcointl.org/~documents/standard/11162-2020-common-status-codes-for-data-exchange/?layout=default
[7] Ibid., section 1.1.

adherence to standards is still a significant challenge. APCO cites in its standards documents: "*APCO American National Standards (ANS) are voluntary consensus standards. Use of any APCO standard is voluntary."*[8] Stakeholders believe that until a national mandate comes about, much of the good work done to date developing quality standards may remain voluntary.

2.4.5 GIS Component

It bears noting that the ECC stakeholders cited that sharing of key data elements is critical and is the focal point to improving emergency response between jurisdictions, but the role of mapping and geographic information system (GIS) data cannot be forgotten. When sending resources into a neighboring jurisdiction, ECCs should have maps in their CAD systems that cover neighboring jurisdictions with address points within those jurisdictions. A common map with the same view across jurisdictions would be ideal. Stakeholders advised that situational awareness and a common operating picture are necessary across jurisdictions. The mapping component also applies to in-vehicle mapping on mobile computers, as the CAD map and the mobile data map are typically the same. Since GIS is an integral component of routing 911 calls accurately in Next Generation 911 (NG911), collaboration with county, city, and ECC GIS for 911 and CAD is critical.

2.4.6 Other/Miscellaneous Issues

Several "other/miscellaneous" obstacles to seamless data sharing were cited by the ECC stakeholders, which accounted for thirty percent of all issues in Figure 2. The other/miscellaneous category includes issues that could not easily be grouped into other categories within Figure 2 because the responses were vague or were not cited by multiple members of the group. This other/miscellaneous category include issues, such as:

- Data ownership
- Data "held hostage" by proprietary systems
- Lack of cooperation between solution providers
- Liability issues
- Memoranda of understanding (MOU)s and intergovernmental agreements (IGAs)
- Network connectivity and backhaul between ECCs
- Political boundaries
- Politics
- Cooperation with contracted providers (e.g., ambulance services)
- Solution provider financial motivation
- Translation between CAD systems

[8] Ibid., page 4.

2.5 Positive Outcomes to be Realized with CAD Interoperability

The ECC stakeholders strongly believe that CAD interoperability with neighboring ECCs would positively affect their ability to provide optimum service levels to their communities and first responders. Some ways in which CAD interoperability would help provide better service levels include:

- Reduced call times for shared calls
- Entering an incident for a neighboring jurisdiction rather than transferring a call saves time in a life-threatening situation
- Improved response times
- Fewer call transfers, which in turn reduces caller frustration
- Improved mutual aid and quicker mutual aid responses
- Enhanced situational awareness from a county or regional perspective versus an agency perspective
- Reduced strain on 911 personnel
- Reduction in errors
- Assists with record requests

It was also noted that currently in 911 the focus is on voice conversations, but with the advent of NG911, ECCs will also need to transfer text, imagery, and video. It is believed that CAD data interoperability can be a strong facilitator of this. For example, in the scenario of a school shooting, many students text or send images to their parents while the incident is active. The parents may be at work in a different jurisdiction. If they share imagery or video when contacting 911 with that information, CAD-to-CAD will enable the receiving jurisdiction to send the imagery or video to the responding jurisdiction.

2.6 Governance

A data-sharing environment will require a governance approach that ensures that relevance, functionality, and accessibility are maintained. The stakeholders believe governance must be mandatory for CAD interoperability to work. Governance structures build buy-in and promote communication across jurisdictional boundaries and provide an avenue for collaboration among all stakeholders.

2.7 NG911 Data Exchange Model

The ECC stakeholders discussed if the NG911 data exchange model—EIDO (caller location, number, etc.)—can effectively be used as a framework to build out a comprehensive, compliant CAD interoperability solution. Many agreed it would be best to build on that framework or, at a minimum,

would serve as a necessary first step in the right direction. It was stated that this would be the only way data interoperability would be successful. However, some disagreed with this position, and one stakeholder noted that the chance of this happening is slim to none. It was stated that in a perfect world, everyone adhering to the same standard would be great, but, realistically, it is unlikely to happen, and a CAD-to-CAD solution in the middle to translate data will likely be a necessity. Another stakeholder stated they do not believe CAD-to-CAD middleware is the best way and that a better approach is to make sure core data matches between agencies. Also, several stakeholders stated that it is unlikely that the 6,200 (approximate) ECCs nationwide would be willing to adopt this due to financial constraints and other reasons unless they were mandated to do so. Others do not see the EIDO ever replacing CAD-to-CAD hubs. Another point raised by the stakeholders is that previous attempts at standards-setting have had limited success and take too long to implement and gain compliance.

