REAL-TIME EMERGENCY MANAGEMENT OPERATIONS

HOW TO MODERNIZE YOUR AGENCY'S RESPONSE AND BUILD RESILIENCE

esri

THE SCIENCE OF WHERE®

A Modern Approach to Emergency Management

Many emergency management agencies base their response on history. Every incident contains lessons learned that can be used to better prepare for the next disaster. However, relying on past incidents alone to guide the future can leave emergency managers underprepared. Today's hurricanes are more intense, wildfires are burning hotter, and civil disturbances are more complex. And underlying social inequities only serve to increase the vulnerability of a population to these events. Overall, the risk to our communities is more systemic and interconnected than ever before. Emergency managers need to change the way they approach response efforts and look toward building resilience. By digitally transforming the emergency management toolkit, managers can better connect to information—and to each other—to increase their understanding of the new landscape and improve future response efforts.

Digital transformation may seem daunting. Fortunately, a location-based cloud solution for emergency management makes the task of modernizing response easier than one might imagine. The Esri® Emergency Management Operations solution contains data, tools, and apps for intelligent operations management. It helps emergency operations centers (EOC) coordinate faster response by rapidly showing information for smart decision-making.

This ebook explores use cases from actual emergency management operations. It describes successful deployments from agencies that use location data, the power of maps, and ArcGIS® technology to increase their resilience to today's disasters.

Esri's Solution for Emergency Management Operations

The Emergency Management Operations solution is a fully integrated geographic information system (GIS). The system enables teams, agencies, and partners to maintain shared situational awareness at all points during a disaster response. With real-time data feeds continuously updating configurable, cloud-based dashboards and maps, information becomes instantly available to inform the public and your mission-critical decisions at the same time. Real-time integration between apps breaks down information silos, and digital workflows eliminate intensive paper-based systems, which clears the way for agencies to respond faster and for citizens to act.

Operational Briefings

Damage Assessments

Impact Analysis

Public Information

Real-Time Emergency Management Operations
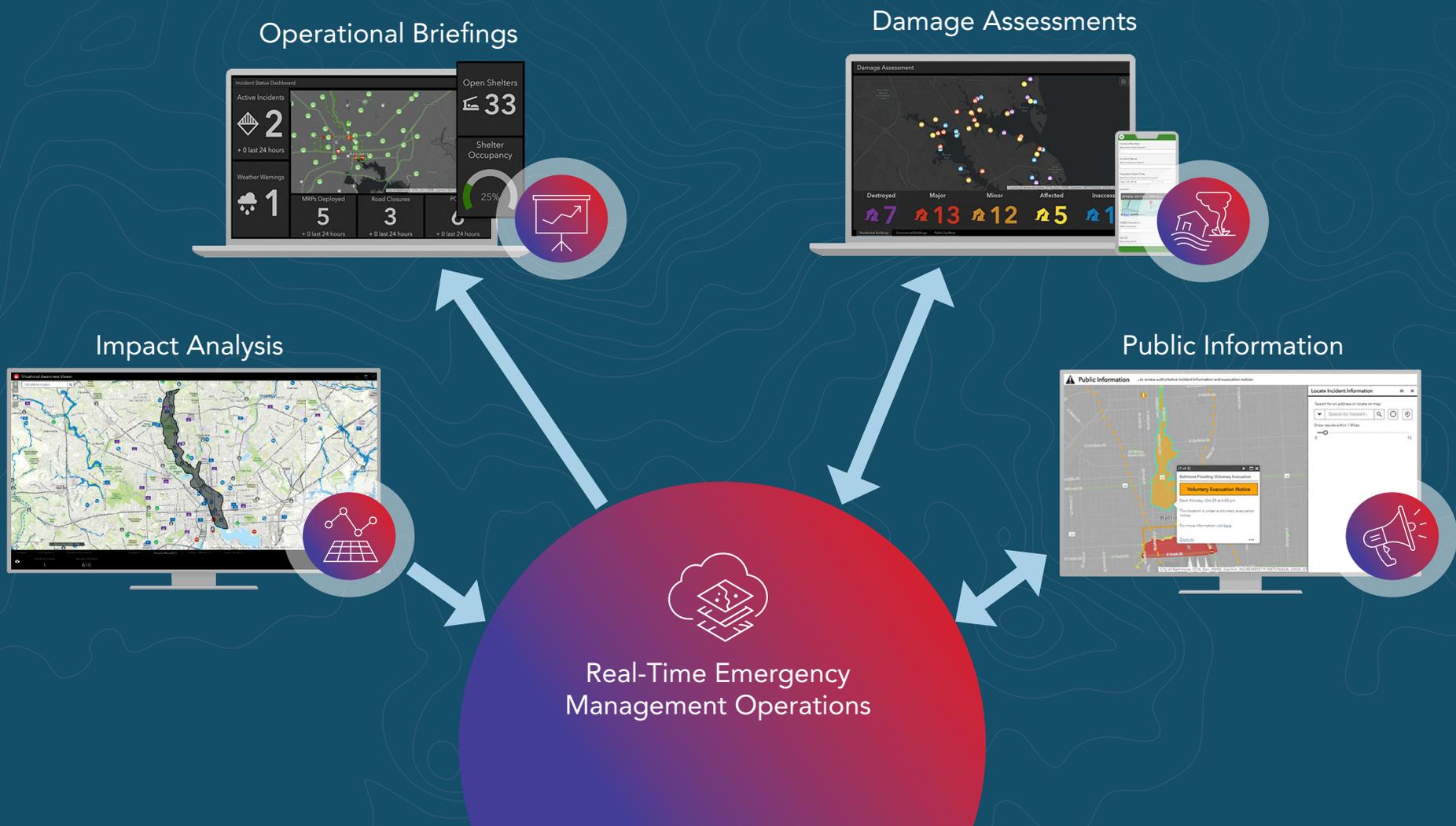
Modern Solutions for Emergency Management Operations: Use Cases

