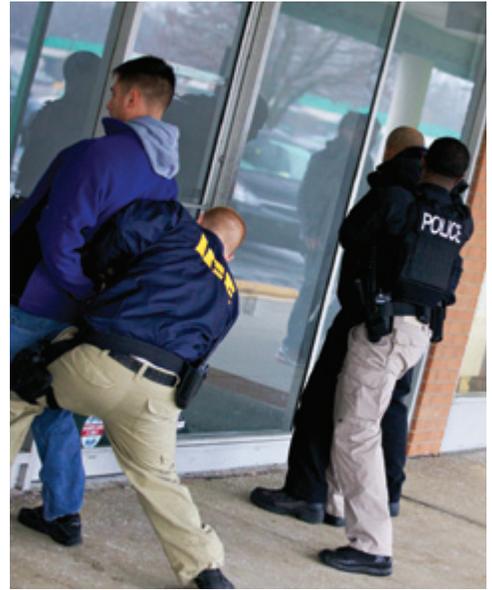
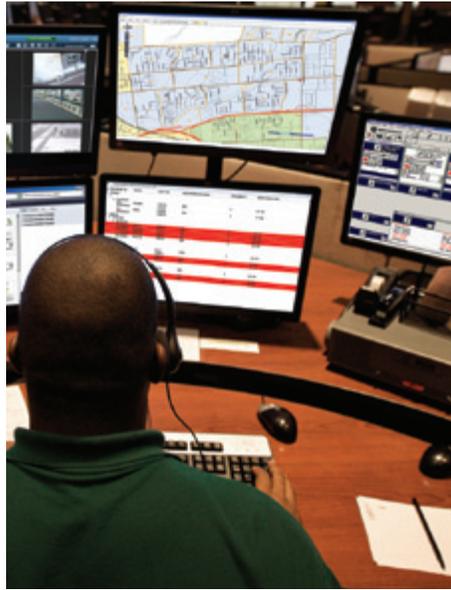


GEOGRAPHIC INFORMATION SYSTEMS (GIS): THE BEDROCK OF NG9-1-1

**THE TIME IS NOW FOR PSAPS AND REGIONAL AGENCIES TO TAKE
ADVANTAGE OF THE ACCURATE GEOSPATIAL DATABASES THAT
WILL BE KEY TO NEXT GENERATION EMERGENCY CALL SYSTEMS**



11:52:15 WEDNESDAY, OCTOBER 12, A FEW YEARS FROM NOW.

A little before noon, an emergency call center begins receiving reports of a growing mob action in an urban neighborhood. The cause is unknown, but the calls describe a dangerous scene. A group of people is rampaging through a small commercial district, threatening citizens and causing serious damage. Using caller location data provided by the mobile phones of persons reporting the incident, the NG9-1-1 system automatically routes the calls and text messages to the PSAP best able to respond to the emergency. One caller sends video of a group of stores on fire, including a dry cleaning establishment housing dangerous chemicals.

As the calls come in, the system automatically displays caller location on a map of the vicinity, and dispatchers using the same map are able to see which police units are in the best position to respond. The map also displays gang affiliations in the area, alerting first responders to which gangs are likely to be involved. Dispatchers can also see which fire stations are nearby, enabling them to send units equipped to deal with hazmat situations. They also can see that two primary schools are in the area, and should be placed on lockdown status with strong police presence. The maps, enriched with several layers of GIS data, also show the nearest hospitals from which to dispatch EMT units. Response is immediate, and the situation is resolved in short order, with fire and hazmat damage minimized, arrests made quickly and major injuries avoided.

Many of these advanced functionalities of NG9-1-1 are not yet available today. But today is when to start preparing to take advantage of the next generation emergency command and control systems that will deliver them.