2.8 Other Applications that Ingest CAD Data

Ninety percent of the stakeholders indicated that their CAD systems ingest data from 911 call-handling equipment (CHE) and, subsequently, display caller location data on the map. Some ECCs use the CAD map, others the CHE map, or a combination of both. All stakeholders in attendance said they use some type of third-party services such as RapidSOS, Smart911, SMS paging (e.g., Everbridge) or other third-party applications to augment CAD in their operations. However, it should be noted that although this was the feedback from the stakeholders gathered, in rural ECCs throughout the country use of third-party systems is not as prevalent.

2.9 Current CAD Data Sharing

All the ECC stakeholders stated that they currently share CAD data with other applications within their jurisdictions. Police and fire records management systems (RMSs) were the most frequently cited systems that consume CAD event data. Other systems include fire station alerting, third-party awareness and notification systems, data analytics and heat mapping, and crash reporting. The stakeholders all noted that they currently share, or are in the process of sharing, data outside of their jurisdiction with entities such as LexisNexis, ArcGIS, and private ambulance companies. Typically, each requires interfaces so that the data can be exported and then consumed by the third-party applications.

3 Symposium II – CAD Solution Providers and ECC Practitioners

3.1 Venue and Agenda

The CAD solution providers and ECC practitioner's symposium was held on March 2, 2022, at the Executive Conference & Training Center in Dulles, Virginia; the ECC practitioners were the same group as for the first symposium. The focus of the second symposium was to understand the challenges from the solution provider perspective and discuss potential solutions.
The second symposium was divided into five sessions:

- Session 1 – Introductions and Dialogue
- Session 2 – Dialogue and Questions and Answers
- Session 3 – Interactive Whiteboard
- Session 4 – Solutions Discussion
- Session 5 – Wrap Up

3.2 Solution Providers' Perspective on Interoperability Obstacles

Solution providers related similar obstacles as those reported by the ECC stakeholders but shared a commercial marketplace perspective that provided unique insights into the interoperability dilemma. Namely, the solution providers are driven by the customers and the marketplace that require software that can be tailored or configured to customer-specific needs. The CAD providers related that they are never asked to deliver software that adheres to a standard other than the customer's specific standard. They related that if the marketplace required conformance to an established standard and the customers required compliance, it would likely alter this mindset, but currently this is not the case.

One solution provider noted that interrelationships between agencies could be an obstacle. Jurisdictions are typically very careful and protective of their data, which impacts efforts in interagency information sharing. However, when asked what obstacles most hindered data sharing, solution providers overwhelmingly cited a lack of standards as the critical element (see Figure 5).

