How to Establish GIS-Based Initial Operating Capabilities at Fusion Centers

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Executive Summary

Global events routinely shed light on the complex, interrelated worlds of safety and security. Civil unrest, crime, natural disasters, and widespread public health threats all reflect the heightened need for coordinated prevention activities and response capabilities. Intelligence fusion centers are uniquely positioned to spearhead this coordination.

Fusion centers have been a growing practice since 9/11. They are embedded in most local, state, federal, military, and corporate organizations worldwide. These centers are tasked with collecting and analyzing data, as well as sharing crime, disaster, and threat-related information with all levels of government, the private sector, and the public. Fusion centers also provide intelligence and investigative support during critical incidents and planned special events.

To support many missions, fusion center technical solutions must be able to fuse foundational, incident, dynamic, and intelligence data. Integrating data from multiple data sources and multiple agencies with advanced maps and spatial analysis can only be accomplished through the effective use of geographic information system (GIS) technology.

Esri's new Safe Communities initiative is focused on helping organizations rapidly set up GIS for shared situational awareness. This initiative supports fusion center efforts to use GIS as a foundation for protecting lives, property, and critical infrastructure. (Learn more by reading the *How to Build Safer Communities* white paper at go.esri.com/SafeWhitePaper.)

Goal of This White Paper

This white paper outlines an expanded approach to using GIS for intelligence fusion, operations, and analysis that supports safe communities. This process-based approach goes beyond using GIS to support common operating pictures (COPs) for visualization and moves toward leveraging GIS as a system of insight that supports the entire intelligence life cycle process. Geospatial frameworks enable interconnectivity between people, process, and data. With this approach, agencies with a national security mission can

■ Collect and integrate information for rapid analysis to identify threat patterns, trends, and relationships.

■ Create repeatable and shareable information and models.

■ Reuse information and services across systems and jurisdictions.

■ Improve risk, threat, and vulnerability assessments to safeguard communities and critical infrastructure.

- Facilitate better emergency planning, response, mitigation, and recovery efforts.

- Provide enhanced dissemination and knowledge capture.

- Evolve the common operational picture to a common operational platform.

A GIS-Based Strategy Works

It is important to remember that all security issues have one thing in common—location.

Successful security strategies use geographic information as the foundation for integrating business intelligence across the enterprise. When location is a common identifier for different data types, workflows, and processes, key information can be integrated regardless of which organization owns it.

Why GIS?

Fusion centers make it a priority to keep decision-makers informed, prevent incidents, manage responses to incidents, and quantify impacts when they occur. To achieve these goals, staff must collect and process data from various sources for current and accurate situational awareness, then they must develop actionable processes and plans for prevention and response. GIS is a unique technology that excels in these areas.

GIS is a complete system that goes beyond powerful visualizations. It provides the ability to organize information, as well as analyze and understand trends and protection priorities in new ways. GIS also supports streamlined data dissemination. It is an effective tool for both internal and external communication.

Integrating and geotagging structured and unstructured intelligence data, including sensor, imagery, and video data, empower fusion center staff to fully analyze and exploit that information and create actionable information out of raw data. One GIS platform supports a fusion center's many missions.

Perhaps most importantly, GIS provides a common language and reference system for multiple disciplines—including law enforcement, emergency management, intelligence, public health, and defense. It empowers stakeholders to collaborate and make data-driven decisions.

Creating an Initial Operating Capability

To lay the foundation for a successful GIS implementation, fusion centers need to create an initial operating capability (IOC). The IOC provides immediate and robust mapping and spatial analysis capabilities right out of the box.

The advantage to this approach is that the center immediately benefits from its investment in a set of commercial off-the-shelf (COTS) software apps for desktop, web, and mobile users. This first phase of implementing a COTS-based platform allows organizations to use industry best practices rather than reinventing the wheel and creating new, customized processes.

