

Make GIS Part of Your Daily Operation



Paul Christin, Homeland Security Industry Manager, Esri

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What started out as something specifically intended to be used by a state or local fusion center is quickly becoming a solution for everyday public safety operations such as real-time crime analysis or structure fire preplanning.

For a while now, we have talked about Esri's collaborative effort with Microsoft (known as Fusion Core Solution) to solve many of the problems associated with the intake, analysis, and dissemination of suspicious-activity reports.

Just to recap, Fusion Core Solution is pre-configured SharePoint security, workflow, and forms that are integrated with ArcGIS for Server using ArcGIS Map Parts for SharePoint.

For a long time, GIS was used only by trained individuals. If people wanted a map, they had to ask a GIS professional to create one. For example, fire officers wanting to know which community structures have completed preplans and which ones do not would have to ask for a map of the data to illustrate the amount of work that was still to be done and help them prioritize remaining inspections. A GIS analyst would then build a geodatabase containing all the points depicting structures that were with and without preplans, then print the map and provide it to the fire officers. If the department wasn't lucky enough to have a GIS professional on staff, they would most likely have to ask someone within city or county government, and receiving the map could take a long time, depending on the workload.

The integration of ArcGIS and SharePoint streamlines that process. The fire officer, with little to no training, can create a simple georeferenced SharePoint list

of structures requiring fire department preplans and then easily generate a map directly within SharePoint. To make more informed decisions, the officer can view preplans within the map along with other data such as the location of fire hydrant and water sources, staging sites, and ladder operation obstructions to easily perform their own spatial analytics, such as vulnerability and risk assessments.

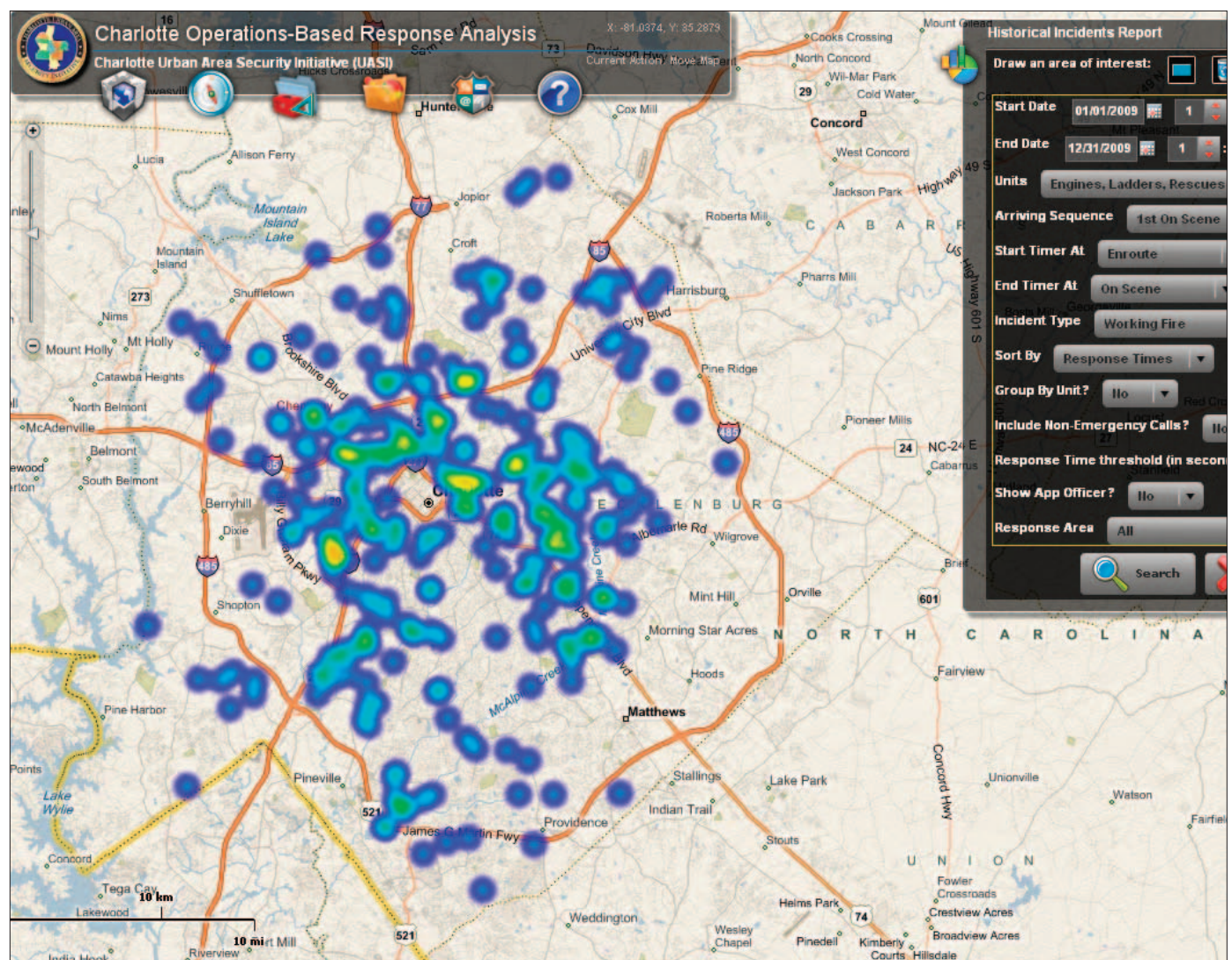
The combination of these two technologies has created an environment where public safety professionals do not need to be GIS specialists. They can leverage geoprocessing capabilities and all the advantages a map provides in terms of understanding data. And they can do this on their own, which means a faster process for getting the right information into the right hands. This is just another example of how true GIS is becoming a powerful tool available for daily workflows.