1 Maintaining Real-Time Situational Awareness

2 Briefing Command Staff and Elected Officials

3 Understanding the Potential Impact

4 Conducting Damage Assessments

5 Managing the Flow of Public Information

Maintaining Real-Time Situational Awareness

As an incident unfolds, emergency management staff need immediately accessible and actionable information to make the best decisions at the right time. Seeing what is happening in real time is an advantage during a disaster. Understanding where and when it is happening can help change the outcome. Esri's Emergency Management Operations solution allows organizations to use live feeds of information to effectively monitor changing conditions. They can see where resources are needed most and anticipate problems before they occur.

Informational Dashboards Enhance Emergency Operations

Chapel Hill, North Carolina

The Emergency Operations Center (EOC) of the Town of Chapel Hill, North Carolina, strives to protect the lives of its 59,000 residents by having an emergency management plan ready when perilous situations occur. These EOC activations require resources and the coordination of multiple partners, such as law enforcement, fire departments, emergency medical services, and public works. EOC staff needed an efficient way to manage and disseminate information with internal and external partners, especially as their activations have grown more frequent.

According to Kelly Drayton, emergency manager for the Town of Chapel Hill, the town has experienced nearly nonstop activations of the EOC due to critical events over the past three years. At the outset, staff faced barriers to keeping teams coordinated as the pace of operations quickened.

> "How you communicate and maintain that common operating picture during a fast-moving incident is really challenging," says Drayton. "And being able to bring everybody together on the same page is critical because that becomes the starting point for talking about how we are going to protect life, property, and the environment."

By the time the EOC team updated partners about an emergency, the details would instantly change

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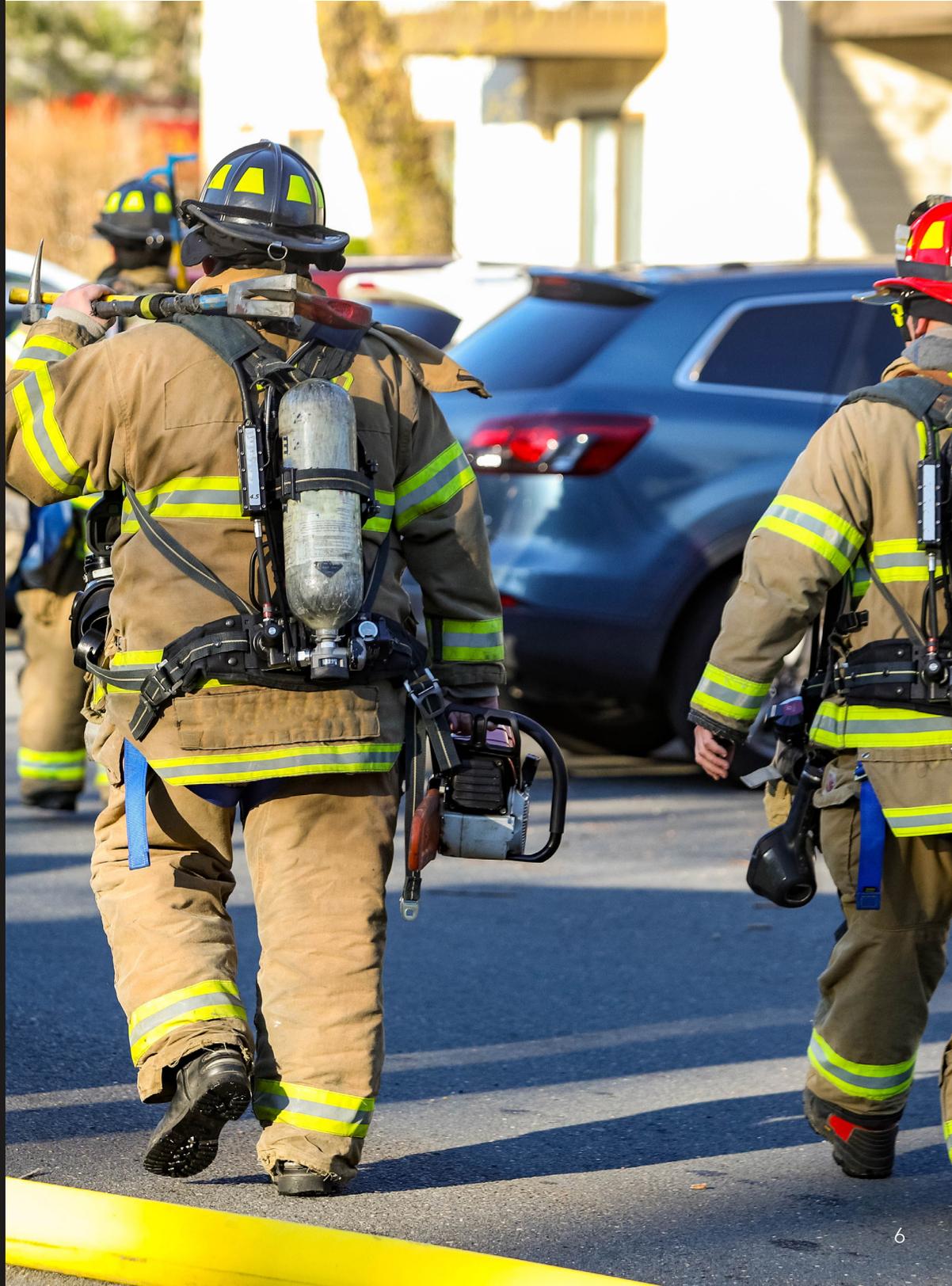
because of the rapidly evolving nature of the event. Without the common operational picture, it could take a lot of time to get personnel on the same page to begin the conversation about the operational objective and next steps.