When implementing ArcGIS® platform capabilities into a fusion center environment, the solution architecture should comprise local and web-based software. The envisioned solution is a web-enabled environment that provides a wide range of GIS capabilities supporting data collection and management, analysis, visualization, and sharing (see figure 1). The foundation for this ArcGIS platform is ArcGIS Enterprise, which runs behind an organization's firewall, in its

infrastructure, on-premises, and in the cloud. This flexible deployment works with enterprise systems and policies.
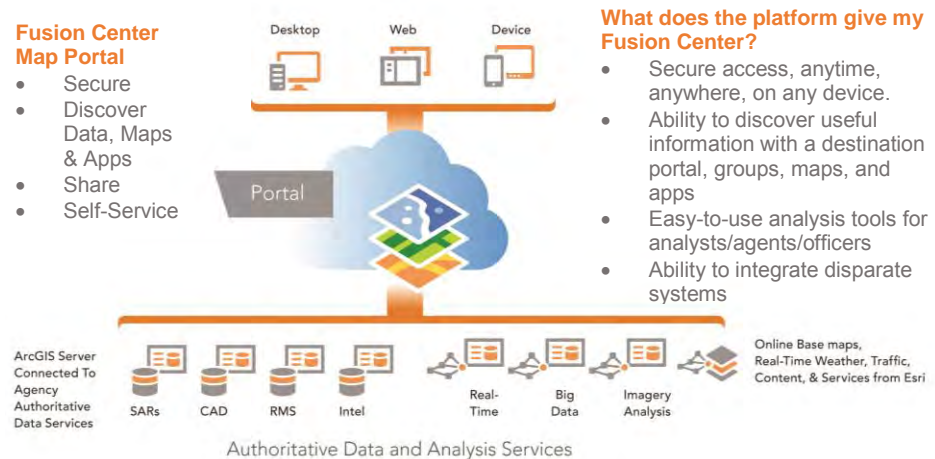

Figure 1: Conceptual Architecture for Fusion Centers

Components of the IOC include the following:

■   Web GIS—ArcGIS Enterprise, which has server and secure portal functionality, is used for securely creating, organizing, publishing, and managing geographic information. Most fusion center users (non-GIS professionals) will access and use geographic data and apps this way. There is a content management capability that administers access to data and services.

■   IOC Apps—ArcGIS Enterprise provides access to a set of powerful productivity apps, including web map viewing templates, data collection apps such as Collector for ArcGIS, analytical tools such as Insights^{SM} for ArcGIS, apps for monitoring activities and events such as Operations Dashboard for ArcGIS, and apps for data dissemination such as Esri® Story Maps. While powerful, these apps are ready to use with minimal effort. They can be easily configured to support center needs, providing personnel with quick access to information. To see a complete listing of public safety IOC apps, visit go.esri.com/SC_Apps.

■   Desktop—ArcGIS Pro provides very powerful tools for spatial analysis, data management, workflow management, and modeling. A small set of GIS professionals within the organization needs this tool. ArcGIS Pro is deeply integrated with the entire ArcGIS platform so online content such as municipal data or community baseline data, as well as content from ArcGIS Enterprise, is readily available to center users.

Once an IOC is established with data collection, spatial analysis, and data dissemination, a fusion center can then consider additional investment in extending the platform such as integrating with other core business systems, automating analytics, and adding alerting capabilities. A center's GIS can evolve over time as new capabilities become available and baseline expertise grows.

This approach slowly builds toward a rich, integrated enterprise system. Figure 2 outlines a phased approach from an IOC to more advanced capabilities.
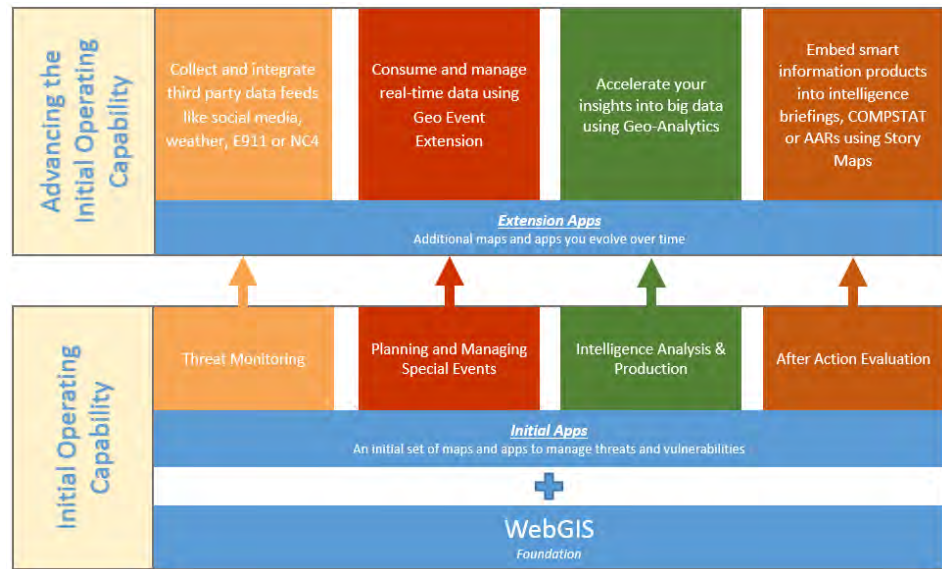

