



IJIS Institute

CRITICAL DECISION CRITERIA FOR DATA SHARING



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INTRODUCTION

The IJIS Institute white papers [*Data Sharing Between Computer Aided Dispatch Systems*](#) and [*Governance Agreements in Public Safety Information Sharing Projects*](#) have set the stage for this third whitepaper – *Critical Decision Criteria for Data Sharing*.

The first paper discussed the distinction between data sharing and information sharing, as well as the different methods employed to initiate the data exchange. The second paper discussed governance agreements between agency partners. This third paper takes the next logical step by providing guidance to practitioners who need to select their technology partners and implement the solution.

This paper outlines critical points organizations must consider when implementing a data sharing solution, whether it is CAD-to-CAD (Computer Aided Dispatch)¹, RMS-to-RMS (Records Management Systems), and/or Automatic Vehicle Location (AVL), mobile and mapping interoperability. The following pages often mention CAD systems; however, other applications and systems could easily be substituted in the discussions. The benefits of data sharing solutions are far-reaching and are presented first. Next, we address a high-level discussion of projects, planning, and partners, and then discuss requirements and how to associate them with specific, desired outcomes. Subsequent sections present solution assessments from different perspectives. General cost discussions follow. The conclusion advises the reader that, in most cases, data sharing has migrated from “nice to have” to “need to have.”

Who Should Read This Paper?

Practitioners in leadership positions, individuals in information technology roles, consultants, and system integrators should read this paper to become more familiar with concepts critical to the success of data sharing solution. The buying agency’s team may not be aware of the variety and depth of the issues, as well as the technical aspects of data interoperability and data sharing solutions. It may be difficult for them to evaluate service providers’ assertions and be aware of the immediate and/or future risks that may come with these systems. These risks include unexpected costs, deeply seated frustration, or even failed projects. Leaders will gain much of the knowledge they need through awareness of critical decision criteria and thus be better able to make the right decision for their agency and its partners.

Interoperability is still most often thought of as pertaining to radio/voice systems, yet the U.S. Department of Homeland Security (DHS) clearly sees them as joined, as evidenced in the SAFECOM Interoperability Continuum². A so-called ‘interoperability’ project, with specific information sharing purposes, will result in greater system or regional interoperability. In other words, interoperability is a solution characteristic, not necessary an end goal; however, for the purposes of this white paper, the term ‘interoperability’ will apply to data interoperability and data sharing.

For optimal operational efficiency, mutual aid and support must be automated through data sharing, primarily with dispatch and mobile data solutions. Part of these solutions may also include shared mapping with AVL, as well as records exchanges. Sharing data facilitates the prevention and solution of

¹ A [full list](#) of acronyms and abbreviations is included in this document.

² For more information on the SAFECOM Interoperability Continuum, visit:
<http://www.safecomprogram.gov/oecguidancedocuments/continuum/Default.aspx>

crime, enhances analytic capabilities, and provides financial benefits for the participants. Additionally, for fiduciary and prudent budget management, a data sharing solution may be more cost effective than a system replacement.

The discussion below begins with actual reported benefits of real projects to aid practitioners in championing data sharing and interoperability efforts.

DISCUSSION

Benefits and Return on Investment

It is a significant investment to select and implement an interoperability solution. Agency and political leaders should ensure that benefits outweigh the costs and should assess the anticipated return on such a return on investment (ROI).

A wide variety of agency practitioners were informally surveyed on the benefits they expected and realized from several interoperability projects. The benefits in Table 1 below were reported by these agency practitioners. We projected the importance by the number of times they were mentioned and the emphasis of each mention by participating agencies.

TABLE 1. BENEFITS AND ROI

Highest Reported Benefits	<ul style="list-style-type: none"> ▪ <i>Improved Emergency Response</i> <ul style="list-style-type: none"> – Lives saved and injuries addressed faster with quicker medical care – Missing persons recovered – Less property damage with units more quickly arriving ▪ <i>Improved Decision Making</i> <ul style="list-style-type: none"> – Better, faster, and richer information has led to better decisions; errors reduced with more timely information; improved data aggregation - better crime analysis ▪ <i>Situational Awareness</i> <ul style="list-style-type: none"> – More efficient and faster deployment of shared resources ▪ <i>“Independence” Solution</i> <ul style="list-style-type: none"> – For agencies who do not wish to join a single dispatch or records system, interoperability provides a virtual “single provider” while allowing for agencies to remain independent
Next Highest Reported Benefits	<ul style="list-style-type: none"> ▪ <i>Lower Costs of Operation</i> <ul style="list-style-type: none"> – Fuel, personnel, equipment ▪ <i>Productivity Increased</i> <ul style="list-style-type: none"> – Payroll, training costs, processing costs ▪ <i>Risk Mitigation</i> <ul style="list-style-type: none"> – Fewer lawsuits (failure to dispatch closest unit) – Insurance (jurisdictional boundaries mitigated)

**Occasionally
Reported
Benefits**

- *Back-up and Recovery Centers*
 - Systems always active in catastrophic situations
- *Historical Data Easily Available*
 - Avoid data conversion costs
 - Treat legacy system like an “agency”
 - Apply savings to other needed procurements

The following sections more closely examine a few of the reported benefits.