Drayton met with individual teams across the town to ask what each one needed during an EOC activation and presented that information to the Chapel Hill GIS team and Esri partner, Blue Raster. The group created four unique dashboards using ArcGIS Dashboards, including an executive summary dashboard designed for the policy group that provides strategic direction when there is an activation. Viewers can also see at-a-glance information like a list of town services, historical data, weather alerts, and a heat map that displays 9-1-1 data for the town.

The dashboards have enhanced situational awareness, improved access to information, and streamlined decision-making during every EOC activation. The availability of timely data has enabled the EOC and its partners to maintain a common operating picture, allowing them to get straight into strategies and tactics.

"From an emergency management perspective, information is vital. In the EOC, we manage resources, we manage consequences, and we manage information. But you're not really doing the first two without the latter," says Drayton. "So, this tool helps keep our policy team informed, helps get our operational leads the information they need, and ensures we are making data-driven decisions—and allows us to do it all more efficiently."

Briefing Command Staff and Elected Officials

During an emergency activation, command staff and elected officials are under pressure to make decisions that have potentially life-or-death consequences. They need accurate and comprehensive information about current events and what the operational plan is moving forward. Esri's emergency management tools give decision-makers real-time intelligence that helps them make pivotal decisions that can save lives based on the current situation—not based on information that is already out-of-date. This transforms the process from static, out-of-date PowerPoint-based briefings to dynamic, real-time briefings that interactively show the most recent situation and plan.

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Statewide Visibility for Emergency Management

California Governor's Office of Emergency Services

Californians are all too familiar with catastrophes. US News and World Report recently rated California as number 1 on its top-10 list of disaster-prone states. The state is susceptible to earthquakes, floods, landslides, significant wildfires, prolonged drought, public health emergencies, cybersecurity attacks, and agricultural and animal disasters.

The California Governor's Office of Emergency Services (Cal OES) oversees and coordinates the state's emergency response operations. Its California Preparedness Platform (Cal PreP) includes Esri technology. The platform's Cal PreP dashboard brings all emergency information together to show the state's current fires, traffic, Doppler radar, weather, and power outage data on one screen. Depending on the hazard type, operations centers across California access the dashboard to better understand incidents they are managing. The dashboard shows incidents in real time and provides local agencies with critical information for making intelligence-based decisions.

> "You're looking at what's happening now, not what happened 12 hours ago. The dashboard provides that snapshot; it saves time. Instead of someone stopping in the middle of an operation to brief someone, they can just walk in, look at the screen, and see exactly what they want to see."
>
> Duane Valenzuela
> Response Operations, Cal OES

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Understanding the Potential Impact

When emergency managers realize that a situation requires monitoring, they need to know the size and scale of the potential impact on the community as quickly as possible. Esri's platform shows emergency operations teams who and what is at risk, which resources they need to move or deploy, and where to send them. It adds insight to emergency operations that helps managers coordinate a more effective response and maximize limited resources. It also connects emergency personnel to accurate data and vital information to help adjust planning assumptions in real time.