Figure 2: Develop Initial Operating Capability That Is Scalable over Time

Advancing the IOC

Once the ArcGIS platform is configured, staff can move into a second phase of development to enrich the IOC. This is the time to begin dynamically accessing web services and combining them to create a variety of products. Fusion center staff can integrate external geographic assets from other agencies and departments to grow capabilities.

ArcGIS serves content to virtually any application—on desktops, the web, smartphones, and tablets. This means fusion center personnel have open, flexible access to the data and services available on the platform.

In this phase, fusion center staff will find success integrating third-party solutions and data feeds that capture, manage, and disseminate multi-intelligence data sources. These sources include data from records management systems, CAD-911, social media providers, meteorological feeds, DHS HIFLD, CCTV, border sensors, AIS, and other government/private sources of information.

Figure 3 shows advanced IOC integration with the NC4 global threat feed into Operations Dashboard for ArcGIS.
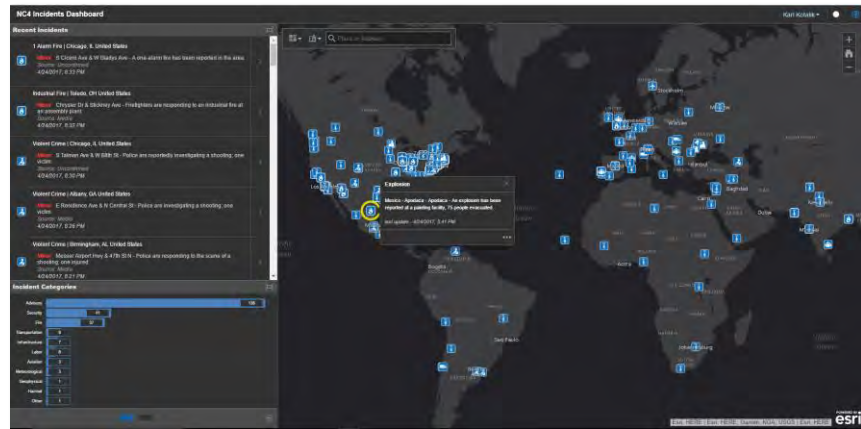
Figure 3: Esri/NC4 Integration of Real-Time, All Hazards Threat Feeds

Creating Safe Communities

The hallmark of a safe community is having organizations use GIS as a foundation for multiagency, multijurisdictional collaboration. Esri's Safe Communities initiative supports organizations during all phases of development—from technology implementation to expanding capabilities.

Security organizations use GIS to prepare for known and potential issues and present shared awareness to many consumers about issues including the following:
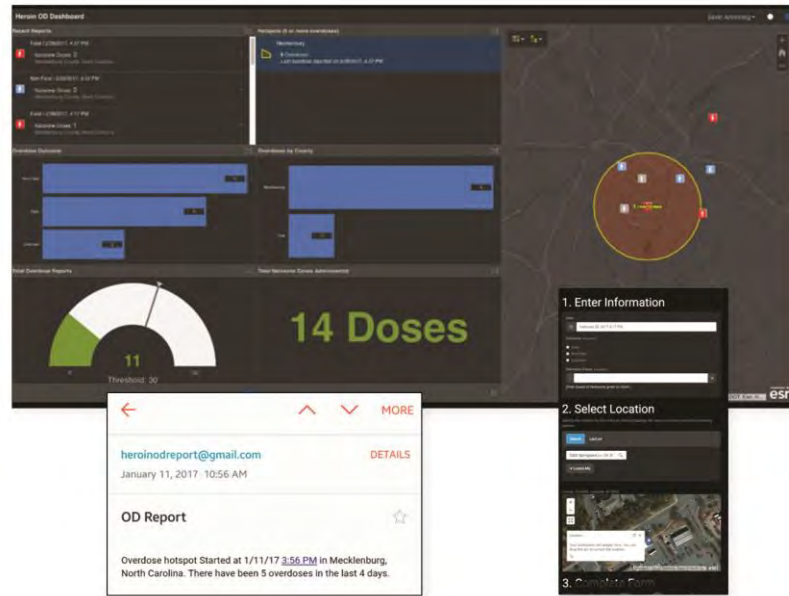
- Responding to health threats such as epidemics
- Preparing for environmental or technological disasters
- Protecting citizens at a major event
- Managing civil unrest and executing modern crime control strategies
- Preparing for and managing emergencies and intentional attacks
- Protecting critical infrastructure (both physical and virtual)
- Securing borders and managing refugees or migrants