Benefits measured in terms of lives saved and risks reduced

Providing the right information to the right person at the right time can have a huge impact on the first responder, citizens, and the community: Criminals can be arrested; the innocent can be freed; the lost can be found. These enhanced decisions have both dollar and lifesaving impacts that affect the health, well-being, and viability of families and communities.

Case Study

In October 2012, the *LA Times* reported³ that the City of Los Angeles and the Los Angeles Fire Department was being sued for wrongful death, which occurred in February 2009, involving delayed response and not sending closer units. News articles report that emergency callers near the City’s jurisdictional border are about 50 percent more likely to wait more than 10 minutes for responders to arrive (remember that, in cardiac arrest, brain damage can begin after just four minutes). An Internet search reveals several other cases of a similar nature in other cities and states⁴.

In many of these examples, a CAD-to-CAD interoperability solution had the potential to save lives. Unfortunately, there are hundreds of instances where people pleaded for help to come and minutes, hours, or days passed. The anguish of these people, as well as the telecommunicators unable to help them, is unquantifiable. Lives have certainly been lost by the inability to send the closest responders to help. With available technology, many lives are now being saved by sending the closest units to provide assistance.

Benefits measured in terms of optimized and extended legacy system investments

Consider how an effective and functional interoperability deployment extends and leverages significant investments of time (*e.g.* application selection and implementation), people (*e.g.* project managers, trainers, and trainees – many of whom are trained on overtime), and money (*e.g.* original procurement, annual maintenance cost, and upgrade costs) previously spent in dispatch or records systems. The right data sharing platform has the powerful effect of unifying disparate systems as if they were one single operational system. This benefit results from a modest investment, often much less than the combined annual maintenance costs of the disparate systems.

Case Study

The Orange County Regional Fire Interoperability Project in California has four Public Safety Answering Points (PSAPs) within its jurisdiction, operating several different CAD systems. One of these systems is very old, yet still shares dispatch information with the other dispatch centers. All fire apparatus utilize AVL to present their exact position to the CAD systems. This common operational picture provides

³ Ben Welsh, Robert J. Lopez and Kate Linthicum (2012). "Hooks family’s lawsuit against LAFD," *LA Times*. Retrieved from: <http://documents.latimes.com/hooks-family-lawsuit-against-lafd/>

⁴ For more articles regarding delayed 9-1-1 response, visit: <http://www.latimes.com/news/local/lafddata/>

dispatch and command staff accurate, real-time location of the closest resources. Automatic call transferring between CAD systems allows for quicker response time and automatic mutual aid. The ability to interoperate extends the life of the systems and provides significant cost benefits year after year.

Benefits gained with expanded situational awareness

Situational awareness has undisputed value – and so does more quickly arriving at a fire or a medical emergency. One early study⁵ determined agencies could save between 30 seconds and four minutes with robust data sharing solutions in place; and, that these time savings result in saving lives and reducing property damage.

Case Study

The Nashville Regional Information Sharing System (NRIS)⁶ in Tennessee began sharing information between Nashville and its four surrounding counties in 2009. Twenty-four dispatch centers share data in real time as events take place. Within two weeks of the system being installed, police apprehended a number of perpetrators and broke up a regional burglary ring. The common operational picture displayed the location of all units to the command post that were then able to deploy units to effectively track suspects' cell phones and capture them while fleeing. One NRIS officer commented:

"Knowledge is power, and we can never have too much knowledge with our jobs. There are too many unknowns for us out there anyway so every little bit that we can have that brings us closer together and gives us more knowledge and more communication ability with one another, the better off you are."

The Keys to Making the Best Decision

There are a number of things to consider when deciding to proceed with a regional data sharing project, whether it is CAD, RMS, Geographic Information Systems (GIS; also, called "mapping"), or mobile data. Careful evaluation of proposed solutions and service providers is imperative. This will enable agencies to:

- ❖ Assess information and avoid solutions that are not suitable, proven or tested;
- ❖ Understand the depth and breadth of the technical aspects of data exchange and the related issues; and,
- ❖ Compile the complete cost of potential systems and technologies.