Charlotte Fire Department Deploys GIS-Based COP

Charlotte Fire Department (CFD) has spent years building rich geospatial databases that help its entire fire service operation. From preplanning to response to emergency management, GIS has improved all aspects, meeting mission demands. The department serves approximately 700,000 citizens within the city limits, and it has teams that can be assigned to missions anywhere in the state of North Carolina and within the southeastern United States. The Charlotte-Mecklenburg Office of Emergency Management (CMEMO) is a division of CFD and maintains Mecklenburg County's Emergency Operations Center (EOC), which serves over 900,000 residents countywide.

The agency now deploys the Charlotte Operations Based Response Analysis (COBRA) system as an effective GIS-based common operating picture (COP). Built using ArcGIS, the system is used by all CFD divisions, Charlotte-Mecklenburg Police Department, and many federal and military branches. Moreover, COBRA will be used during the Democratic National Convention, which will begin September 3, 2012.

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COBRA supplies powerful analysis tools for making better decisions.

More Industry News

You will find more news and information specific to GIS for the public safety industry in *ArcNews*, a quarterly magazine for the Esri community. Visit esri.com/arcnews.

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More GIS News

Keep up with breaking GIS news, watch the latest videos, access ArcGIS resources, and connect to social media outlets at the newly launched website esri.com/news.

The Real-Time Crime Center

Ogden PD: The Real-Time Crime Center tells the story of how the agency recently launched its high-tech facility to provide 24/7 support to law enforcement. The center deploys a host of advanced technologies including camera systems, crime databases and vehicle tracking. Serving as its foundational integration platform, ArcGIS software provides a multi-mission common operating picture. Ogden Police Department uses the GIS-based COP to perform advanced analysis and digitally map the results. Bringing those functions into the Real Time Crime Center has helped extend these benefits to different workflows and more people. In this video, you'll learn how Ogden police better serve citizens and provide increased safety to both officers and offenders.



Discover how Ogden Police deploys GIS as part of its advanced operations.

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“COBRA removes boundaries,” says Bridget Hayes, GIS manager, Charlotte Fire Department. “We have current traffic, rain gauges, weather, fire, police, and emergency management feeds on top of a basemap supplemented with local data. The basic premise of hosting all of the data and formats on one platform is extremely powerful.”

COBRA displays medical and nonmedical events on a digital map interface with other supporting data such as incident type, responding units, and cumulative time on the scene. These feeds are extracted via

the department’s computer-aided dispatch (CAD) data warehouse and available in near real time. Public safety staff have the live information they need to monitor emergency situations.