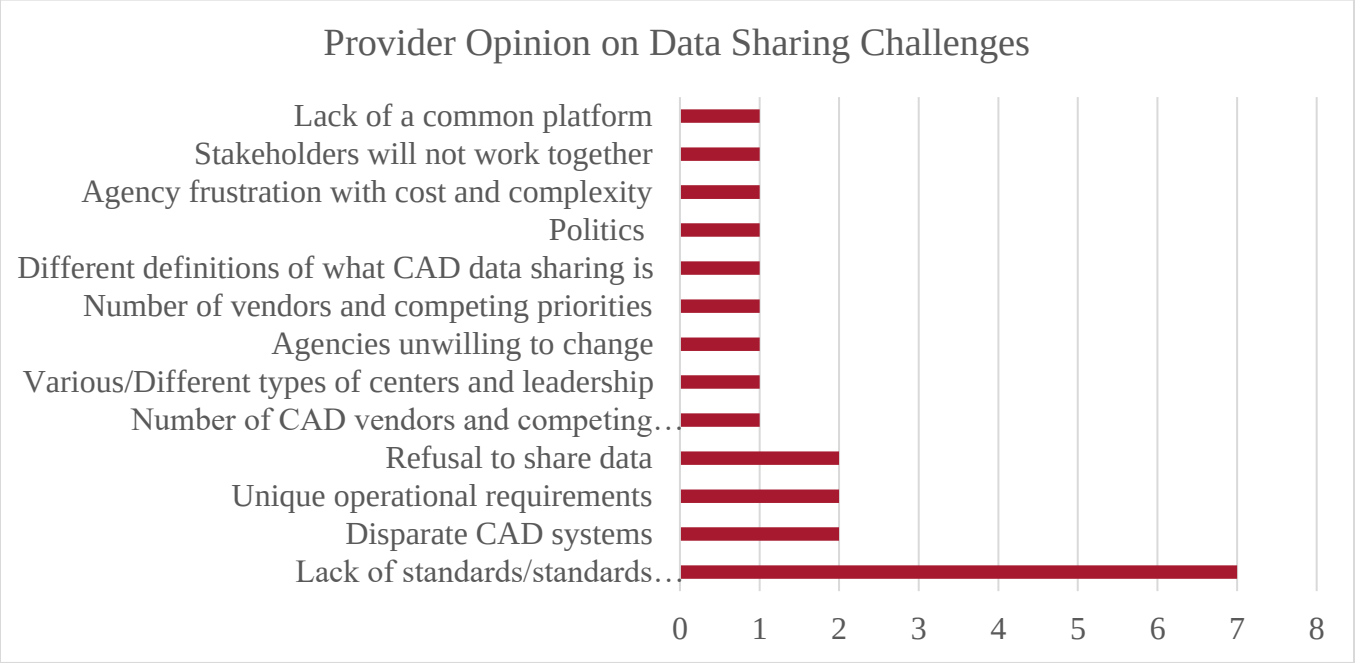

Figure 5: Solution Provider Opinion on Data Sharing Challenges

3.3 EIDO Standards Compliance

The EIDO standard is intended to define the means of moving data from an ECC's receipt of the call and initiation of the incident through the process to its completion. The initial EIDO standard was first published in October 2021, so it is not a standard that CAD developers have been designing to in their product development for several years. Eventually, a second standard, the Incident Data Exchange (IDX) functional element, will establish the transmission protocol that will control the movement of that information between ECCs. The EIDO can be part of a call/incident from one ECC to another, or it could serve as a request for services by CAD from one ECC to another.

It should be noted that ECCs can continue to utilize their incident types, similar to the motor vehicle accident example noted earlier (MVAINJ = CINJ). Each ECC would have to ensure their CAD provider ingests standardized data and can then translate the data into an incident type that a neighboring ECC understands. For instance, ECC#1 transmits a standardized MVAINJ incident to ECC#2. ECC#2 must then translate the MVAINJ into a CINJ incident type in the receiving CAD. The same translation must occur on an outbound message as well. If ECC#2 is now requesting assistance with their CINJ, they can transmit the incident to ECC#1 but must first have their software translate it into the standardized format —MVAINJ—before sending. In this scenario, a data exchange hub is not necessary as the software at each ECC is mapped to input and output standardized incident types.

The solution providers noted that the approach to making CADs interoperate is lacking. Most CAD systems were developed as the single source of truth for an agency. The CAD systems are not designed

to interoperate easily with other applications. There are difficulties in translating nature, address, and other important incident properties. Different CAD systems can have different rules about what types of incidents can be processed and what data those incidents are required to have or not have. Moreover, the same CAD system may be configured differently from one ECC to another, further complicating seamless data sharing.

The solution providers were asked whether their CAD product(s) would be compliant with the EIDO standard or whether they had intentions to align with the EIDO standard. Figure 6 represents the responses of the nine CAD providers.