To make the best decision, we recommend agencies begin project planning with finding a strong project leader and engaging all stakeholders. The absence of strong project leadership at the outset is a portent of difficulties to come—at the least, there will be confusion and difficulty in making decisions, which will lead to timeline slippage and scope creep. Additionally, the interest of stakeholders will wane and cynicism will replace belief in leadership. Political support may also decline, possibly leading to withdrawal of funding. Organize your team of stakeholders well and get started.

⁵ OIC (2008), "Computer-Aided Dispatch Interoperability Project: Documentation of Regional Efforts," DHS. Retrieved from: <http://www.safecomprogram.gov/library/Lists/Library/Attachments/148/ComputerAidedDispatchDocumentationofEfforts.pdf>

⁶ NRIS, "NRIS Nashville Regional Information System / Data Interoperability," NRIS. Retrieved from: <http://www.youtube.com/watch?v=LiE9J6lAVZU>

Next, thoroughly understand and document the roles and responsibilities of contributing parties. Never make assumptions as to responsibility or deliverables.

The leadership team should then create a list of their ‘Highest Priority Outcomes’ and matching ‘Operational Functionality’. With this as the central guiding list, the agency team can weigh the [critical criteria checkpoints](#) and understand the different components and options available to them. These concepts, along with examples, are presented further in this document.

Project Planning and Preparation

There are several prerequisites for good decision making for an interoperability project. These foundational decisions are so critical that they can impact your project independent of other decisions and actions you may take. Remember that it is imperative to first spend time planning before implementation and execution; it will be time well spent!

The first prerequisite: **Build a strong team** among the agency participants. This team should have a basic (if not an advanced) understanding of the principles of change management and should be excellent communicators. They must champion the need for change and must recruit others. The leadership team should be composed of individuals with credibility, authority, and analytical expertise. The team will need to communicate the collective vision to all stakeholders and convey the benefits and urgency of change to gain buy-in.

The second prerequisite: **Address governance issues early**. Solid governance will eliminate many of the risks associated with interagency information sharing and will provide a process for addressing issues that arise. This step can take longer than expected. Do not avoid addressing these issues and hope that they will not come up: Address them early and participants will know where everyone stands.

The third prerequisite: **Plan for sustainability**. Many projects have gotten off to good starts and were stood up with great success. But without succession and sustainability planning, some have floundered. Leaders must plan for sustainability at the outset for several reasons:

- ❖ It is required for grant applications;
- ❖ It greatly contributes to the return on investment; and, most important,
- ❖ It does save lives.

Responsibilities of Partners in Interoperability Solutions

While the majority of the costs in an effective interoperability solution will likely be borne by the lead agency and the selected solution provider, the total list of involved entities includes:

- ❖ The Agency; and, *Agency Partners – Project Management and Leadership Teams* – including each participating agency’s IT and operations staff, change management and training teams, and community relations, legal, and media teams
- ❖ The *Interoperability Solution Provider* – Sales team, contracts team, project management team, and customer service team
- ❖ *Existing/Legacy CAD or RMS Systems Service Providers*
- ❖ *Systems Integrators and Consultants*

Table 2 below provides details of what the parties normally manage in interoperability projects.

TABLE 2. RESPONSIBILITIES OF PARTNERS IN INTEROPERABILITY SOLUTIONS

RESPONSIBLE PARTY	TASK RESPONSIBILITY
Solution Provider	<ul style="list-style-type: none"> Provide application software for one way point-to-point integration, and/or bidirectional point-to-point integration, and/or one consolidated regional system with all agencies on one platform relinquishing individual applications
	<ul style="list-style-type: none"> Provide an agreement with Scope of Work (SOW) that include deliverables, timelines, and payment milestones
	<ul style="list-style-type: none"> Provide, as per the SOW, distributed or centralized configurable layer of business rules. <ul style="list-style-type: none"> NOTE: It is very important to address and eliminate any grey areas in the SOW. It must have language about deliverables that is clear, complete, and concise. This helps the service provider, as well as the agency, be successful as they identify additional work out of scope thus preventing scope creep, delays, and disputes on what is or is not to be provided.
	<ul style="list-style-type: none"> Specify/identify workstation and server hardware and hardware specifications of all affected components, providing recommendations for best performance as well as acceptable minimums
	<ul style="list-style-type: none"> Specify/identify license and maintenance fees. <ul style="list-style-type: none"> License fees are typically based on the number of users or number of systems integrated, while maintenance normally begins after the first year of warranty expires. Expect maintenance costs to escalate each year by as much as 5 percent or the 'cost of living adjustment' (COLA)
	<ul style="list-style-type: none"> Provide professional services (<i>i.e.</i> project management, configuration, training, customization, and go-live support)
	<ul style="list-style-type: none"> Provide capability to expand the interoperability system for both additional CAD and/or RMS systems, and/or for added functionality (<i>e.g.</i> AVL, mobile, field reporting, analytics, risk analysis, or any additional features or applications)
	<ul style="list-style-type: none"> Provide an administrative tool set – providing user configurability tools to the agency
	<ul style="list-style-type: none"> Provide on-going support (<i>i.e.</i> maintenance agreement)
Agency Leadership Team	<ul style="list-style-type: none"> Review existing mutual or automatic aid agreements Revise as needed with revised governance agreement
	<ul style="list-style-type: none"> Search available technologies Perform preliminary evaluation Match study to potential service provider pool
	<ul style="list-style-type: none"> Prepare list of high priority outcomes and associated functionality so that metrics can be derived and performance measured (sometimes called a 'Needs' or 'Requirement Analysis')
	<ul style="list-style-type: none"> Check with purchasing department to determine procurement rules and the availability of contract vehicles for expedited procurement
	<ul style="list-style-type: none"> Manage the Request for Information (RFI) and/or Request For Proposals (RFP) development, issuance, and selection process if this path is chosen
	<ul style="list-style-type: none"> Conduct contract negotiations and execute a mutually beneficial (<i>i.e.</i> win-win) agreement with clear deliverables, timelines, and payment schedules
	<ul style="list-style-type: none"> Obtain current Application Programming Interfaces (API) from existing service providers providing CAD and RMS applications <ul style="list-style-type: none"> A commitment of cooperation by the service providers is an absolute requirement to allow the data sharing solution to be successful.
	<ul style="list-style-type: none"> Budget for internal staff time and tools required to manage and update the applications at each agency