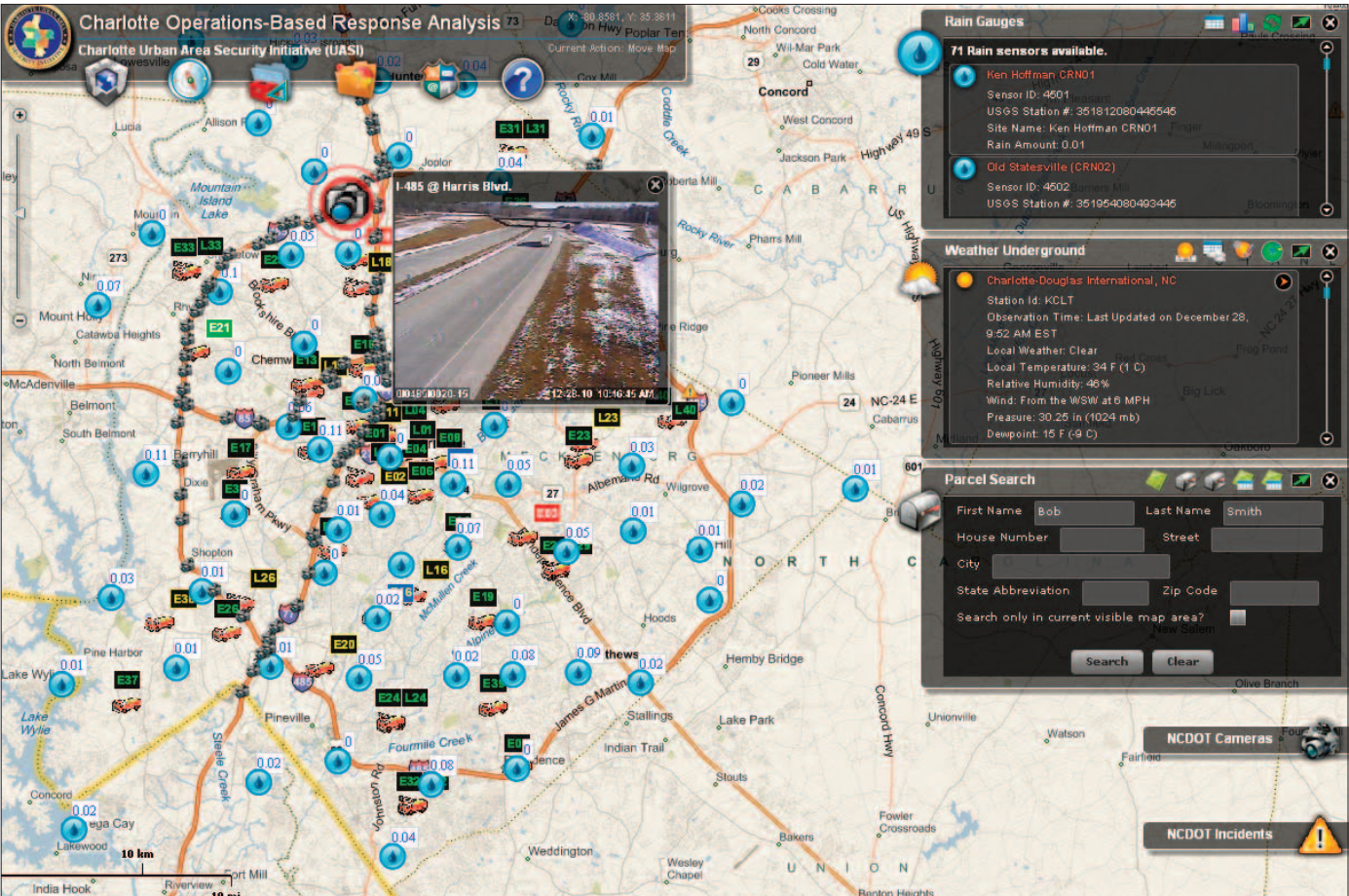
For instance, incident maps help evaluate response times and historical demand. This can be used to determine the best possible location for a new fire station. For daily operations, a web-based status board shows resources and coverage, including coverage gaps. Commanders can quickly relocate vehicles as incidents occur and coverage gaps result.

COBRA is particularly useful for event management. Real-time data is instantly fed into the COP. Commanders can view everything they need to monitor the event and respond to an emergency. Weather, automated vehicle location data, social network communications, and video feeds are all streamed into the web map. Command staff can take advantage of real-time situational awareness—vital for large events such as the Democratic National Convention. COBRA will help ensure that adequate fire, law enforcement, medical, and security staff are in place.

Advanced analysis and reporting are performed on a weekly, monthly, quarterly, and yearly basis to help with long-term planning. Are there areas with a particularly high rate of incidents such as automobile accidents or structure fires? Are there enough staff members readily available? Are there times of the day, week, or month when more staff members are needed for a particular location? This type of analysis helps commanders identify problems early and determine what additional steps may be needed. Both heat and cluster maps clearly and accurately convey information that’s immediately understood by staff.