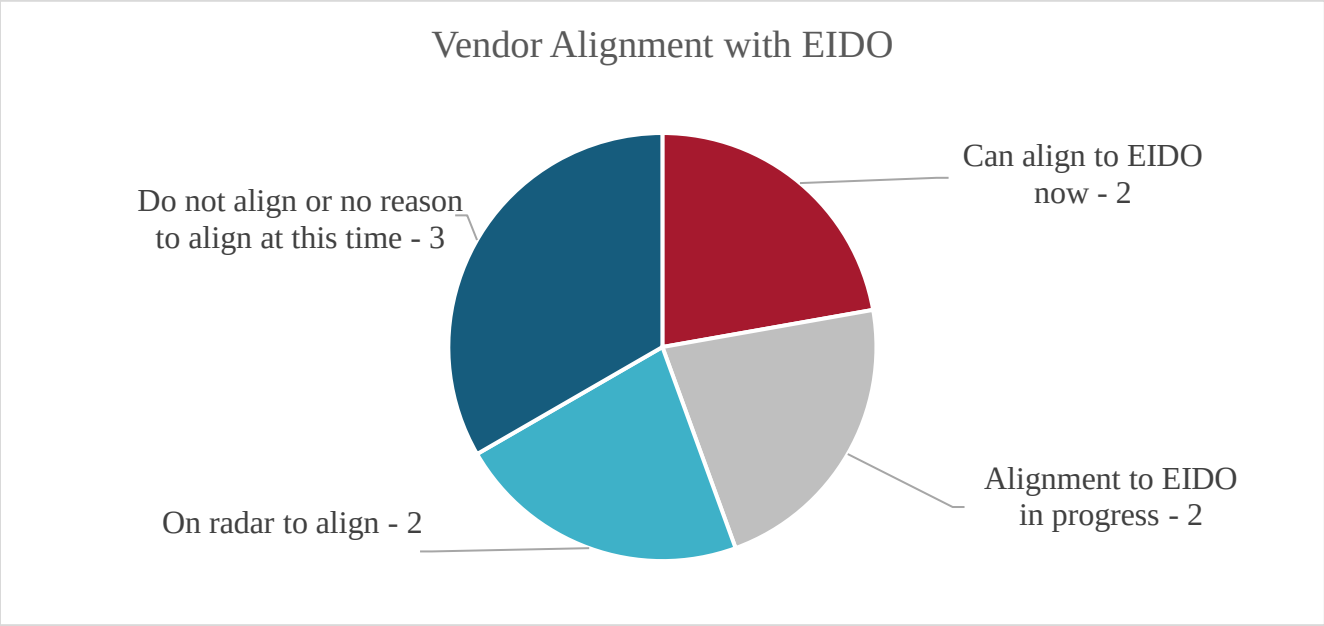

Figure 6: Vendor Alignment with EIDO

3.4 Market-driven Software Development

Many of the solution providers were quick to note that they developed products based on the requests of their customer base. If the customers are not requesting standards-based CAD products, their companies do not invest the capital to develop them—it is that simple. As shown in Figure 6, some solution providers have stated that using the EIDO standard is not a priority for them currently; others indicated it is on their roadmap for future development. Many reasons were given for this, with it not being a highly requested customer requirement the major contributor; however, the overarching reason is there are no federal or state standards driving solution providers to conformance. Thus, solution providers and agencies themselves can “opt-out” from any standard that is not required at the federal or state level.

The solution providers advised that technology (i.e., CAD systems communicating with one another) is the easy part; it is the manipulation of data into non-standardized, local terminology that complicates standardization. Solution providers and ECC stakeholders agreed that standardization and willingness to adopt standards are integral in this endeavor moving forward. While there are other things to consider that are important, the lack of standards is the lynchpin and will continue to keep systems somewhat disparate.

KEY FINDINGS

- Standardization is Critical
- Adoption of Standards is Integral to Progress

As a reference point, NENA first published its i3 standard for NG911 CHE and the network that supports the delivery of NG911 in June 2011. Version 3 of the standard was released in October 2021.[9] CHE solution providers are acutely aware of this standard, and it is a best practice to require i3 compliance in any request for proposal for 911 CHE. The same evolution must occur with CAD and its adherence to standards, such as the EIDO and soon-to-be-released IDX.

The NENA i3 standard paved the way for compliance with NG911 standards among the 911 CHE provider community. A similar evolution must occur with CAD and adherence to the EIDO/IDX standard.

When asked what their company vision is for their CAD products to align with an EIDO/IDX standard in the future, the solution providers gave very straightforward responses, as indicated in Figure 7.