RESPONSIBLE PARTY	TASK RESPONSIBILITY
	<ul style="list-style-type: none"> Manage the change management program and the internal and external communications process so that all stakeholders are kept informed of the status, issues, risks, and successes Proactively gain support to present the project in the best light to the public, as well as elected officials, to ensure continuous long-term support. <ul style="list-style-type: none"> Be sure to publish successes! Advise on contract issues throughout the relationship Advise the leadership team <ul style="list-style-type: none"> This is done by a legal liaison. Ensure sufficient time for training all users
Existing Legacy Providers	<ul style="list-style-type: none"> Cooperate fully and collaboratively to provide API and any required documentation with the interoperability service provider to serve the public with faster emergency response Work in partnership with the interoperability service provider during upgrades or changes to the database that may impact data exchanges Construct data exchanges that are standards conformant
System Integrator and/or Consultants	<ul style="list-style-type: none"> Provide, as contracted, important oversight, strategy, staffing, testing, project management, contract administration, support, and/or guidance

Although the above list captures the highlights of task ownership, there are likely additional tasks that will arise with individual projects.

List of High Priority Outcomes and Associated Operational Functionality

This list of outcomes and functionality is very important in guiding the solution selection efforts. The list should comprise the highest priority outcomes that you want to achieve when the solution is in place, and should match with expected operational functions to achieve the outcomes. Table 3 below includes several examples that pertain to interoperability.

TABLE 3. EXPECTED OUTCOMES AND OPERATIONAL FUNCTIONALITY FOR INTEROPERABILITY

SYSTEM TYPE	EXPECTED OUTCOME	OPERATIONAL FUNCTIONALITY
CAD-to-CAD	<ul style="list-style-type: none"> Reduce the time it takes to send closest appropriate resources to a fire call by 30 seconds to four minutes or more from first call 	Gaining the electronic ability to transfer a call taken in Agency 'A' CAD system to one or more Agency 'B' CAD systems automatically based upon rules of operation in the system
	<ul style="list-style-type: none"> Increase first responder safety and performance through gaining real-time, common operating picture 	Having real-time knowledge of unit status and location by automating the process of sending and receiving status updates of units and AVL data
	<ul style="list-style-type: none"> Reduce dependence on voice communication between agencies 	Allowing real-time electronic communication of information between all systems
RMS-to-RMS	<ul style="list-style-type: none"> Increase first responder safety and increase efficiency of warrant service 	Automatically checking neighboring law enforcement agency's RMS database for wants and warrants when a query is run on a person or location
AVL / Mapping	<ul style="list-style-type: none"> Be able to view units from surrounding agencies on a regional map in real time 	Using AVL devices that report their location on regional map views

SYSTEM TYPE	EXPECTED OUTCOME	OPERATIONAL FUNCTIONALITY
	<i>Agencies should articulate additional outcomes specific to their project</i>	<i>Agencies should articulate the operational functionality to be achieved</i>

Critical Criteria Checkpoints

Now that you have quantified what you want the solution to accomplish, you will need to evaluate solution providers. Conducting due diligence on solution providers to help choose the best fitting solution makes more fiscal sense now as tax dollars are ruthlessly scrutinized for potential ROI. Few agencies have the financial means to be totally self-sufficient in today's economic environment—and, the imperative to share resources and exchange information is self-evident. Making the right decision initially saves time and money, and success proves value to political leaders who, in turn, can show such value to their constituents.