Other examples of putting the COP to use include carrying out property searches for inspections, conducting tier II chemical assessments, and monitoring nuclear radiation sites.

“As COBRA continues to grow, we hope to expand its functionality,” says Hayes. “The future is bright. We know we have a lot of design and development behind us, but there is so much more that can be done.”



Charlotte Fire Department integrates numerous feeds using a GIS-based common operating

Gathering and Sharing Field Intelligence

How Queensland, Australia, Flood Response Benefited True Mobile Situational Awareness

The devastating Queensland, Australia, floods of December 2010–January 2011 cost A\$30 billion in damages, displaced tens of thousands of residents, and resulted in more than 30 fatalities.

While GIS applications helped with the entire emergency, mobile mapping provided a new and powerful capability for a more effective response. Deployed immediately during the Queensland floods, responders captured valuable field incident intelligence both from the air and on the ground, so accurate decisions could be made in the fastest time possible.

Mobile data was easily integrated into the GIS-based common operating picture where it could then be analyzed, visualized, and shared. Near real-time information provided ongoing situational awareness, and better decisions were made because people could see exactly what was happening on the ground as the emergency evolved.

“Mobile GIS replaced a paper-based workflow,” says Mark Wallace, GIS Unit, Queensland Fire and Rescue

One of the first needs for all emergency operations is incident impact and overall assessment data. What exactly is happening on the ground and how is the emergency evolving? For the cyclone, which eventually turned to massive flooding, mobile GIS was part of the responders’ toolkit.

The Aerial-Total Operational Mapping (A-TOM) solution was developed by the QFRS GIS Unit. It was originally created for the Air Operations Unit in 2006, when the unit was trying to capture fire line locations with handheld GPS units operated by staff from the air.

“The quality and accuracy of the original system was poor,” says Wallace. “We needed to provide more accurate, near real-time fire intelligence during an incident to support both strategic and tactical decision making. That led us to develop a better solution, which helped immensely during the storm and floods.”

Based on Esri’s ArcGIS technology, the second-generation A-TOM system provided a simple, easy-to-use tool for the initial gathering and mapping of

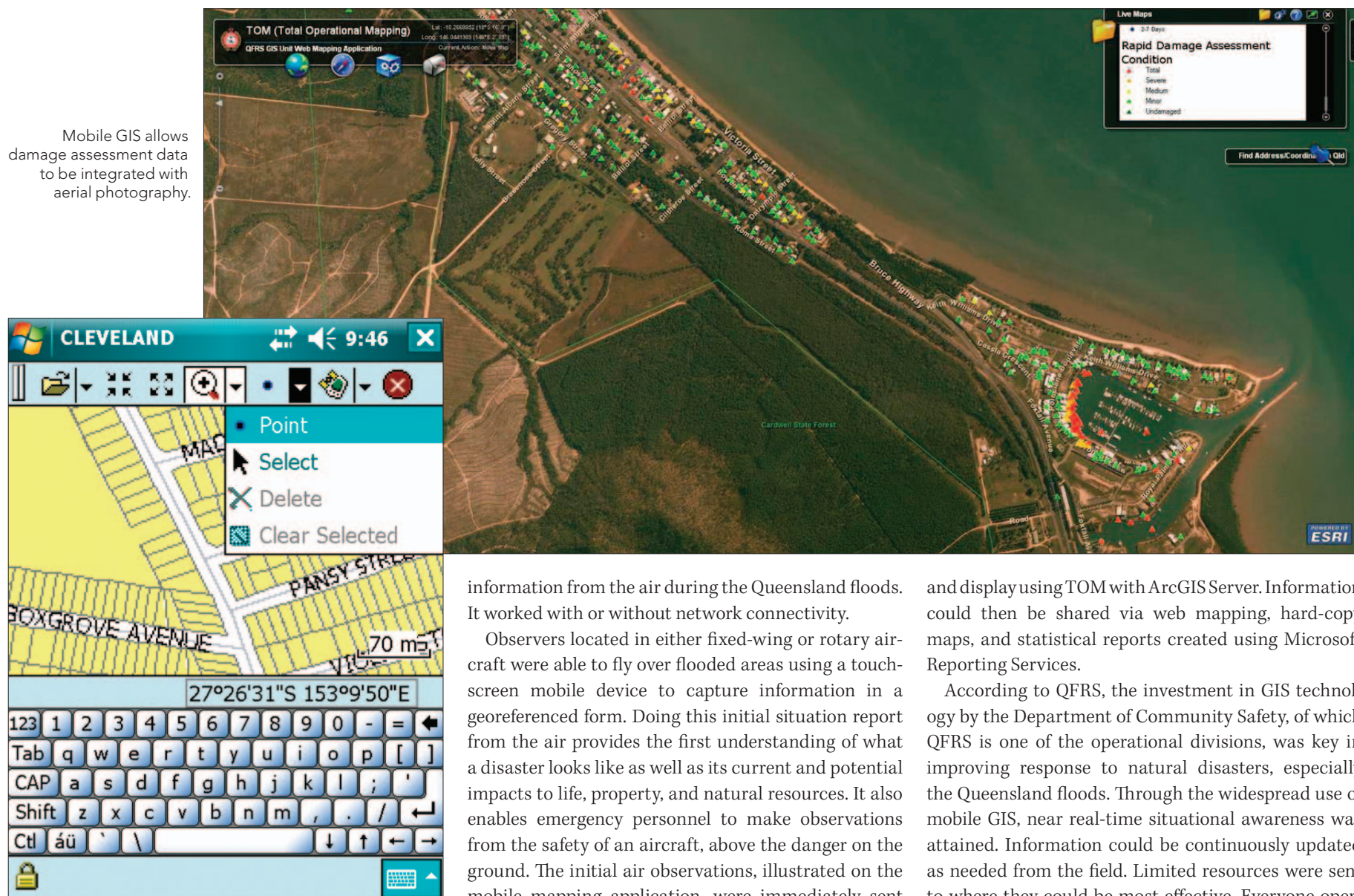
coordinating staff and equipment. They could accurately pinpoint water damage extents, community impacts, infrastructure damage, road washouts, downed power lines, and damaged railways. Highest-priority requirements for evacuations, road closures, power restoration, medical facilities, food, and temporary shelter were easy to ascertain. This helped during the initial phase of the disaster response.