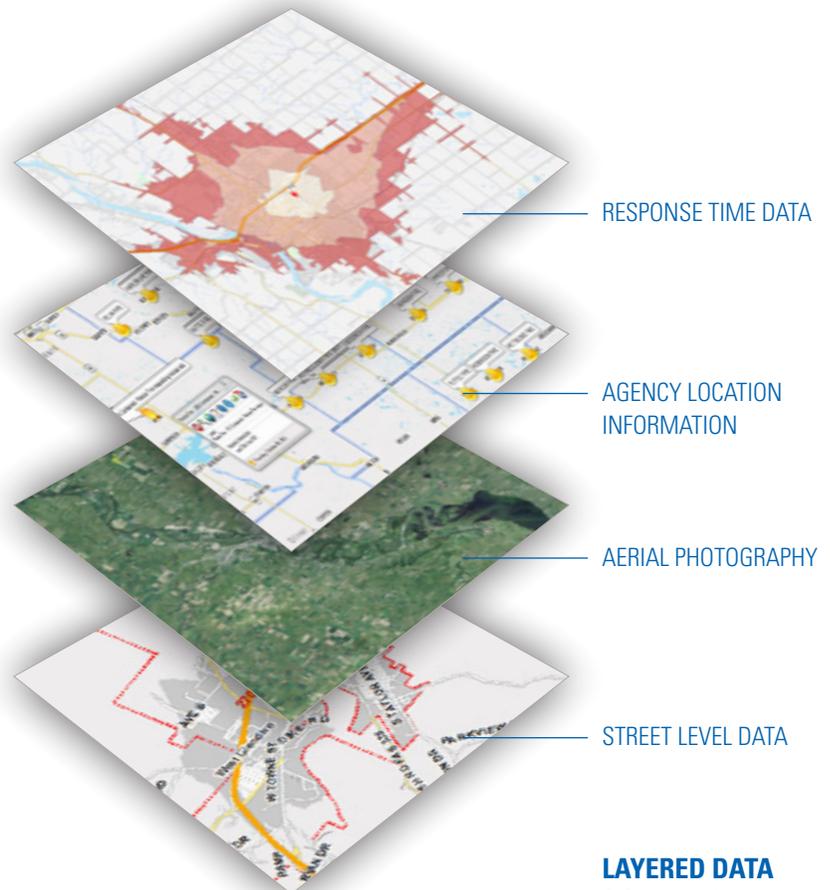
All around the world today, virtually every public safety agency is trying to figure out all the implications of next generation emergency command and control systems. Whether the emergency number is 9-1-1, 9-9-9, 1-1-2 or any other, the enhanced capabilities provided by emerging next generation systems are going to be transformational. Unlike voice-only legacy networks, next generation systems also enable text messaging, data, images and video to be sent to the PSAP to help ensure more efficient and appropriate emergency response.

Most public safety professionals understand that Geographic Information Systems (GIS) and their associated data are going to play a mission critical role in these advanced new systems. They're also aware of the challenges they face in transforming their current Master Street Address Guide (MSAG), Automatic Location Identification (ALI) and existing GIS databases into more powerful next generation GIS data. They know that next generation systems will be built upon Emergency Services Internet Protocol Networks (ESInets) that will often have a regional or even broader geographic focus. They realize that ESInets are going to be dependent on sophisticated GIS systems and up-to-date data sets that go beyond anything most jurisdictions have today. Because of this, GIS systems and GIS data creation and maintenance will be even more important to next generation emergency response systems than they are now.

This report will provide a brief overview of GIS functionality in next generation call systems, discuss the benefits of the technology, point out implementation challenges and provide suggestions to help Public Safety Answering Points (PSAPs) and other jurisdictions with an interest in GIS to understand and overcome these challenges.

WHAT IS GIS?

GIS is an integrated mapping system that takes words, numbers and other data that can be correlated to geography (i.e., location) from a database and visualizes them on a map, making the information easier to understand, analyze and work with. GIS incorporates hardware, software and datasets to capture, manage and analyze geographic data and optimize the use of location-based information in systems of all types, including next generation emergency command and control systems. GIS uses geographic data and geospatial analysis to



provide more accurate, more in-depth location information to dispatchers and first responders. GIS automates use of this information to improve response times and optimize situational awareness, leading to more effective incident resolution. It allows public safety agencies at local, regional and statewide levels to view and work with the same consistent geographic data, helping to maximize inter- and intra-agency collaboration and coordination in the pursuit of safer communities.

LAYERED DATA

GIS map projects can be built by overlaying multiple datasets to provide more in-depth information on a specific location

MAPPING LOCATIONS AND MORE

GIS takes mapping far beyond simply showing specific locations, e.g. a street address or an intersection. GIS-enhanced mapping can be used to deliver a great deal of additional information concerning the relationships between people, places and things. The correlation of physical locations to reveal relevant proximities and relationships is a key function of GIS systems and tools. Mapping specific locations of primary schools, for example, and correlating them with the locations of video surveillance cameras or fire and police stations reveals proximities and relationships between and among these key community populations, as well as with other locations in the community. Use of GIS can also help to map densities, such as which areas have the highest concentration of known gang members or the largest number of burglaries, helping to identify patterns and providing information to enhance community safety. GIS can even map change. It can reveal how areas and locations change over time, helping to gain insight on the short- and long-term impact of various events on a location, or to analyze change patterns to help anticipate future needs.

GIS AND SITUATIONAL ANALYSIS

GIS maps deliver detailed situational awareness for dispatchers and first responders by geographically tying persons, processes and data together. Dispatchers, police officers, firefighters and EMTs can access a common view of GIS data such as street maps and agency boundaries projected on a 2-D map using longitude and latitude coordinates. These maps help them assess the situation at a glance, and can be enhanced by overlaying other areas (or layers) of geographic importance like gang territories, location history or hydrant sites to present a complete picture of each incident and location. Other data — such as live video from street cameras or photos sent from mobile phones — can also be displayed to enhance awareness and safety. Because each responder is able to view exactly what others are seeing, it's also faster and easier to work together and coordinate with other jurisdictions and agencies.