Table 4 below contains suggested critical check points that will help evaluate solutions and solution providers. Although CAD is mentioned, any interoperability solution can be inserted. If objective scoring is desired, then the agency may score each check point on a scale of 1 to 10, with 10 being the best. In certain checkpoints, a 10 means the step is complete with the particular vendor solution, or the costs are a subjective assessment that is balanced against real capability and real delivery. In all cases, reference checks and site visits should be conducted.

TABLE 4. CRITICAL CRITERIA CHECKPOINTS

	CRITICAL CHECKPOINT	SOLUTION ASSESSMENT (BY EACH SERVICE PROVIDER)
1	<ul style="list-style-type: none"> ▪ Has the solution been implemented and is it live? <ul style="list-style-type: none"> – Ask the service provider to show you or allow you to see the complete and functioning system in use – exactly like the one you desire for your agency/region. 	
2	<ul style="list-style-type: none"> ▪ Does the solution align with stakeholders needs? <ul style="list-style-type: none"> – How well does the demonstrated solution match your very specific list of needs, both in desired outcomes and operational functionality? 	
3	<ul style="list-style-type: none"> ▪ What are the API costs and associated capabilities? <ul style="list-style-type: none"> – Is the API cost included for all involved service providers and are they all proven and tested? – Are the data exchanges standards conformant where applicable? 	
4	<ul style="list-style-type: none"> ▪ What are the integration requirements and costs? <ul style="list-style-type: none"> – What are the requirements to connect to each system's API so that communication can flow end to end? – What is the cost for developing the adapters and translators to make that communication work; and, are the methods proven and fully functional? – Are the business rules customizable for your agency's needs, as well as for other agency's needs? 	
5	<ul style="list-style-type: none"> ▪ What are the message switch / hub middleware costs? <ul style="list-style-type: none"> – What is the full capability of the message switch hub; and, is its operation measured to high performance specifications? 	

	CRITICAL CHECKPOINT	SOLUTION ASSESSMENT (BY EACH SERVICE PROVIDER)
6	<ul style="list-style-type: none"> What are all the required customization and professional services needed to be successful? <ul style="list-style-type: none"> What implementation and professional services are needed, on both the agency side, as well as the service provider side, to obtain the “rich intelligence” layer of business rules required for a completely functional system in year one? 	
7	<ul style="list-style-type: none"> What are the maintenance and support costs that may result from changes made to any vendor’s CAD, RMS, mapping or other applications, APIs, or other agency type of business rule changes? <ul style="list-style-type: none"> Experience should enable the service provider to project cost categories and probable expenses (e.g. vendor application updates, adding new agencies, policy changes, etc.). 	
8	<ul style="list-style-type: none"> What is the full cost and realistic cost projection over time? <ul style="list-style-type: none"> List previous historical application procurement costs, upgrades and maintenance, and cost of data exchanges, as well as future cost projections (i.e. previous, currently, and in the next five years). 	
9	<ul style="list-style-type: none"> How well does the solution cost match my budget? <ul style="list-style-type: none"> Considering the cost of time, people, and the system itself are all to be included, evaluated and weighed. 	
10	<ul style="list-style-type: none"> What is the service provider’s ability (technical framework) and willingness (attitude) to team with other vendors for a total system over time? <ul style="list-style-type: none"> This includes the commitment, capability and capacity to add more agencies’ dispatch systems to the regional solution, or add more CAD functionality, add RMS-to-RMS interoperability, add regional Global Positioning System (GPS) views, alerting functionality, communication functions, etc. 	
	TOTAL SCORE RATING	

Three Critical Perspectives

There are three critical perspectives to consider when seeking an interoperability solution and the right service provider partner. Acknowledging these perspectives will help in planning for both short- and long-term success. They are:

- 1) Expanded Need Perspective
- 2) Proven and Tested Perspective
- 3) Full Cost and Benefit Perspective

Expanded Need Perspective

Be clear on what you initially want, as well as how it fits in with overall operational systems that include CAD, RMS, mapping, GPS/AVL, and other data exchanges. Then, articulate the desired “future state” as to what you know you will need for interoperability, mobility, and operational functions among your regional stakeholders or partners.

For example, with regards to functionality, you might initially state:

- ❖ “I want to be able to view all on-duty units within my region”; or,

- ❖ “I want to be able to transfer the entire call information pack to another agency and save 3 to 4 minutes from what it now takes manually.”

Future functionality might include:

- ❖ “I want to be able to dispatch another agency’s fire units if they are closer to the call for incidents where lives may be at stake (*i.e.* house fire as opposed to a dumpster fire in a vacant lot).”