One Map Enables Several Organizations to Reach People in Crisis

American Red Cross

Emergency food assistance organizations saw a need for aid increase by as much as 500 percent within the last couple of years. The accelerated demand, inflated by the pandemic and recent disasters, put an added strain on nonprofit groups.

To increase support for impacted communities and the organizations that serve them, the American Red Cross built the Disaster Partner Hub. This web destination brings together data from more than 70 organizations related to four key areas: feeding operations, call center data, damage assessment, and shelter operations.

The pilot project focused on pandemic food insecurity, which allowed American Red Cross regions and partner groups to effectively prepare for and respond to an unprecedented combination of sequential disaster and global health crises.

"The Partner Hub is a game changer as far as data collection and visualization," says Doug Roberts, state individual assistance officer, Florida Division of Emergency Management. "The central tool will make our response better. In addition to understanding where current efforts are under way, analysts at the American Red Cross can now look at historical disaster response data to score regions for their risk propensity."

The fact that the hub is delivered as a software-as-a-service implementation and accessible anytime and anywhere was crucial for many partners working from home and using mobile devices. In addition, American Red Cross has leveraged ArcGIS StoryMaps^SM to produce more than a dozen event-specific Partner Situational Awareness Briefs that were viewed more than 22,000 times in an eight-month span.

The GIS tools have fostered more direct connections between the individuals and organizations working to feed people in times of crisis.

"It's really amazing," Patrick Colley, director of member engagement at Feeding America says, "to see how all of your coworkers, community, donors, other national partners can clearly see the exact same goal and the same need."

Conducting Damage Assessments

Documenting postdisaster damage must be done quickly to start the process of recovery for a community. Damage assessment reports are critical to accessing recovery funds for the community and to prioritizing resource allocation to reestablish community lifelines. Emergency managers use GIS to deploy disaster response teams faster to the hardest-hit areas and provide them with reliable intelligence—with or without a cellular network. In disconnected areas, inspectors access maps on their phones as they conduct damage assessments and document the process. Emergency managers can also engage the community to crowdsource local impacts that inform priority needs within the community. These maps update immediately when users enter connected service areas to provide quick updates on the impact and reporting thresholds for the community.

Field Connectivity Supports Hurricane Irma

Key West, Florida

Hurricane Irma was the first category 5 hurricane of the 2017 hurricane season. The Florida Department of Emergency Management (FDEM) had its location strategy in place. When the hurricane was on the horizon, the department was prepared to rapidly launch more than 60 mission-critical applications.

The state agency, regional agencies, and counties lent their GIS managers, analysts, and technicians to help with disaster management. Under the FDEM's leadership, they participated in daily GIS coordination calls, managed postdisaster remote sensing requirements, shared data and resources, and improved outcomes during Hurricane Irma preparedness, response, and recovery operations.

Hurricane Irma left citizens in Key West, Florida, with no power, water, internet connection, gasoline, or cell phone service. Resources were scarce, and residents had very little food. They desperately needed help. The city's emergency operations center (EOC) used Esri's emergency management solutions to conduct the initial damage assessments to get resources where they were needed.

Responders used Esri's Damage Assessment configuration application on their phones to collect data. The app showed them a map of the immediate area and provided tools for workers to select the location, detail the damage, and add photos to supplement the information for verification.

In areas where communications and power were down, the data collection app switched to offline mode. Responders could still see maps and enter survey data. Anytime they entered an area with service, the devices would automatically upload all their collected data to the EOC. If service was unavailable, all their data would be uploaded as soon as they returned to the office and synced their devices with the EOC's operations dashboard. With each addition, the dashboard showed an updated common operational picture for both the EOC and on every device in the field.