GIS-OPTIMIZED CALL ROUTING

Next generation GIS systems help PSAPs solve many of today's call processing issues. In legacy systems, for example, GIS data is normally accessed *after* the call reaches the PSAP and is used to help dispatchers locate the caller. Efficient and effective response can be compromised due to missing or incomplete geographic data. This can lead to incorrect or imprecise routing and caller location determination, which can cause significant delays in response that may be life threatening for both citizens and responders. In NG9-1-1 systems, however, the pervasive use of GIS datasets at all points along the emergency call helps eliminate the manual caller location lookup of today's traditional ALI systems. Instead, through the use of real-time caller location provided by the calling device itself, the call is automatically routed to the correct PSAP. Dispatch can therefore be faster and more accurate, dramatically improving outcomes.

GIS-ENHANCED ANALYSIS

By enabling the real-time mapping a variety of geospatial data, GIS shows at a glance a wealth of information that is tied to a location or area. By overlaying additional geospatial datasets, the system can reveal patterns in the data that might go unrecognized without this mapping functionality. This can help agencies to analyze data such as traffic accident and crime rate information to better view, investigate and understand geographic patterns to help remedy and resolve recurring problems in locations such as intersections and neighborhoods.

HAZMAT SITUATION

Mapping the location, scope and impact of a significant toxic material spill

NG9-1-1 TRANSITION



The transition to a next generation call system involves a significant amount of work. Overall, agencies must deal with issues such as budgeting, technical preparation, operational planning, governance issues and more. But the key to a successful migration is the creation and maintenance of next generation GIS datasets. Those municipalities and PSAPs that are now developing and maintaining their own data must understand how NG9-1-1 systems' stringent data and mapping requirements are going to affect their current systems and processes. To prepare for NG9-1-1, public safety agencies must reconcile and synchronize GIS data with their existing ALI and MSAG data as they transition to next generation emergency call systems. That can be a big job.

NEW REGIONAL FOCUS

In today's 9-1-1 environment, PSAPs generally build their own GIS datasets. Each PSAP is an island of local information, with little or no parity between systems. That's about to change. Next generation emergency call systems are going to take a more regionalized approach as new ESNets are developed for use by multiple PSAP partners at regional or state levels. That means there must be a more regionalized picture of GIS data, and many agencies are concerned about how they can translate and migrate their existing GIS data to these new systems without disrupting their current call mapping and CAD systems.

IT'S ALL ABOUT ACCURACY

Fundamentally, a GIS system is only as good as its data, and data accuracy is essential for next generation call systems to deliver their substantial benefits. The reality is, when there are delays in emergency call response today, they are primarily due to data inaccuracy or missing and incomplete data. This is a major concern of today's public safety professionals wherever in the world they are located. The truth is, accuracy issues with GIS, ALI and MSAG data are to some degree a problem with virtually every PSAP in every city, region, state, province or country.

To meet the enhanced accuracy standards needed for NG9-1-1 and other next generation systems, a number of criteria must be met. The fundamentals of GIS — road centerlines, address locations and jurisdictional boundaries — must be both accurate and complete. Existing MSAG and ALI databases must be synchronized with GIS data. PSAPs must work with neighboring jurisdictions to assure that boundaries in current GIS maps are accurate and that there are no gaps in emergency services zone coverage. If the data's not right, the call won't be handled right and most important, the response and results won't be right.