As you move through the process of learning and listening to solution options, refine your list of functions and keep it central to every discussion.

With regards to scalability within your region, you might initially state:

- ❖ “I want to share dispatch data between 5 local fire departments and be able to expand it to all 21 fire agencies within my county, irrespective of the dispatch solution provider, the version of the software or the age of the system.”

Proven and Tested Perspective

Mandate that any service provider demonstrate their solution works and is proven in other settings that match your size, volume, and desired functionality. Given that real interoperability such as CAD-to-CAD is still relatively new operationally and has not been implemented very often, you avoid significant pain and cost by taking a “proven and tested” perspective. There are reasonable risks that are acceptable in this area, but demand a solid plan be presented to mitigate these risks. Talk to several customers that are using the core technology being proposed, and visit several on-site that are doing something similar to what you want done.

Many proposed solutions are not tested and still under development, applied in other non-mission critical environments, or will only take you so far and then are not expandable in adding agencies or in adding functionality. Your first two critical questions should be:

Test 1

- **Is it proven and functional now with other customers?**
 - Where can I go see the solution that is similar in scope and functionality to what we are trying to accomplish?
 - What versions of software and operating systems are involved at these agencies?
 - Can you describe to me the architecture so that I can understand it?

Test 2

- **Does it match my full list of what I want done?**
 - If not the full list, does it match the top priorities?
 - What is the development time for the missing priorities?
 - What assurances do I have that the missing functionality will be delivered?

Full Cost and Benefit Perspective

Chart the full cost and benefit picture by looking at real data. Understand the full procurement costs for each of the applications from agencies that will be involved in the CAD, RMS, mobile, or AVL data sharing. Add to that the cost of every year of maintenance and license fees, plus any additional upgrade fees you have paid to the CAD vendors or consultants. The significant investments made to date also

include personnel and training time. These investments will likely not be recovered should the agency relinquish their systems and agree to a shared, regional system from one service provider.

Now add the cost of the new proposed CAD-to-CAD—or RMS-to-RMS or regional mapping/AVL—solution and the related ongoing maintenance, consulting, upgrade, and training personnel time that come in year one and beyond. Also, consider opportunity costs and performance consequences related to leaving the system the way it is now or to not implementing a total interoperability solution. You will discover that your interoperability solution is likely a fraction of the cost of the original systems.

Costs and Other Considerations

As you acquire interoperability, particularly with CAD, you also need to evaluate other components of your overall public safety operational software system. Recognize that GPS/AVL and mapping functionality is also very important to present a robust common operational picture for first responders; and, RMS interoperability is needed for a true regional picture of crime that would be most productive for data analysis, data mining, and threat analysis. These components and applications have costs beyond simply procuring them: There are maintenance and management costs, upgrade and testing costs, data preparation and conversion costs, and more.

You may be able to **s quickly ort** out the validity of each solution and save time by not further examining solutions that do not pass the tests mentioned in this paper. All service providers have to make money to stay in business; some may also have to answer to stockholders or investment firms that dictate to them the acceptable level of profitability. They are thus compelled to try to win your business (*i.e.* make sales), which means that you should verify any claims with thorough fact checking.

Consider the ways that added features would enable you to take advantage of the newly presented information. Consider other “communities of interest” such as hospitals (including emergency rooms and trauma centers), emergency operations centers, Federal emergency assistance organizations, and back-up and recovery sites with which information could now be shared. Consider interoperability between other regional systems particularly in a natural hazard area such as a flood zone.

Think further about functionality that would enhance operations such as bulletins, alerts, special group email, and task force chat to enhance communications and collaboration among law enforcement and fire-rescue agencies. Not only do you need all of these operations to function in an data sharing, networked and unified system, but they should also be mobile. Mobile device and applications have significant costs, but being truly mobile today is critical and means that you can connect securely with anyone – and get that access at anytime, anywhere. It enables the delivery of the right information to the right people at the right time. Since mobile devices are ever changing and increasing in functionality, select a solution that can support multiple platforms (*e.g.* IOS, Android, etc.) and can evolve with the devices.

Finally, to aid in providing information for decision making on data exchanges, ensure common configurations are presented in easy to understand graphics.

Configuration Synopses

It helps to have a picture in your mind of what the various configuration options look like. Presented below are *consolidated*, *point-to-point*, *message broker*, and *intelligent middleware* options. Note that these terms are not industry standard as there are no accepted defined terms among service providers

as to what configurations are called; and, that service providers often choose marketing impact over clarity.

