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Data Analysis for Fire and Emergency Medical Services

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Data Analysis for Fire and Emergency Medical Services

Executive Summary

Responders make critical decisions based on limited information every day. Agencies should strive to generate verified data for emergency and nonemergency needs to provide responders with the right data at the right time. Fire and emergency medical services (EMS) departments generate a large amount of data that can be used to identify emerging threats, monitor performance measures, and develop resource deployment models based on verifiable intelligence.

Modern challenges require modern solutions. Agencies and organizations need tools and operational capabilities to adapt to fluid risks and support a variety of mission requirements. Today, we must be able to identify threats, collaborate and unify operations, and rapidly respond to events. We must be able to communicate with the public and analyze the success of those efforts. Through the power of geospatial technology, organizations can now adopt a smarter, more integrative approach to safety and security. With the right technology, data, people, and processes, every community can become a safe community.

Now, there are more demands on agencies—from the growing needs of an aging population to increasing severity and frequency of events—to which we must respond. The role of public safety is changing as we strive to keep our communities livable. The health of a community depends on the effective operation of its public safety agencies, and geographic information system (GIS) technology can improve that effectiveness.

How GIS Can Be Used by Fire and EMS

We can use GIS to analyze, measure, and share data with decision-makers. This data can come from computer-aided dispatch (CAD) software, records management systems (RMS), community risk reduction (CRR) activities, or nearly any data source deemed appropriate by the agency.



Data Problem in the Fire Service

The issue in public safety is determining how we use this data. How do we visualize it? How do we communicate it? The data can be incorrectly collected. Software changes, proprietary vendor policies, and agency guidelines can obstruct the use of data. Software can be complicated, and visualization can be cumbersome. These challenges can disrupt the use of the data by leaders. GIS can help overcome these obstacles. Agencies can develop plans and processes for collecting, measuring, and analyzing appropriate data to support their operations.

There is often a communication gap between fire service leadership and GIS personnel. It is important to note that we are all searching for safe solutions for our customers and public safety personnel. We must bridge the gap between data and its use to make well-informed decisions. GIS is the tool that can bridge that gap. How well we collect, measure, and analyze data can directly impact the credibility of leaders and the organization. Appropriate data analysis and the communication of

that analysis to our personnel, elected officials, and the public can impact the long-term health of an organization. The ability to tell the organization's story will affect staffing, fleet, station construction, and fiscal decisions.

The accreditation process is a perfect example of the appropriate use of data. As defined by the Center for Public Safety Excellence (CPSE), *accreditation* is "An all-hazard, quality improvement model based on risk analysis and self-assessment that promotes the establishment of community-adopted performance targets for fire and emergency service agencies." This model of continuous improvement is heavily dependent on the collection and analysis of data.

Analyze the Data

Public safety personnel are continually analyzing data. Every response generates data for after-action reporting, performance measures, and the identification of successful outcomes. These reviews can be supported through the use of GIS. The benefit of using the appropriate GIS data to measure performance and focus resources can be wide-reaching. To appropriately analyze data, three things must occur:

1 Identify what decisions must be made and the agency's data needs to support these decisions.

This data can include tax parcel, road network, demographics, RMS, CAD, and CRR. Consider what data the agency would want in a visual product to help make decisions. RMS and CAD data is typically easily consumed by GIS to generate visual products.

2 Use available off-the-shelf solutions to analyze data; agencies can analyze data by location, time, and performance.

Is the agency meeting effective response force (ERF) objectives? What areas of the community have service delivery gaps?

3 Visualize and share the information with the appropriate decision-makers.

Agencies can determine if the department is meeting performance objectives. Decision-makers can determine where these performance gaps are so resources can be appropriately deployed.

Identify At-Risk Populations

A community risk assessment (CRA), performed for the accreditation process and CRR programs, can identify high-risk occupancies (target hazards), at-risk populations, and areas of the community where prevention and public education programs should occur.

Increase Responder Safety

By identifying risk through a CRA, preplanning efforts can be focused on the highest-risk occupancies. GIS allows agencies to efficiently share these assessments to anyone deemed appropriate through a visual product. These plans can be communicated in near real time as they are generated or updated.

Support the Budgetary Process

Gone are the days of anecdotal presentations to justify expenditures. Elected officials and the community no longer want decisions based on intuition. With GIS, data can be presented in a way that easily identifies gaps in service delivery, at-risk areas of the community, and the impact of growth on a community. These stories can be communicated to elected leaders to justify the investment of public funding.

Planning Zones

The accreditation process requires the use of planning zones. These planning zones can be easily generated at the agency's preferred level. These zones can be a geographic designation such as a square mile or individual resource areas of responsibilities or "first due." Or, at the most comprehensive level, the agency can perform a focused risk assessment at a very granular address point for every occupancy in a jurisdiction.

Community Risk Assessment

A CRA is vital to understand the community we serve. These assessments not only identify risk but also highlight the characteristics of the population and infrastructure that impact response daily. The data available for the CRA is from the agency and outside sources. This data can include demographics, occupancy types, water systems, target hazards, floodplains, and critical infrastructure that can be identified and presented with GIS. This assessment is used to focus efforts on continuous improvement and reduce the risk for the identified population. GIS can then be used to manage that risk reduction effort efficiently.

Drive-time analysis, 90th percentile data visualization, or the presentation of high-risk areas can all be performed with GIS. Off-the-shelf templates support the agency's data analysis. Templates provide direction on how to automate the data you import into your solutions. These solutions are configurable and flexible. You decide what data is used, how to view it, and who can access the data.

Conclusion

GIS solutions and data are used to focus fire service efforts on continual improvement and reduce risk for responders and the identified population. These solutions are not complicated and provide the appropriate tools to decision-makers—from frontline personnel to the agency head. It provides leaders with the appropriate tools to make decisions to increase responder safety and improve response times, thus promoting an environment of continuous improvement.

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