[9] https://www.nena.org/page/i3_Stage3

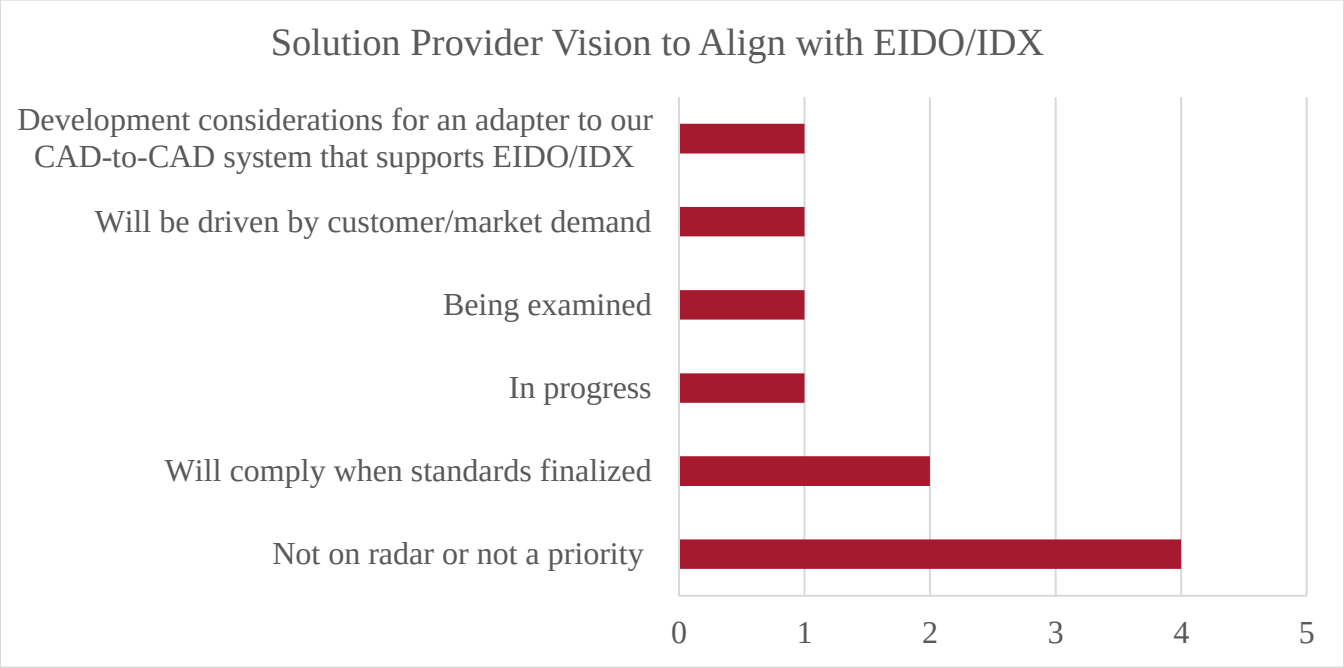

Figure 7: Solution Provider Vision to Align with EIDO/IDX

3.5 Are Data Standards Enough

The solution providers were asked if they believed that national standards alone are enough to overcome the disparate CAD systems deployed throughout the nation. The responses were very clear—all solution providers stated that national standards alone are not enough to overcome the disparate CAD systems deployed throughout the nation. Some said it is a good start but not enough. Others opined that there are other considerations, such as data-sharing agreements and network infrastructure, that are also needed. Others noted that financial incentives will likely be needed and that agencies will need to cooperate. However, in the end, the majority of the solution providers agreed that national data standards are a necessity.

3.6 Data Exchange Hubs

Most solution providers and ECC stakeholders agreed with the fact that, with roughly 5,748[10] ECCs across the country, most of which use a CAD system of varying age and complexity, applying a standard to every agency so that their system outputs EIDO-compliant data is unrealistic in the near term. As new CAD systems are procured, yes, they can be required to align with the standard, but transforming every existing software platform is not feasible. Considering this reality, an open discussion was held regarding the use of data exchange hubs and their ability to translate the output

[10] https://www.nena.org/page/911Statistics

from one ECC into the standard terminology or the terminology understood by their neighboring ECCs.

The solution providers were asked if a data exchange hub is the only other feasible solution to solve interoperability, assuming that converting every CAD in the United States to a standard-conformant format is unlikely. Their responses to this question are noted in Figure 8.