Consolidation, Regionalization or Centralization

This paper would be remiss if it did not expand upon consolidation as a method of sharing CAD, RMS, mobile, and/or AVL data. Consolidation under a single service provider—where everyone in the county, region or district gives up their own separate systems and agrees to use one service provider’s applications—can be a viable method for information sharing. What must be taken into account is the cost of additional software licenses (balanced against the licenses you will be collectively abandoning), project management for the initiative, data migration, and training (which may have to occur on overtime). Of course, this option is predicated on the premise that the service provider applications “fit” all of the needs of the agencies, and that the workflows take into account the requirements of the agencies. Figure 1 below conveys this concept.

FIGURE 1. CONSOLIDATION CONFIGURATION

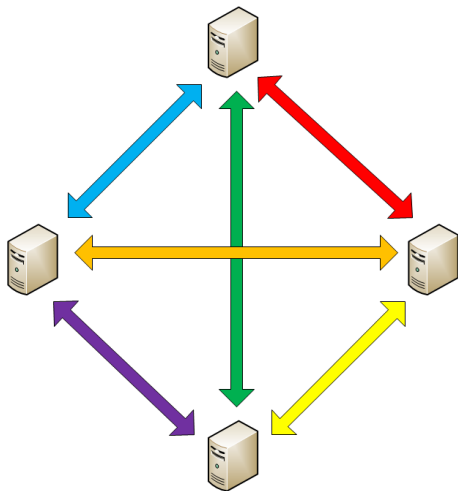


Typically, agencies within the region give up individual systems and adopt the “one size fits all” of a single solution provider. They need to ascertain and accept the functionality at the outset, which may be more (or less) than what they are used to. Participating agencies may also consolidate their CAD operations yet maintain separate operations for their Records Management Field Reporting Systems.

Point-to-Point

The point-to-point configuration involves direct linkage of four systems with each other. This becomes unwieldy and expensive to implement and enhance as more agencies are added. Early adopters of interoperability often found this to be their only choice and, even today, this is all that many service providers offer. Figure 2 below conveys this concept.

FIGURE 2. POINT-TO-POINT CONFIGURATION

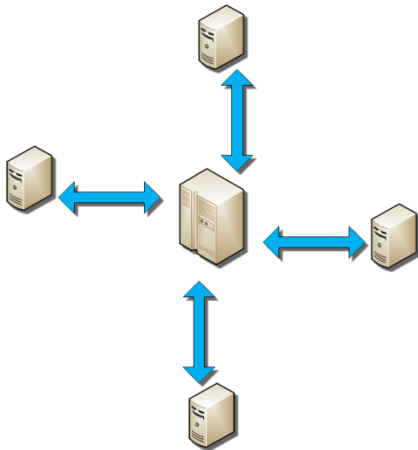


Typically, this configuration works well if there are 2-3 systems and 1-2 service providers involved. It is highly dependent on the expertise of these service providers as, well as their internal bandwidth. It is also cumbersome to administer.

Message Broker

Message broker solutions can be likened to big empty pipes that gush almost everything. Most intelligence and filters are at the receiving end; there may be some 'publish and subscribe' rules at the hub but they are typically not highly intelligent. There is a danger of information overload, which obfuscates important incoming data. Figure 3 below conveys this concept.

FIGURE 3. MESSAGE BROKER CONFIGURATION

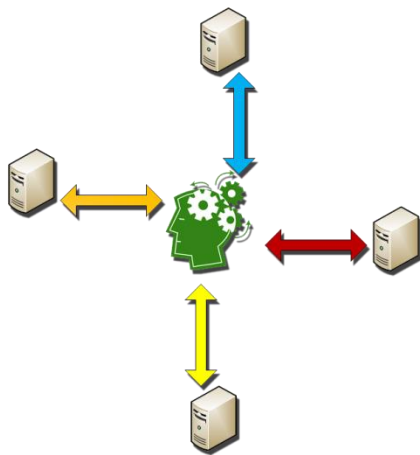


Typically, the message broker is the hub in the middle that passes along all information and filters, if any, reside at the agency end points. There can be a lot of work involved in updating and making any changes to the connections at the end points. Information overload is a real possibility with irrelevant information obscuring truly important information.

Intelligent Middleware

Intelligent middleware solutions are highly scalable and highly configurable, as the logic and business rules are in the middle hub (server). Agencies are usually given simple instructions to "publish all and subscribe all" because all the filtering is done at the hub. Exceptional service providers state that they can connect, "any vendor, any version, any vintage" for a view-only integration. Bi-directional data exchanges need the cooperation of the other service providers, which is usually not a problem, especially among IJIS Industry members. Figure 4 below conveys this concept.

FIGURE 4. INTELLIGENT MIDDLEWARE CONFIGURATION



Typically, all the filters are in the intelligent middleware, which means that all the business rules and logic reside in the middle. It is much easier to set up and maintain, with the spoke agencies receiving exactly what they want. They can easily exchange data and share based on current situation, needs, and location.