Key West's damage report met the Federal Emergency Management Agency (FEMA) requirements and proved that a federal disaster declaration was warranted. FEMA had enough detailed damage documentation to declare a major disaster for Key West and provide federal funds for the community and its citizens. The city used the same damage assessment to prioritize and complete recovery work.
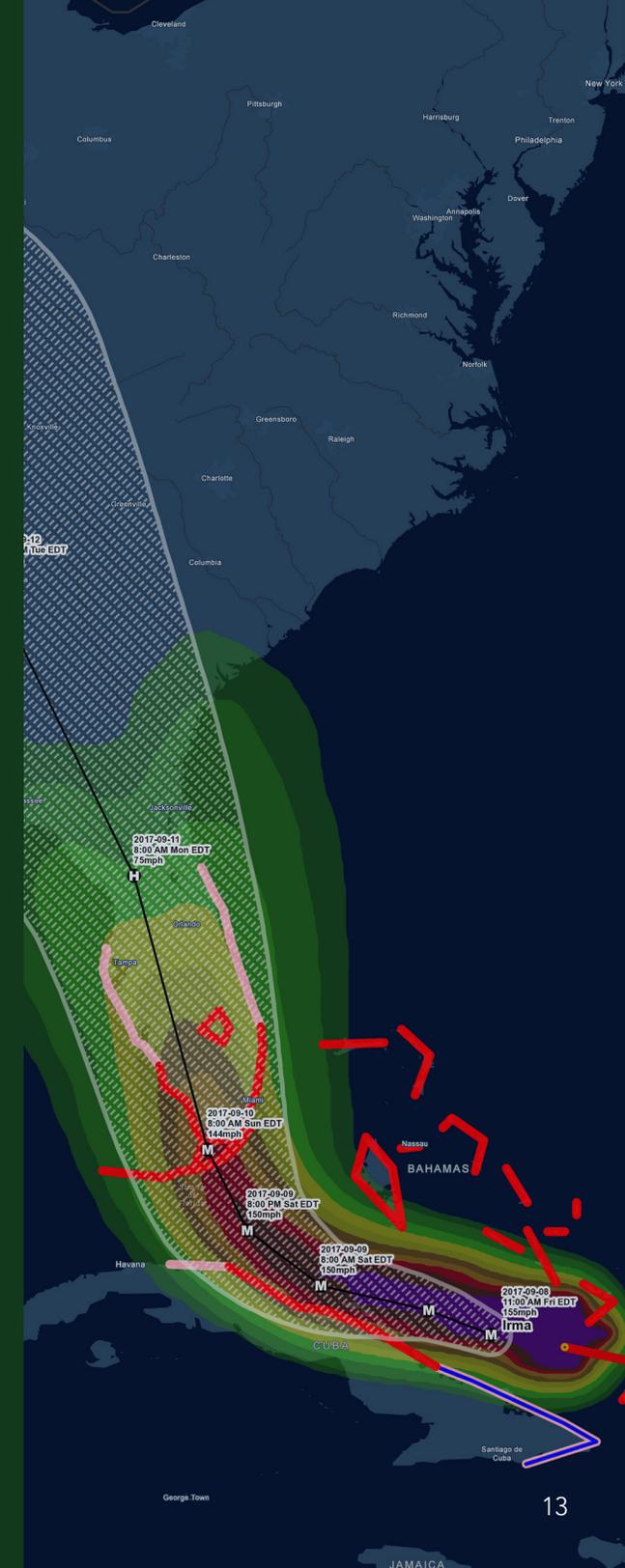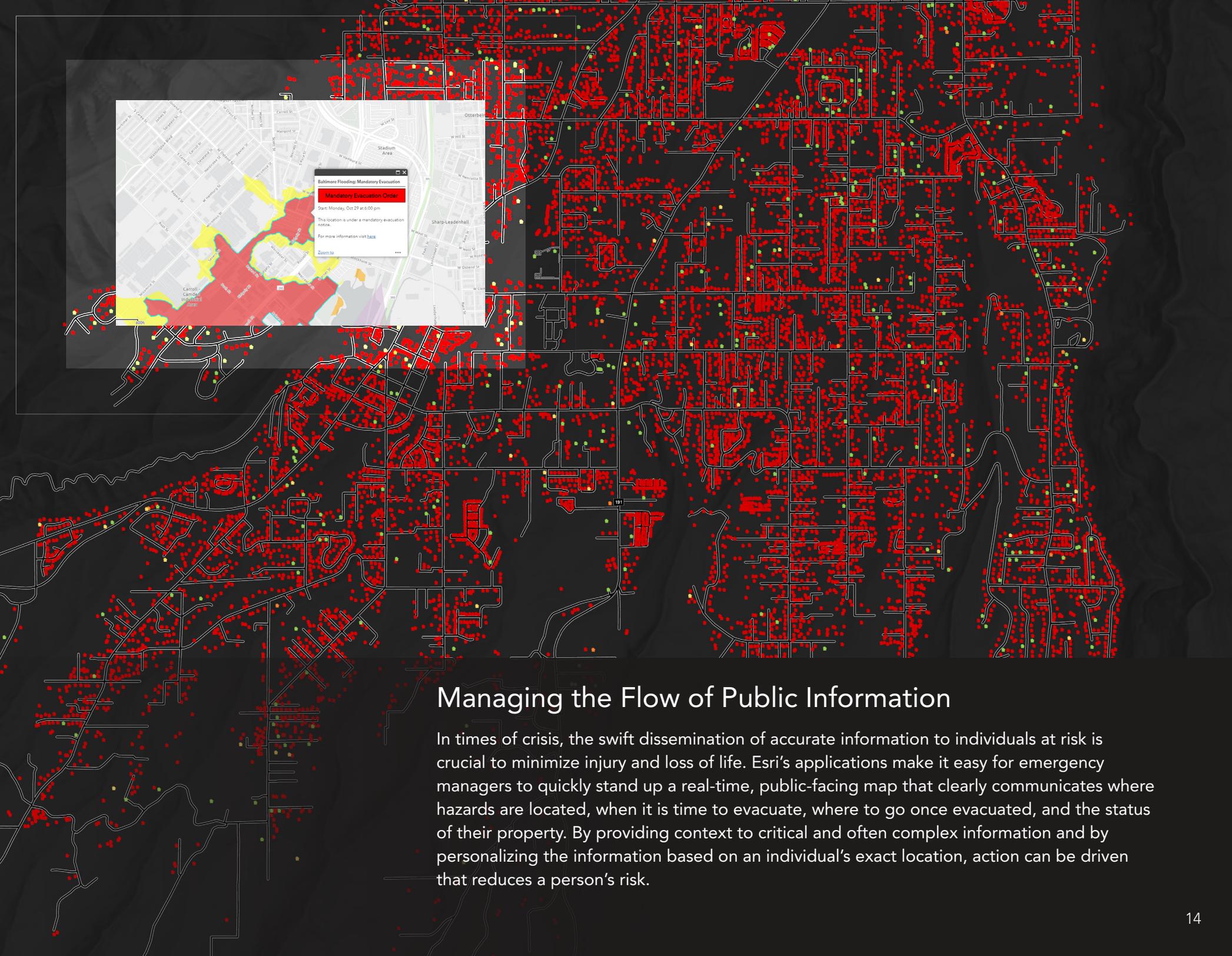
Managing the Flow of Public Information