The following images detail how fusion centers can use GIS to address each of these urgent challenges:

### Responding to Health Threats Such as Epidemics

With real-time awareness, your community can not only better respond to epidemics but also identify trends that may indicate when a threat will emerge. For example, identify vulnerable populations and monitor heroin overdose locations to make data-driven decisions on how to manage prevention, intervention, and enforcement activities.

## Preparing for Environmental or Technological Disasters

Be the first to know when a disaster is occurring by monitoring and analyzing data from the Internet of Things. Share real-time information across public and private lines, build your response plan, and deploy limited resources to affected areas quickly and efficiently.

Swipe Map

Social Media

Casualty Dashboard
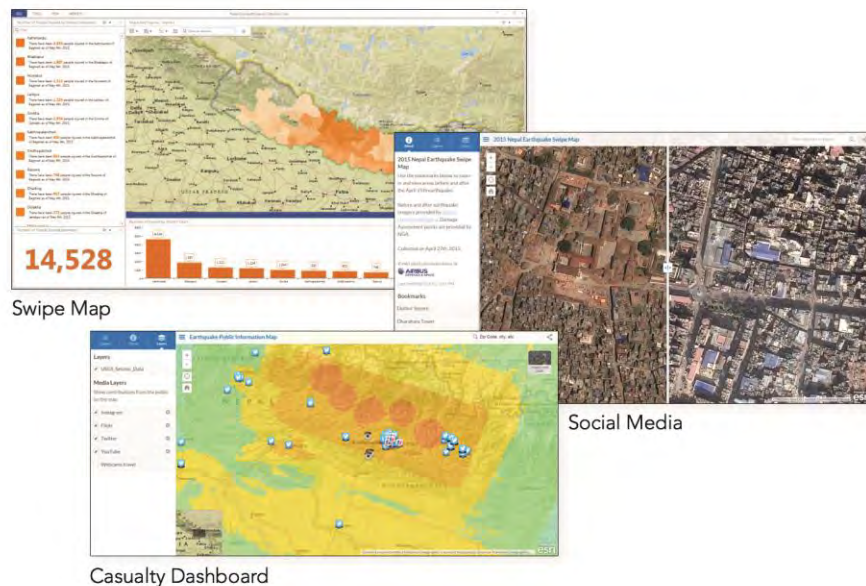
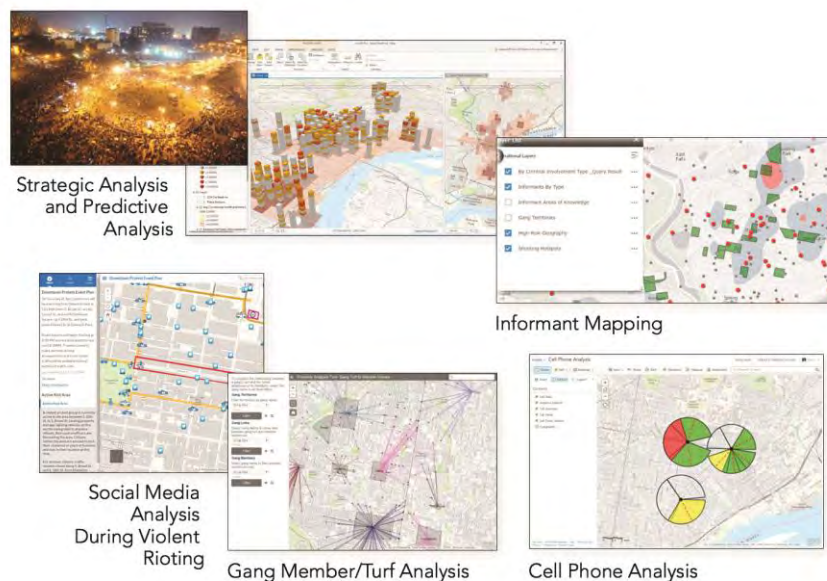## Protecting Citizens at a Major Event

