NECP Spotlight:
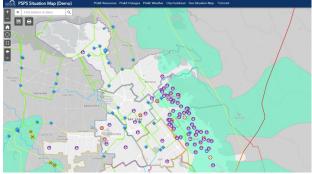# Leveraging Geographic Information Systems to Enhance Emergency Response

INTRODUCTION

The public safety community heavily relies on technology, software, and applications to receive, dispatch, and respond to requests for emergency assistance. The data produced by geographic information systems (GIS) helps to accurately identify an individual's location, resulting in quicker response times and improved situational awareness for responders. Unfortunately, public safety organizations often operate on outdated technology, computing software, and applications, resulting in inefficiencies and an inability to coordinate with other public safety agencies during a crisis. To assist local jurisdictions with preparing for natural disasters or man-made events, Emergency Communications Centers (ECCs) and Emergency Operation Centers (EOCs) must adopt tools that leverage real-time data and geographical information into their operations.

The National Emergency Communications Plan (NECP) emphasizes the importance of accurately sharing information across the entire Emergency Communications Ecosystem, including the various functions and people that exchange information prior to, during, or after incidents and planned events. This spotlight will examine how Shelby County, Tennessee and San Jose, California leveraged GIS tools to improve their emergency response operations to meet mission-critical needs.

AN IN-DEPTH LOOK

Shelby County's Emergency Communications District is responsible for establishing and updating the 911 GIS mapping data for each ECC within the county. Before 2018, Shelby County's imaging process required a contracted flight to capture photographs of the county which it used for its 911 mapping system. Because the cost of capturing these images was so high, the county only captured images once every two years, often resulting in outdated geographical information, forcing them to seek out alternative methods for locating accurate addresses. To address this issue, the county decided to integrate a high-resolution aerial imagery system into its existing 911 mapping application. The new system is delivered through a cloud-based subscription service, making it more up to date and affordable. Images are easily uploaded into an existing application allowing ECCs to capture imagery at least twice per

year to provide different views of locations in different seasons.[2] This enabled ECCs to plot new addresses and developments and equipped fire and rescue teams, emergency medical services, and law enforcement with instant access to updated maps. With the implementation of this aerial imagery system and the combined impact of data services, base maps, and third-party data, all aspects of public safety in Shelby County are improving. Other agencies, such as the county clerk and a Memphis utility company have begun using the county's addressing data because of its accuracy.

Dashboard of the PSPS Situation Map; San Jose's layered GIS tool[3]

The Department of Public Works in San Jose worked alongside the city's EOC to implement a new GIS tool that was built to assist residents and emergency responders during public safety power shutoffs (PSPS). The agency decided to transition to the tool after a major west coast power company announced that it would continue to implement PSPS throughout the state to reduce the number of fires caused by their equipment.[3] New issues emerged for the 60,000 impacted residents and hundreds of businesses and critical facilities in San Jose that would have to go without power. Areas with a heightened fire risk and residents who needed power to maintain life-sustaining medical devices were especially a cause for concern. To manage these risks, the GIS tool was used to predict and display outage statuses to the public and allowed residents to report other power outages in the city. The tool ensures emergency responders are better prepared for power shutoffs, allowing them to better anticipate outages and allocate resources to help residents in need.

NECP ALIGNMENT

As one of its national priorities, the NECP recommends enhancing coordination and effectively using public safety communications resources at all levels of government. GIS-based mapping tools are a critical resource for public safety organizations, allowing them to leverage real-time data and geographical information into their daily operations.

NECP Goal	Objective	Objective Description	Real World Example
Goal 2: Planning and Procedures	2.3	Incorporate risk management strategies to protect against and mitigate disruptions to mission-critical communications	San Jose created and implemented its power vulnerability plan to inform at-risk populations about upcoming power shut-offs due to weather-related public safety reasons. The plan guided the adoption of a GIS tool that helped public safety agencies predict and display outage statuses and inform areas with a heightened fire risk.[4] This multi-agency coordination plan assisted San Jose with managing risks and mitigating disruptions to communications that could be affected by the shut-off.
Goal 3: Training and Exercises	3.1	Update and ensure the availability of training and exercise programs to address gaps in emergency communications	Following a disastrous flood in San Jose, the city evaluated its current emergency management plan, and developed a vulnerability plan along with trainings to avoid future communications gaps. The city created an internal task force to pinpoint gaps in the power company's plans and exercised its vulnerability plan in partnership with other key agencies across county lines.[5]
Goal 4: Communications Coordination	4.2	Enhance coordination and effective usage of public safety communications resources at all levels of government	Shelby County's Emergency Communications District collaborated with the Tennessee Emergency Communications Board (TECB)—the state's 911 authority—to promote the use of the county's GIS-based mapping tool. Using a cloud-based subscription service, the Shelby County Emergency Communications District obtained more frequently updated aerial imagery that geocoded and plotted new addresses and developments into its 911 mapping system. This GIS tool helped Shelby County replace its outdated maps and offered more accurate addressing, which is critical to locating and responding to emergencies. The TECB was able to identify this service as a best practice that other Emergency Communications Districts statewide could leverage as a cost effective communications resource.

RESOURCES

Emerging technologies, such as GIS-based mapping tools, can be leveraged to enhance and strengthen emergency response coordination during incidents. To ensure that these new technologies meet public safety's mission-critical needs, state, local, tribal, and territorial public safety organizations must continue to evaluate their current resources and plan for the adoption of new technologies and capabilities. To learn more about preparing for the adoption of new and emerging technologies, visit: cisa.gov/necp.

Want to share your organization's successes and alignment to the NECP? Email us at: necp@cisa.dhs.gov

For more information on GIS, visit:
- FEMA GIS: gis-fema.hub.arcgis.com
- GIS Lifecycle Best Practices Guide: cisa.gov/publication/next-generation-911

[1] "What is a geographic information system (GIS)?" United States Geological Service (USGS). https://www.usgs.gov/faqs/what-a-geographic-information-system-gis?qt-news_science_products=0#qt-news_science_products
[2] Fredrickson, Mark (2018). "The Emergency Communications District of Shelby County, Tennessee, Improves 911 Call Plotting and GIS Data Using Nearmap's Aerial Imagery" Business Wire. https://www.businesswire.com/news/home/20180918005704/en/The-Emergency-Communications-District-of-Shelby-County-Tennessee-Improves-911-Call-Plotting-and-GIS-Data-Using-Nearmap%E2%80%99s-Aerial-Imagery
[3] Le, Stefanie (2020). "Map Monday: Emergency Management in San Jose" Data-Smart City Solutions. https://datasmart.ash.harvard.edu/news/article/map-monday-emergency-management-san-jose-0
[4] Oviatt, Jill (2020). "Lessons Learned From Utility-Initiated Power Shutoffs" Western City: City Forum. https://www.westerncity.com/article/lessons-learned-utility-initiated-power-shutoffs
[5] Neaves, Rosario (2021). "What San Antonio Can Learn from San Jose about Crisis Management" San Antonio Report. https://sanantonioreport.org/what-san-antonio-can-learn-from-san-jose-about-crisis-management/