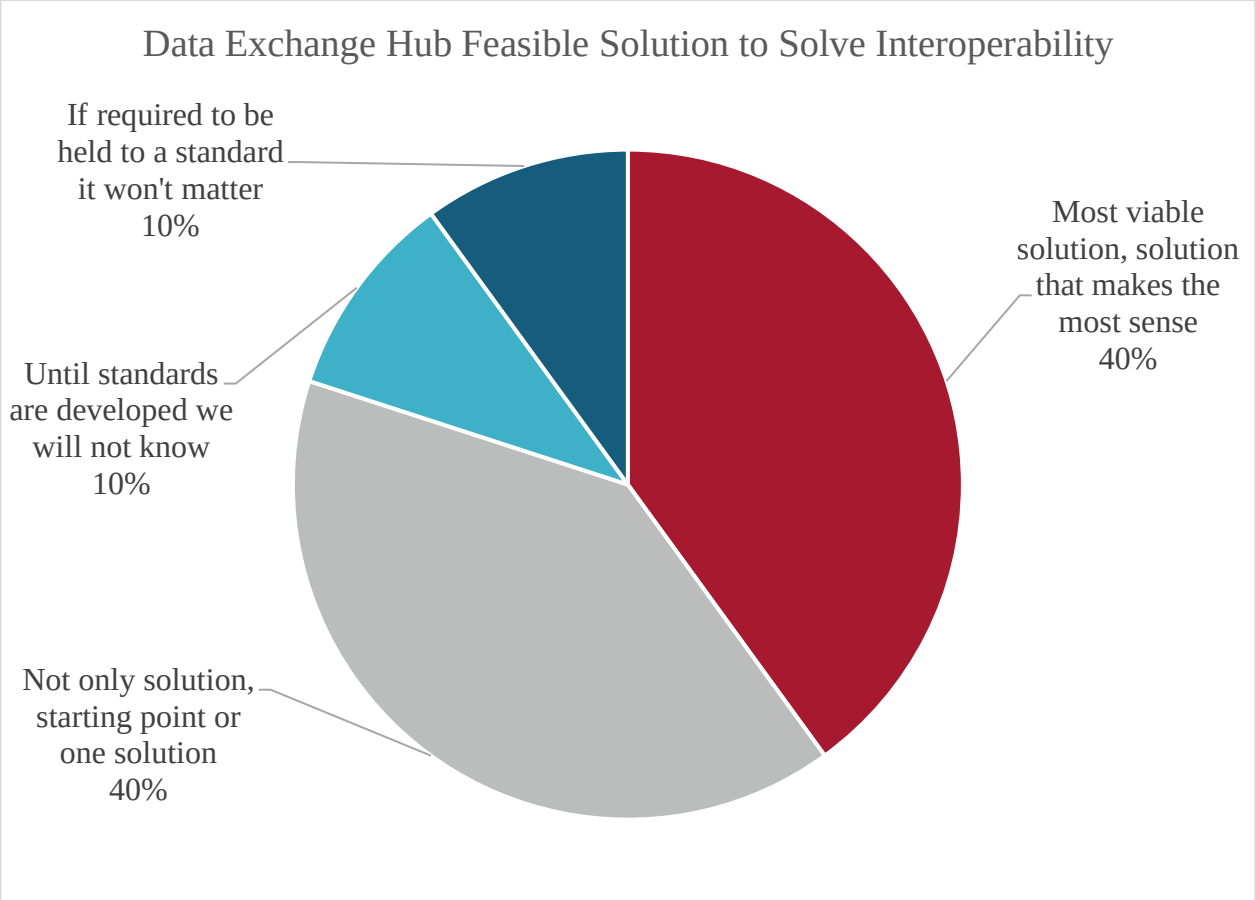

Figure 8: Solution Provider Opinion on Data Exchange Hub Solution

ECC practitioners and solution providers agreed that it would be a good start or had a strong possibility of enabling interoperability. However, one provider noted that only if it was promoted to the practitioners as a solution as opposed to ECCs looking to third-party developers for one-time solutions. Others noted that if this was championed at the state or national level, it would take root. One provider expanded on that, stating: “It likely will be more meaningful at the state level because state-level hubs will be able to consider state protocols and operational needs that a national standard would not be able to accommodate or consider.”