Crowd control, security, and managing the movement of people across the community are essential during a big event. Track the progress of the event and

monitor situations that may affect it and the people attending. Ensure the safety of VIPs, participants, and the attending population.
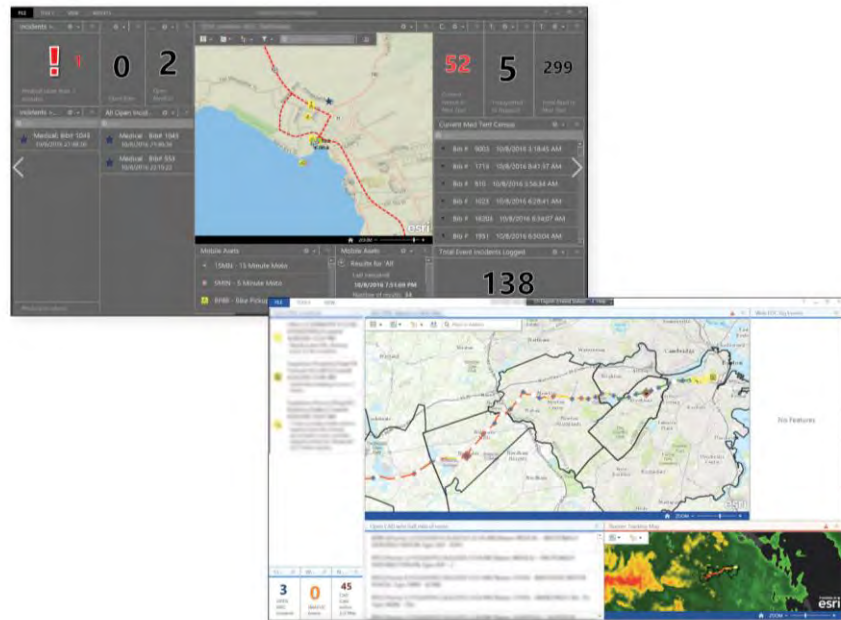
Managing Civil Unrest and Executing Modern Crime Control Strategies

Combine authoritative big data with advanced analytics to identify crime patterns and trends. Take control of crime threats in your community by leveraging advanced spatial analysis and apply it to strategies like predictive policing, CPTED, intelligence-led policing, and community policing. Deploy resources to the right locations at the right time.

Strategic Analysis and Predictive Analysis

Informant Mapping

Social Media Analysis During Violent Rioting

Gang Member/Turf Analysis

Cell Phone Analysis

Managing Emergencies or an Intentional Attack

Exchange critical information across departmental, municipal, and county lines to ensure all at-risk populations are aware. Minimize the impact of an emergency

and facilitate a rapid recovery by staying connected to the data, people, and resources you need.

Protecting Critical Infrastructure (both physical and virtual)

Know where your assets are located, how they are functioning, and what's affecting performance with real-time monitoring tools. Get alerts on potential threats or attacks, and mitigate cascading effects stemming from the loss of critical systems.
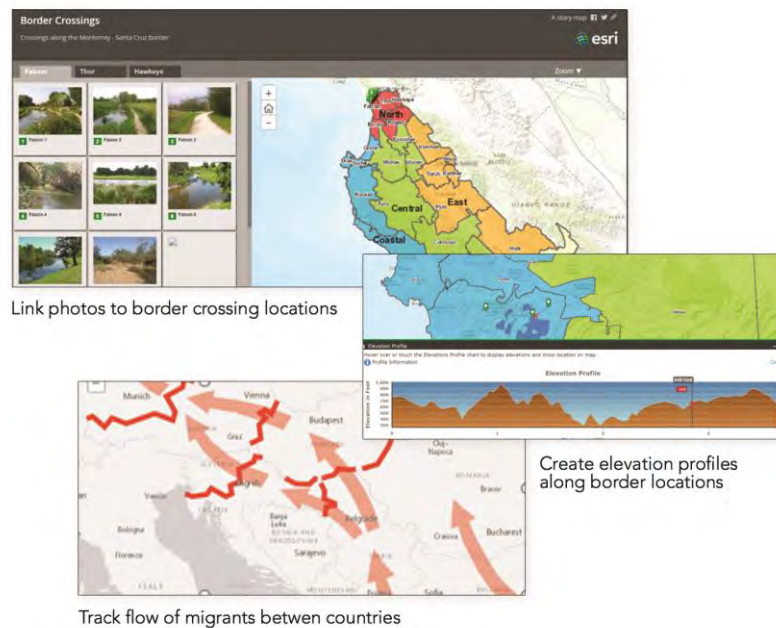

