Geospatial Features and Functionality for Emergency Call-Taking, Computer-Aided Dispatch, and Record Management Systems

An Esri® White Paper
January 2016

380 New York Street
Redlands, California 92373-8100 USA

800 447 9778
info@esri.com

esri.com

G71511

Geospatial Features and Functionality for Emergency Call-Taking, Computer-Aided Dispatch, and Record Management Systems

An Esri White Paper

Contents **Page**

G71511

Geospatial Features and Functionality for Emergency Call-Taking, Computer-Aided Dispatch, and Record Management Systems

Executive Summary and Introduction

For more than 40 years, the public has relied on the 9-1-1 system (USA and Canada) during emergencies. As technology improves, location intelligence increasingly appears as an integral component of everything we do. Every unit of data has a geographic component. The public has come to rely on maps on its mobile devices, home computers, and vehicle navigation systems. Today's citizens are demanding faster and more flexible, resilient, and scalable ways to communicate in emergency situations. In fact, the National Emergency Number Association (NENA) publicly promotes the statement, "Emergency Help. Anytime, anywhere, any device."

With the introduction of Next-Generation 9-1-1 and the challenge providers face to improve aging analog call-taking, dispatch, and record-keeping systems, Public Safety Answering Points (PSAPs) around the world are updating and upgrading their current solutions at an unprecedented pace. First responders (police, fire, and emergency medical services) rely on sophisticated, computerized systems to manage large volumes of information including the data necessary to accurately locate and identify callers, dispatch resources, and manage the historic record of the call for service.

As decision makers evaluate and prepare formal requests for information (RFI) and requests for purchase (RFP) or purchasing tenders, they seek industry leaders to understand the functions, features, and requirements they should be looking for to embrace best practices. This document is a supplement to the Esri white paper "Geospatial Considerations for Emergency Call-Taking, Computer-Aided Dispatch, and Record Management Systems" (January 2016) and is intended to serve as a reference point for some of the more commonly requested GIS-related requirements for these implementations. This list is ever changing and growing, and it is recommended that interested researchers also see Association of Public Communications Officers (APCO), NENA, European Emergency Number Association (EENA), and the Esri website for current information.

Government agencies are regularly using GIS to identify streets, boundaries, tax information, and so on. GIS usage among law enforcement agencies includes the management of geographic patrol areas, crime analysis, infrastructure protection, and call routing (see Esri Technology for Law Enforcement). Fire departments are using GIS to catalog the locations of fire hydrants and assess vulnerability or deployment planning (see GIS for the Fire Service), while emergency medical services use GIS to respond to calls for service, define service areas, and so forth. These agencies are typically staffed with personnel who maintain the geographic data in the system to ensure planning, analysis, and response accuracy.

A GIS-integrated solution provides more actionable information and capability than simply displaying an incident on a dispatch monitor or map. Solutions that incorporate platform GIS provide more relevant and actionable information to the call taker, first responder, or supervising commander, who can interface with the data from a number of different sources. These sources can be dynamically updated and analyzed and, when properly configured, provide officials with reliable information such as available fire apparatus or patrol units, their location, and any conditions that may impact a safe and timely response.

Geospatial Features and Functionality for CAD and RMS

This paper is intended to provide insight into some of the key GIS-specific features and functionality that customers ask for in computer-aided dispatching (CAD) and record management system (RMS) acquisitions. The features can be paraphrased as needed into the requirements document for RFPs. The features and functions listed here do not represent an exhaustive list or all the aspects of a geospatial CAD/RMS.

GIS-related requirements are found in many applicable local, state, and federal laws (Federal Communications Commission [FCC] Orders and Regulations) and through standards published by the NENA and the APCO.

Entity Name Map	For example, when street centerline features are stored in a table called STREETS, and the street name is stored in a column named FULLNAME, a configuration tool will need to allow you to specify these names without having to change entity names to match hard-coded names in the GIS.
Functional Feature Classes	A features class (spatial layer) is a collection of geographic features with the same geometry type (such as point, line, or polygon), the same attributes, and the same spatial reference. A functional feature class is a feature class that has specific business logic developed to consume data from it. For example, applications that need to perform address matching services will need to require the presence of a street centerline and/or address point feature class in the geodatabase. Some feature classes are never required and only support specific functionality if present. For example, the GIS service will need to support the existence of a hydrant feature class and allow clients to search for a nearby, in-service fire hydrant. While this feature class is not required for basic dispatching, it may be used to supplement dispatch functionality.
Geospatial CAD Functional Feature Classes	This diagram provides an illustration of applying various functional GIS feature classes within a CAD business logic and workflow engine. Geographic data provides the ability to create new rules and automation for dispatching and emergency response.

G71511

	 **LINES (Examples):** Street Centerlines, Addresses, City Boundaries, ZIP Code Boundaries, Area Code Boundaries, and Fire Hydrant Locations **POINTS (Examples):** Crime Locations, Registered Sex Offenders **POLYGONS (Examples):** Districts/Coverage Areas, Special Enforcement Districts, Risk Zones, Buffer Zones, Unit Staging Areas
Nonfunctional Feature Classes	A nonfunctional feature class is a feature class that exists in the geodatabase and must be displayed as a layer on a map client application. It does not require any business logic associated with it in the GIS. Examples of nonfunctional feature classes include water boundaries, forestry boundaries, orthophotography, and any other feature classes not specifically listed
Feature Class Attributes	Each feature class will need to have certain attributes providing the ability for the feature class to be consumed as a data variable in a business logic process. For example, a street centerline feature class must contain attributes for house number values and the name of the street. There may also be attributes that are not required but will need to be used if present (functional).
Hierarchical Address Matching Model	A geospatial CAD system will need to support a hierarchical approach to street address matching. Address matching will need to be supported against both point (address point) and line (street centerline) feature classes. If an address point feature class is available, it will need to be queried first for a street address match. If no match is found, or if an address point feature class is not available, the street centerline feature class will need to be queried. It is recommended that, even if an address point feature class is available, a street centerline feature class exist to support address matching of street intersections. A geospatial CAD system will need to support address point feature classes with attributes consisting of a house number and a street name. The address point feature class will need to optionally support building and unit numbers/names to accurately depict the location of residences or businesses that share the same house number and street name (for example, mobile home parks or shopping centers). If the GIS is unable to find a match, it will need to return the nearest match. For example, if 705 MAIN ST is entered, but no segment of MAIN ST contains this house number, the GIS may return a segment