Considering that standards are a necessary component of any solution moving forward, solution providers were asked if state or federal guidelines are necessary for standards compliance. All but one

provider said they are necessary. One stated: “We have no specific position on the above statement; in general, however, standards without guidelines are likely to remain more nebulous and difficult to achieve.”

3.7 State or Nationally Sponsored Solutions

Knowing that one solution provider in attendance has a data exchange hub solution that it markets and sells nationally, MCP wanted to explore what the solution providers thought of state or nationally supplied data exchange solutions. Questions were posed to the solution providers, and both state and federal were popular alternatives to the solution providers (see Figures 9 and 10).

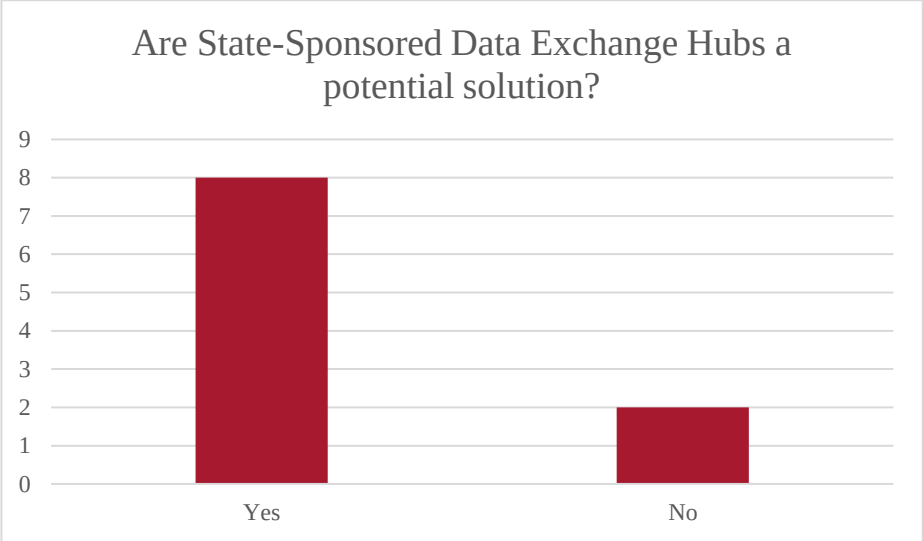

Figure 9: State-Sponsored Data Exchange Hub

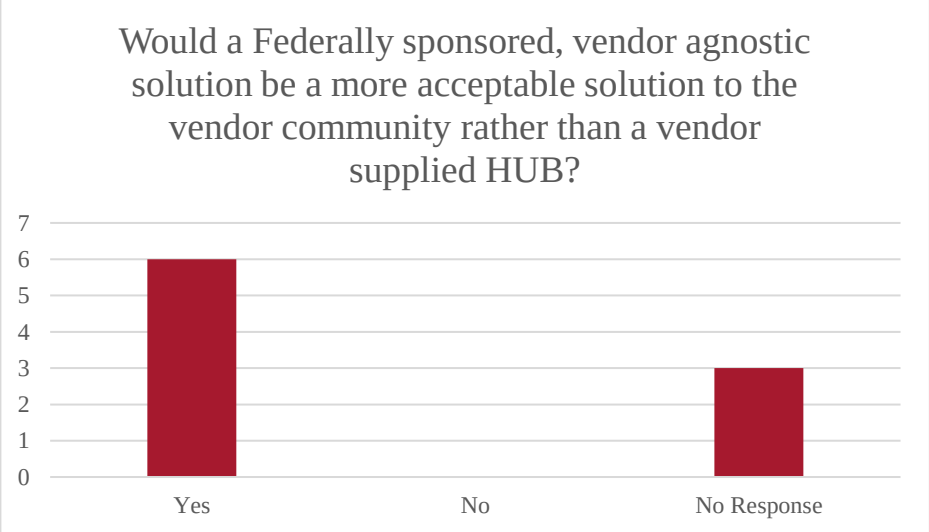

Figure 10: Federally Sponsored Vendor Agnostic Solution

3.8 Other Potential Solutions

The solution providers were advised that the Program is interested in any potential solutions that can promote CAD data interoperability. The solution providers were then asked if their companies have any other approach that might further this initiative? Responses are shown below.