Securing Borders and Managing Refugees or Migrants

Surveil and monitor border areas, crossing points, and vulnerable populations. Connect multiple systems across departments and agencies to identify at-risk populations and provide shelter and logistics for displaced people.

Link photos to border crossing locations

Create elevation profiles along border locations

Track flow of migrants between countries

Organizing Teams for Improved Intelligence Sharing

Historically, intelligence operations have been managed and operated in closed environments. To protect sources and methods, important information is sometimes unavailable to other agency members—even those who may be tasked with working on a similar case or problem. This separation has negative consequences because analytical groups are often removed from the operational and/or intelligence elements they are tasked to support.

Governments are beginning to understand the need to co-locate operational and analytical personnel to ensure maximum fusion between the multiple disciplines. Modern-day fusion centers embody this strategy.

In addition to having operational and analytical staff sitting side by side, technologists need to be nearby. All too often, they are housed on different floors or in different buildings. This separation prevents them from truly understanding their clients' requirements.

The GIS professional possesses a unique blend of knowledge on data, operations, database management, analytical techniques, and application development. Embedding GIS technologists alongside their analytical and operational counterparts ensures a new level of comprehension on how technology can best support the mission. It also allows for rapid development and deployment cycles for operational users whose robust requirements outpace the capabilities of their traditional IT support groups.

Ultimately, GIS is the platform fusion centers should use to unify missions and personnel from data collection through dissemination, from the start of an incident through its closure.

The figure below represents the ideal overlap among operational, technical, and analytical personnel assigned to an intelligence function:
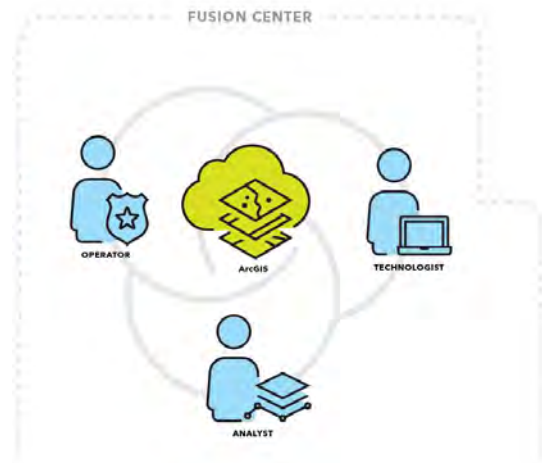
Unity of Mission
Co-locate analytical, GIS, and operational staff to ensure technical capabilities support operational requirements.

Conclusion

Today's information sharing and intelligence requirements are now intertwined among multiple levels of government, international agencies, and private sector partners. Fusion centers need the ability to visualize, correlate, share, and deeply understand information—something that can only be done using GIS.

GIS enriches intelligence data sources through spatial enablement, facilitating a deeper understanding by linking and analyzing the relationship among human, cultural, and physical geography. A proper GIS deployment ensures that technical tools and capabilities remain strongly aligned with operational requirements. The common operational picture transforms into a common operational platform to foster safe communities.

In our new global security environment, agencies need solutions that enable the free, yet protected exchange of geospatial information among vetted partners to ensure collaboration and eliminate traditional information silos. Esri alone provides technology that best supports the evolving security environment.

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Esri inspires and enables people to positively impact their future through a deeper, geographic understanding of the changing world around them.

Governments, industry leaders, academics, and nongovernmental organizations trust us to connect them with the analytic knowledge they need to make the critical decisions that shape the planet. For more than 40 years, Esri has cultivated collaborative relationships with partners who share our commitment to solving earth's most pressing challenges with geographic expertise and rational resolve. Today, we believe that geography is at the heart of a more resilient and sustainable future. Creating responsible products and solutions drives our passion for improving quality of life everywhere.

For more information, visit
go.esri.com/SC_Fusion.