In times of crisis, the swift dissemination of accurate information to individuals at risk is crucial to minimize injury and loss of life. Esri's applications make it easy for emergency managers to quickly stand up a real-time, public-facing map that clearly communicates where hazards are located, when it is time to evacuate, where to go once evacuated, and the status of their property. By providing context to critical and often complex information and by personalizing the information based on an individual's exact location, action can be driven that reduces a person's risk.

Oklahoma Crowdsources Damage Assessments to Kick-Start Disaster Recovery

Oklahoma Department of Emergency Management

When record-setting rainfall caused historic flooding in the spring of 2019, 27 counties across Oklahoma were declared official disaster areas. Approximately 2,200 homes were damaged as the devastating storm produced water levels that caused reservoirs, lakes, and rivers to overflow.

The Oklahoma Department of Emergency Management (OEM) took an innovative approach to its workflow, using ArcGIS Dashboards to display crowdsourced damage reports. Those who were affected by the floods were asked to spend less than five minutes completing a simple, web-based form using ArcGIS Survey123.

Survivors shared their unique damage information, uploaded photos, and identified their location on an interactive map—all using a smartphone or tablet.

To manage the data that would stream in from the completed surveys, the team chose to use ArcGIS Dashboards because of its rapid data aggregation and simple visualizations. From there, emergency managers were able to quickly determine whether further inspection or analysis was required before submitting the full assessment to the Federal Emergency Management Agency (FEMA) for evaluation.

"We have dashboards already that show, basically live, the situation across the data. This made it very easy to integrate this dataset," says Zach Stanford, the state coordinator for crisis information and disaster intelligence at OEM. "As you see how many incidents you have working, you can also see how many damage assessments or damage reports are pending review."

Oklahoma residents who were affected by the disaster embraced OEM's mobile-friendly surveys and new crowdsourcing strategy.

For the 2019 floods, the office received approximately 2,600 submissions. The ease of using Survey123 streamlined communication that resulted in FEMA approving a major disaster declaration for the area and the Small Business Administration (SBA) supporting a related low-interest disaster loan program.

This digital transformation, powered by ArcGIS technology, has completely eliminated paper-based inefficiencies. Emergency managers no longer have to make educated guesses about what information they need to collect and then travel to every site to manually record their observations.