DATA MAINTENANCE IS CRUCIAL

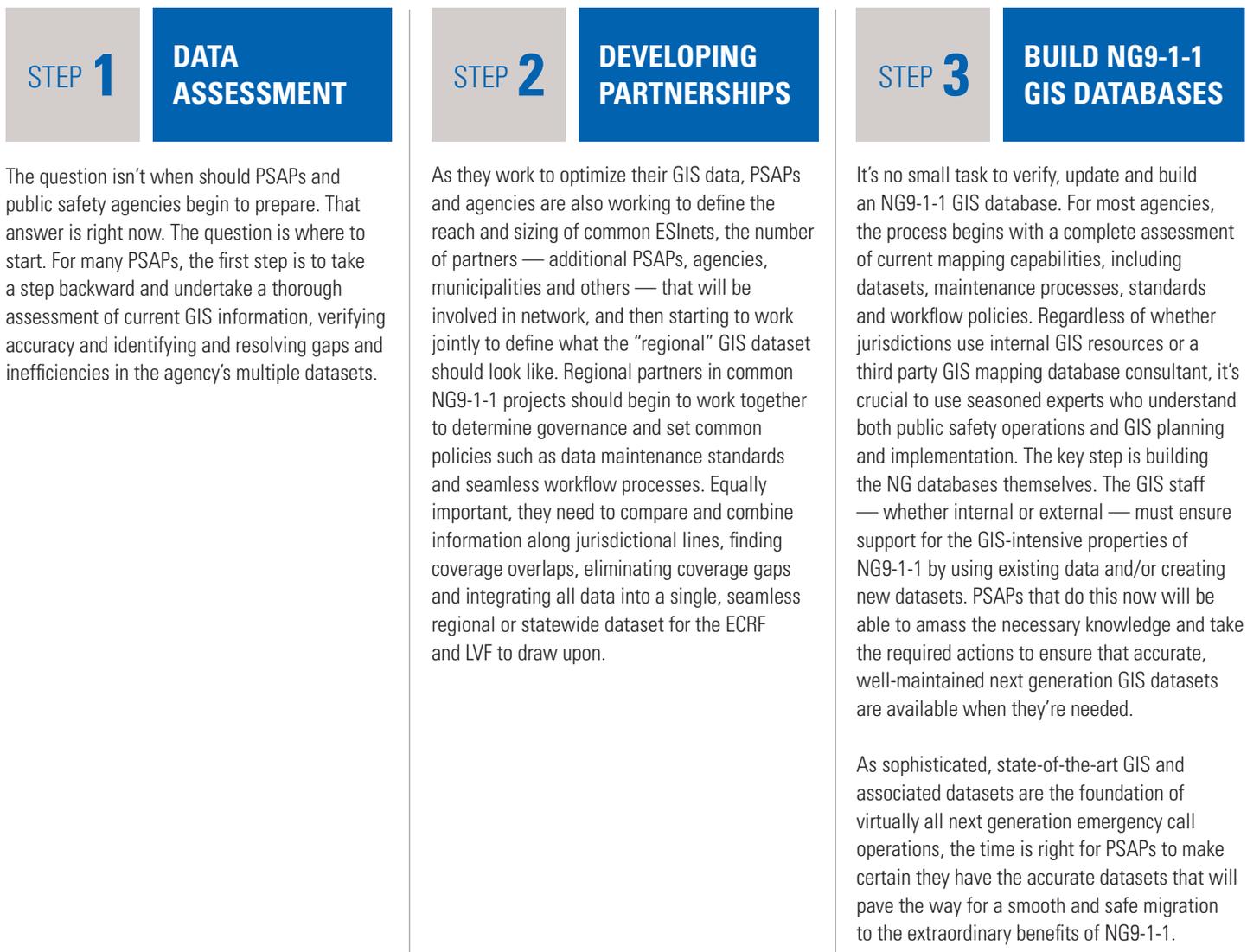
Geographic data isn't static; it's evolving and changing constantly. New roads, new buildings and new addresses are constantly being added in the service zones. The GIS database must be maintained so changes are regularly added and addresses are regularly updated; road names and addresses must also be standardized and consistent across all datasets. These records must be consolidated in a GIS repository that will provide more accurate data to the Emergency Call Routing Function (ECRF) and Location Validation Function (LVF) defined in the NG9-1-1 architecture. The ECRF, the "call router" in NG9-1-1, uses GIS data (jurisdictional boundary definitions, etc.) to route 9-1-1 calls to the correct PSAP. If the data isn't current, complete and accurate, safety can be compromised and that is unacceptable.

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PREPARING FOR TOMORROW TODAY

As PSAPS move rapidly toward deployment of next generation systems, the industry is preparing to meet the challenge of making sure GIS and associated data are ready to support the transition. Recent research has shown that a significant majority — perhaps as many as 80 percent — of PSAPs rank preparing and maintaining GIS data for next generation use as a high priority. Many name it their number one issue. In the United States and Canada, The National Emergency Number

Association (NENA) is currently working to develop consistent standards for GIS use in NG, but however they specifically evolve, it's clear that the standards will rely substantially on ensuring GIS data accuracy and completeness. As the GIS standards being developed by NENA and other Standards Development Organizations (SDOs) continue to advance, many PSAPs and public safety agencies are preparing for the transformation to next generation systems by taking three significant steps.



MOTOROLA NG9-1-1 EXPERTISE AND SERVICES

Motorola has been a significant presence in emergency call centers for many years. We are industry leaders in dispatch console and CAD product development as well as integration and support of call-taking and call-logging technology and software. With our long history of supporting public safety communications systems, our ongoing work with dispatch centers and PSAPs and our leadership in IP-based networks, we are uniquely positioned to support municipalities, cities, counties and states in their transition to NG9-1-1. We are fast becoming the integrator of choice for public safety organizations as they prepare for next generation emergency call capabilities.

motorolasolutions.com/services

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