This review of interoperability topology, along with the information throughout this paper, should arm the practitioner with a foundation to evaluate and select the most appropriate solution for their circumstance.

The IJIS Institute is very interested in your assessment of your interoperability projects.

To provide feedback on your interoperability projects, or feedback on this paper, contact **Randy Kent**, *IPSTSC Committee Liaison*, at randy.kent@ijis.org.

CONCLUSION

If you are diligent in assembling the right leadership team, clearly identifying your needs through a list of your “expected outcomes,” matching “operational functionality,” and evaluating potential solutions through the critical checkpoints, then you are on your way to a successful project. With this background, you will be able to identify solutions that are proven and scalable so you can avoid costly surprises later. By considering costs and other considerations, as well as planning for future options and the returns that they will deliver, you reduce risks and may plan for long-term success.

Simple, low participation interoperability projects may take only a few months to complete. Most complex projects with multiple agencies, service providers, and bi-directional data exchanges are completed in phases over multiple years. Securing funding is usually the largest driver to adding agencies, jurisdictions, and additional functionality. Federal grant funding providers continue to look favorably upon data sharing solutions with regional support and participation.

Initially made decisions will greatly expand or limit your options in following years. The first steps are the critical point of decision making and lay the foundation for success. Selecting a system that meets the budget and available funding at the outset would seem to be the highest priority; yet, of equal importance is selecting a solution with the right technological approach that includes the interoperability platform and framework that will make it secure, serviceable, and scalable in the future.

The bottom line comes down to quantifying your ROI: What do you get in functionality for the cost over time? Are lives saved, first responders better protected, or property damage minimized? You should strive to select a software technology partner that will support you through years of rapidly changing technology. Not only must you consider the robustness of the product itself for getting the operational job done but, with an increasing mobile workforce, you must also take into account the future interoperability and mobility framework upon which the product functions.

ABOUT THE IJIS INSTITUTE

The IJIS Institute unites the private and public sectors to improve mission-critical information sharing for those who protect and serve our communities. The IJIS Institute provides training, technical assistance, national scope issue management, and program management services to help government fully realize the power of information sharing.

Founded in 2001 as a 501(c)(3) nonprofit corporation with national headquarters on The George Washington University Virginia Science and Technology Campus in Ashburn, Virginia, the IJIS Institute has grown to nearly 200 member and affiliate companies across the United States.

The IJIS Institute thanks the IPSTSC for their work on this document. The IJIS Institute also thanks the many companies who have joined as members that contribute to the work of the Institute and share in the commitment to improving justice, public safety, and homeland security information sharing.

For more information on the IJIS Institute, visit the website at: <http://www.ijis.org/>; follow on Twitter: [@ijisinstitute](#); read the [IJIS Factor Blog](#); or, join LinkedIn at: [Justice and Public Safety Information Sharing](#).

About the IJIS Public Safety Technical Standards Committee (IPSTSC)

The purpose of the IJIS Public Safety Technical Standards Committee (IPSTSC) is to promote and contribute to the development of technical and functional standards for public safety IT components, to provide industry input and policy review on technical matters faced by the public safety community, and to oversee IJIS projects assigned to the Committee. IPSTSC's function includes:

- 1) Review, comment, and make recommendations to practitioners on functionality and technology that will improve the capabilities of public safety IT systems.
- 2) Provide advice, counsel, and support to the IJIS Board and other IJIS committees.
- 3) Represent the IJIS Institute and industry at appropriate seminars, meetings, and training programs to educate practitioners and industry on new trends and technologies for public safety IT.
- 4) Provide industry representatives to serve on committees and other national working groups as requested.

The IPSTSC Committee welcomes inquiries regarding participation on the Committee.

To learn more about the IJIS Institute or the IPSTSC, contact: **Steve Hoggard**, *Chairman*, by phone at 800-860-8026 ext. 1896 or by email at shoggard@spillman.com; or, **Becky Ward**, *Vice-Chair*, by phone at 352-342-3022 or by email at bward@ask4cii.com.

ACRONYMS AND ABBREVIATIONS

ACRONYM OR ABBREVIATION	DEFINITION
API	Application Programming Interfaces
AVL	Automatic Vehicle Location
CAD	Computer Aided Dispatch
COLA	cost of living adjustment
DHS	U.S. Department of Homeland Security
GIS	Geographic Information Systems; also, "mapping"
GPS	Global Positioning System
IJIS	IJIS Institute; or, integrated justice information sharing
IPSTSC	IJIS Public Safety Technical Standards Committee
NRIS	Nashville Regional Information Sharing System
OCFA	Orange County CA Fire Authority
PSAP	Public Safety Answering Point
RFI	Request For Information
RFP	Request for Participation
RMS	Records Management System
ROI	Return On Investment
SOW	Scope of Work