Once the flood waters receded, QFRS urban search and rescue teams used the initial intelligence gathered via A-TOM to carry out more than 8,000 rapid damage assessments (RDA) using ArcPad mobile GIS software on Trimble Nomad devices.

For the RDA collection process, fire fighters walked the streets of impacted areas carrying Trimble units. They would visit each structure and property within a predetermined search grid, make a structural and damage assessment, and capture the exact latitude and longitude coordinates.

This data was then sent to headquarters for analysis

Mobile GIS allows damage assessment data to be integrated with aerial photography.



A-TOM forms make it easy to perform field assessments.

Service (QFRS), Department of Community Safety. “The field data and subsequent analysis provided an excellent base for recovery efforts.”

In 2010, when Tropical Cyclone Yasi slammed into the Queensland area, Australia responders—fire fighters, law enforcement, medical staff, and others—were immediately activated. The damage was great due to the size and complexity of the storm. Wind, rain, and floodwaters caused destruction along a massive swath of the country.

information from the air during the Queensland floods. It worked with or without network connectivity.

Observers located in either fixed-wing or rotary aircraft were able to fly over flooded areas using a touch-screen mobile device to capture information in a georeferenced form. Doing this initial situation report from the air provides the first understanding of what a disaster looks like as well as its current and potential impacts to life, property, and natural resources. It also enables emergency personnel to make observations from the safety of an aircraft, above the danger on the ground. The initial air observations, illustrated on the mobile mapping application, were immediately sent back to the incident control center with a touch of a button. If connectivity was an issue, once the plane landed, the digital information could be hand delivered and uploaded by simply connecting the mobile device to the geospatial server powering the common operating picture.

Air observation data was input into the GIS-based Total Operational Mapping (TOM) system. TOM is an implementation of the Esri COP Flex viewer that is built on ArcGIS forServer.

Once the mobile A-TOM data was integrated into TOM, it was immediately visible to incident controllers

and display using TOM with ArcGIS Server. Information could then be shared via web mapping, hard-copy maps, and statistical reports created using Microsoft Reporting Services.

According to QFRS, the investment in GIS technology by the Department of Community Safety, of which QFRS is one of the operational divisions, was key in improving response to natural disasters, especially the Queensland floods. Through the widespread use of mobile GIS, near real-time situational awareness was attained. Information could be continuously updated as needed from the field. Limited resources were sent to where they could be most effective. Everyone operated using the same GIS-based COP. Public communication was enhanced using accurate digital maps, and long-term recovery requirements were more accurately assessed, prioritized, and monitored.