- "Incentivize standards-based development through grant funding to practitioners."
- "Not at this time. We tend to be more reactive. We evaluate as customers request CAD-to-CAD interfaces."
- "We currently have a solution that allows agencies to share CAD data, unit data, asset, and IoT[11] device information regardless of current CAD vendor."
- "Unfortunately, we're more reactive than proactive."
- "Please don't take this the wrong way but, time is money! I think grant funding for development would go a long way."
- "We are partnering with a vendor who is about to release a data exchange hub and hope to see adoption with this solution. It is a good start and hopefully we will see movement across ECCs to have them adopt this product."
- "Yes, our patented CAD-to-CAD solution provides CAD-to-CAD interoperability among disparate CAD systems that can send/receive data through our standard API[12]. Currently, we have numerous adapters to work with a variety of disparate CAD systems and more in development."
- "We strongly believe in the idea of better-connected communities and have been working on how we can further data interoperability across different government systems including CAD."

4 Similarities and Dissimilarities of Opinion

Having conducted two symposiums with 13 ECC practitioners, with the second symposiums hosting nine solution providers, MCP was interested in comparing the similarities and dissimilarities of opinion between the groups.

4.1 Similarities of Opinion

The ECC stakeholders and CAD solution providers were aligned in their opinions in the following areas:

[11] Internet of Things
[12] Application programming interface

- PSAP leadership and decision-making slow progress
- Lack of standards
- Financial support to accomplish the end goal of data sharing
- Lack of federal or state oversight to enforce standards
- Unwillingness of some agencies to share data
- Workflow expectations among agencies
- Politics and jurisdictions not getting along
- Disparate CAD systems with disparate levels of functionality

4.2 Dissimilarities of Opinion

The groups' opinions were not aligned in the following areas, which were mostly driven by the providers' experience in the CAD marketplace or in CAD implementations:

- Competing priorities among vendors
- Customer demand is not there
- Operational demands by clients are different for every CAD deployment
- HIPAA/CJIS information; some clients have different perceived or, in some cases, real statute or regulatory hindrances

5 Next Steps

This report serves as the springboard for the Program's CAD Interoperability Project. In the steps to follow, the Program and MCP will further this project and the advancement of enhanced CAD data interoperability.

5.1 Report on the Current Status of Required Entities and Issues

Having already met with practitioners and solution providers, MCP will conduct candid follow-up discussions with those providers who attended the symposium as well as others who were unable to attend. We intend to drill deeper to uncover the root cause of solution provider reluctance or inability to advance interoperability and better understand the providers' product road map and future vision to become a "part of the solution" moving forward. Our objective is to obtain a clearer understanding of the providers' positions on data interoperability, how they see their products evolving to address this issue, and their commitment to conform to national standards in the future.

As part of this task, MCP will engage with those solution providers that may not offer CAD solutions within their portfolio but offer products that augment CAD capabilities. RapidSOS, Rave Mobile Safety, SOMA Global, and other companies will be interviewed to gain a holistic perspective of how

all providers can improve emergency response in the ECC environment and promote more seamless data exchange capabilities.

5.2 Written Report on Partner Agencies/Organizations

MCP will identify and engage national stakeholders, including APCO, NENA, the Integrated Justice Information Systems (IJIS) Institute, and FirstNet. We will identify the standards in development and what national data-sharing initiatives are active. MCP will determine how current and future standards or initiatives among partner agencies can be leveraged to advance data interoperability nationally. This may include recommendations or proposed standards revisions that better support this project's objectives or suggest new initiatives that must be complied with by CAD solution providers. We will ensure all partner stakeholders' thoughts and concerns are included in the framework of this report.

5.3 Written Document Containing Scientific Research Requirements and Metrics

NHTSA recognizes the need to measure progress toward the objectives as well as develop methods and measures of data accuracy. MCP will identify key factors that will require further research and specific measurements to move this project forward. Metrics and strategies to collect the proper data needed to demonstrate the value and measure progress will be defined in this report.

5.4 Written Document that Addresses the Strategies

Following the collection of the assessment information as identified in all previous stages and reports, MCP will provide a document that outlines the strategies to address the items discovered. To achieve truly interoperable CAD data-sharing nationwide, a clear list of strategies that are actionable, achievable, and measurable is required and will be documented in the final report of this project.