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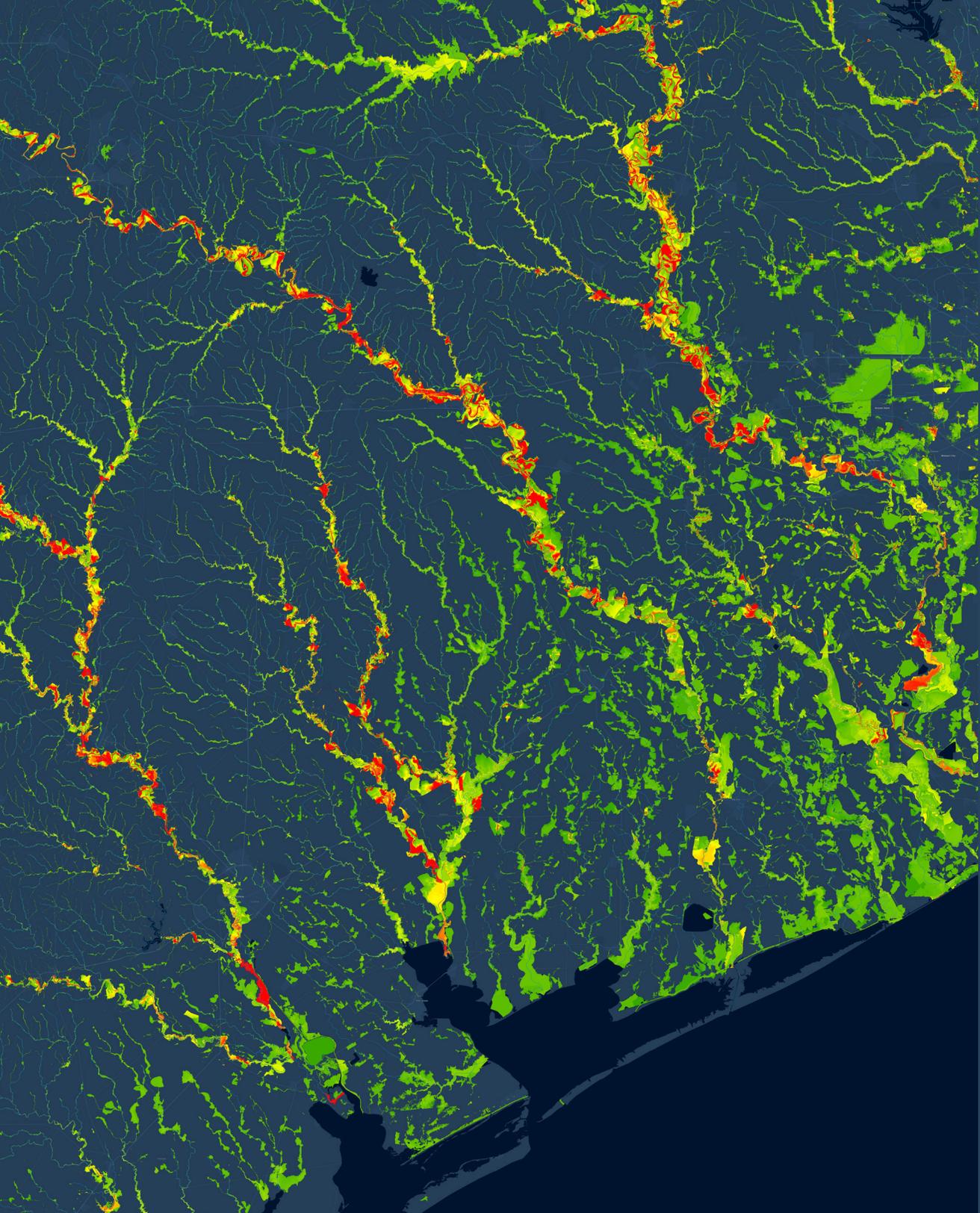
Esri's Emergency Management Operations Solution

An Information Platform for Everyone

When fast-moving incidents happen, emergency managers must monitor the crisis as it unfolds and deploy resources effectively. The Emergency Management Operations solution puts vital information in front of decision-makers and gives them essential insight for anticipating impact and coordinating the response.

Esri's Emergency Management Operations solution is a fully integrated system that allows you, your team, and unlimited partner agencies to maintain shared situational awareness at all points during a response, connecting everyone to the information they need—when they need it—to make mission-critical decisions.

Modernize your emergency response operations and build your resilience with ArcGIS.