“In our response to the Queensland floods, we saw a major cultural shift in the way map information and the underlying analysis [were] used,” says Wallace. “Maps benefited more than just first responders and full-time GIS staff because the timeliness and accuracy of information collected was better than ever before. It let people working at each level quickly view information vital to their job.”

On the Road

International Disaster Conference and Expo (IDCE) 2012

New Orleans, Louisiana, USA
January 17–19, 2012

IJIS Winter Industry Briefing 2012

Washington, D.C., USA
January 19–20, 2012

American Corrections Association Winter Conference 2012

Phoenix, Arizona, USA
January 20–25, 2012

Firehouse World 2012

San Diego, California, USA
February 19–23, 2012

American Probation and Parole Association (APPA) Winter Training Institute 2012

San Diego, California, USA
February 26–29, 2012

Microsoft Worldwide Public Safety Symposium 2012

Redmond, Washington, USA
March 13–15, 2012

MoneyLaundering.com 17th Annual International Conference

Hollywood, Florida, USA
March 19–21, 2012

National Hurricane Conference 2012

Orlando, Florida, USA
March 26–29, 2012

Online

esri.com/psresources

This website is for the public safety user community. You can access templates, best practices, applications, and more. Discover better ways to perform planning and analysis, assist in mitigation efforts, provide comprehensive situational awareness, and support response and recovery operations.

esri.com/psfacebook

Connect with your fellow community online and join the conversations. Follow us on Facebook at Esri—GIS for Public Safety.

esri.com/publicsafety/licensing

Esri has launched a new enterprise licensing program designed to make acquiring Esri technology easy and affordable for small public safety agencies. The Small Public Safety Enterprise License Agreement (SPS-ELA) eliminates the cost barrier that can impede fully realizing the benefits of Esri.

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The Benefit of a Public Safety GIS Analyst

Chesterfield County Fire and Emergency Medical Services (CFEMS) recently made the switch from relying on the County's GIS division to employing its own analyst to perform GIS work on a daily basis. The results were immediate. With more analysis, visualization, and dissemination of map data, the agency is improving multiple workflows and benefiting from better decision support.

CFEMS is composed of 442 uniformed fire and EMS personnel, 45 nonuniformed employees, approximately 130 volunteer fire fighters, and 150 volunteer emergency medical providers. The county provides emergency services from 21 fire and EMS facilities and eight volunteer rescue squad facilities. In fiscal year 2011, CFEMS answered 34,314 calls for service.

Like many fire departments, for years CFEMS relied on the county's GIS division to perform fire service analysis and produce maps.

"We enjoyed a good relationship with the GIS division, but in the past we were one of many departments that needed [its] services and had to wait for time to be allocated for any projects the department needed," says Captain Tommy Tucker, planning unit, Chesterfield Fire and Emergency Medical Services.

Yet as the department grew with its GIS activity—allocating resources, responding to incidents, and

performing mitigation activities—so did its need for services. Eventually, demand exceeded expectations. A change was needed.

With the opening of a full-time research analyst position, the department wanted to employ someone who could manage his or her own GIS activities along with other duties. After a brief search, a full-time GIS-enabled staffer was brought on board.

"This was one of the driving factors when attaching a GIS component to the job specifications," says Tucker.

The dedicated GIS specialist now performs requests that previously were carried out on a transactional basis by the county GIS division. The specialist analyzes historical incidents to determine staffing and resource needs and provides geospatial analysis to establish optimum locations of fire and EMS facilities. For mitigation, the specialist conducts a community risk assessment including preincident planning to develop strategies and mitigation tactics. For instance, analysis can be done to determine hydrant-free rural areas and dry hydrant locations. This helps fire commanders determine whether additional water resources need to be added to a particular location, such as an urban area frequented by visitors that is without hydrant or water resources. Finally, continuously updated GIS maps help fire commanders accurately view and understand fire service

activities, community events, and overall circumstances of singular or countywide incidents to develop appropriate incident action plans. The specialist is able to constantly churn out maps upon request.

"As many fire and EMS departments have begun to realize, being able to put a location to incidents enables data-driven decisions that improve citizen services," says Tucker. "Having our own analyst helps us do more GIS work that better serves our citizens."

A full-time GIS analyst can perform a myriad of functions, including analysis of large-scale incidents like Hurricane Irene.