GET STARTED TODAY

The Esri Disaster Response Program

Help When You Need It Most

Since 1969, Esri has developed technologies that have helped people solve some of the world's most difficult problems, including those that can be life threatening. When the Northridge fault in California unleashed a 6.7 magnitude earthquake in 1994, it took 57 lives and injured 8,500 people. The epicenter was just 80 miles from Esri headquarters, and everyone at the company wanted to help their fellow Californians get back on their feet. A team of GIS experts stepped up to assist local agencies responding to the disaster with GIS technology and technical expertise that helped responders understand the situation and coordinate response operations. From this effort, the Esri Disaster Response Program (DRP) began to take shape.
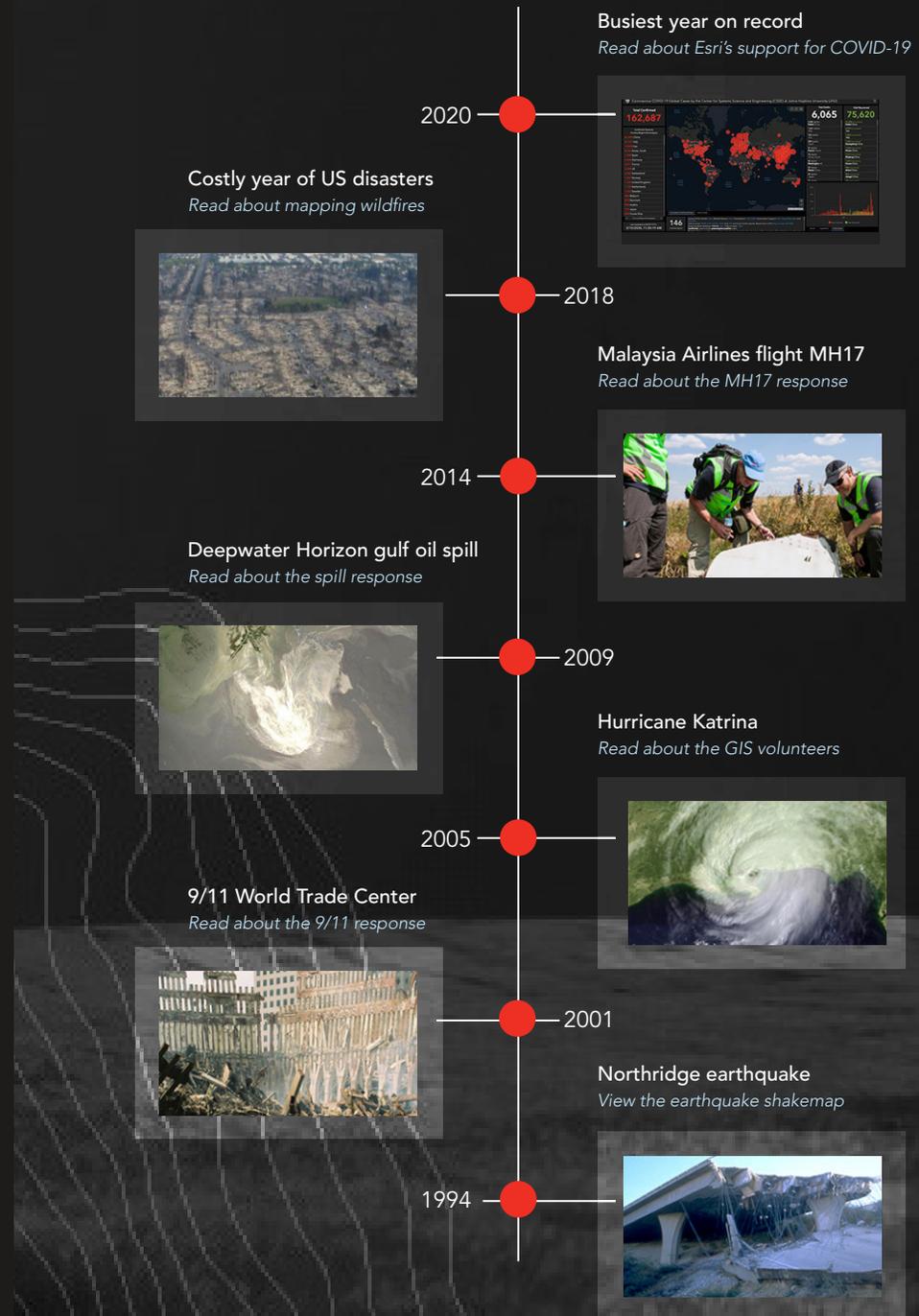
Over the past 27 years, the DRP has responded to thousands of requests for assistance worldwide for incidents of all types and sizes. The DRP was formalized to aid emergency response operations by supplying GIS technology, setting up essential workflows, and processing vital data. Tech support experts also provide help to ensure that mission-critical apps are stable and working when they are needed the most.

By supporting these organizations and documenting lessons learned, best practices, and common challenges from the last 27 years, Esri has been able to develop a solution that helps emergency management agencies address the most common operational needs during a disaster response.

Resources
- Esri's Disaster Response Program
- Esri's ArcGIS Living Atlas of the World, Weather Data Live Feeds
- Esri's Emergency Management Operations Solution

The Story of GIS in Disaster Response

Busiest year on record
Read about Esri's support for COVID-19

2020

Costly year of US disasters
Read about mapping wildfires

2018

Malaysia Airlines flight MH17
Read about the MH17 response

2014

Deepwater Horizon gulf oil spill
Read about the spill response

2009

Hurricane Katrina
Read about the GIS volunteers

2005

9/11 World Trade Center
Read about the 9/11 response

2001

Northridge earthquake
View the earthquake shakemap

1994

About Esri

Esri, the global market leader in geographic information system (GIS) software, location intelligence, and mapping, helps customers unlock the full potential of data to improve operational and business results.

Founded in 1969 in Redlands, California, USA, Esri software is deployed in more than 350,000 organizations globally and in over 200,000 institutions in the Americas, Asia and the Pacific, Europe, Africa, and the Middle East. Esri has partners and local distributors in over 100 countries on six continents, including Fortune 500 companies, government agencies, nonprofits, and universities. With its pioneering commitment to geospatial information technology, Esri engineers the most innovative solutions for digital transformation, the Internet of Things (IoT), and advanced analytics.

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