	of MAIN ST with a house number range of 601–699 and designate it as a near match. The user must be able to geocode an address using a nearby segment if the actual segment does not exist in the GIS.
Numeric, Alphanumeric, and Hyphenated House Numbering	A geospatial CAD system will need to support numeric, alphanumeric, and hyphenated house numbers as specified in the United States Postal Service Postal Address Standards. However, to support geocoding of addresses using an address range, a segment side must use the same house number type for the low and high house number, and it is expected that all houses within the range adhere to the same house number type. Numbering standards are available on the NENA.org website.
"In Front of [Address]"	A geospatial CAD must provide a way to geocode a location for an incident in the street using a parcel address. For example, "In front of 1990 Cherry Circle" would be geocoded to a coordinate on the street segment directly in front of the parcel at 1990 Cherry Circle.
Street Names	Some data sources may have street names stored as a single attribute, while others are parsed into as many as five attributes (prefix direction, prefix type, name, suffix type, and suffix direction). A geospatial CAD system will need to handle any combination of attributes in between. However, because of how the Soundex and address-matching algorithms work, it is desired that prefix attributes be stored in attribute fields separate from the street name. Prefix types are typically considered part of the street name. They are used almost exclusively in foreign language street names such as Calle Valdes and Rue Bourbon. However, by storing them in the same field as the street name, the system will need to produce several Soundex and address match results when only "Calle" or "Rue" is provided as input. Prefix directions create the same problem.
Cross Street Determination	A geospatial CAD system will need to provide a service to determine the cross streets of any given street segment. This service will not only need to support the ability of a user to get the cross streets for a particular segment but can also be used to get a list of streets that intersect a particular street.
Street and Pseudo Intersections	A geospatial CAD system will need to support location matching using the names of two streets that intersect without the use of a junction or intersection feature class. A geospatial CAD will need to also support "pseudo" intersections, where two streets do not actually meet but where the addressing schema aligns with block numbering.
Block Numbers	A geospatial CAD system will need to support address matching and geocoding of locations entered as block numbers (for example, 100 BLK MAIN ST). A geospatial CAD system will need to geocode this address similar to how it would a house number (100 MAIN ST) but without the x,y offsets applied to the segment ends and sides.
Common Place Matching	A geospatial CAD system must support matching point locations that have address information associated with them (for example, common places such as businesses, schools, and other government buildings) by both name and address (reverse place matching).
Geocoding	A geospatial CAD system will need to support translating a verified location (street address, intersection, named feature point) to a

	geographic coordinate. Reverse geocoding, or translating a coordinate to a street address, intersection, or named feature point, will need to also be supported.
Feature Attribute Queries	A geospatial CAD system will need to support querying features in any functional feature class by any functional attribute(s).
Feature Aliases	Most functional feature classes (such as street centerline and common place) will need to support the use of Alternate Name Tables, allowing aliases to be defined on a per-feature basis.
Spatial Queries	A geospatial CAD system will need to support querying features from functional feature classes within a specified radius of a specified coordinate. This feature will need to be used for such things as previous incident searches, premise/hazard searches, and determining the responding agency/beat/station.
Transportation Network Services	A geospatial CAD system will need to provide a service to calculate the shortest or quickest path between two or more points using the street network dataset. Driving directions will need to be included as part of the response, as will estimated travel time. Custom evaluators, such as peak and nonpeak travel costs; restrictions based on vehicle length, height, and weight; illegal turn restrictions; and turn penalties, can be defined in the network dataset and taken into account while solving. Network elements can be closed or opened in real time or at scheduled times. A geospatial CAD system will also need to be designed in such a way as to support intelligent traffic systems so that real-time traffic data can be used to assess network travel costs.
Complex Routing Support	A geospatial CAD system will need to provide the user with complex navigation routing information to be displayed in a map client application.
Turn Penalty Modeling Support	A geospatial CAD system will need to provide the user with the ability to model turn penalties associated with a particular route and display it in a map client application.
Sensory Data Interface Support	A geospatial CAD will need to support an open application programming interface (API) with sensory devices to collect the following data: ■ Vehicle data, Speed ■ Vehicle in motion ■ Warning systems (lights and sirens) activation ■ Personal data ■ Self-contained breathing apparatus air levels ■ Biostatistics ■ Devices ■ Heat sensors, Toxic gas sensors ■ Video surveillance sensors
Meteorologics Support	Users often need to understand how weather may be impacting an incident. There are several situations beyond catastrophic weather situations warranting this feature. For example, weather has an effect on wildfires, the direction and speed of toxic gas clouds, and the usability of bridges/roadways that become dangerous at certain wind speeds. A geospatial CAD will need to support an open API with

	meteorologics applications to import weather data for a specific location and overlay it on a map.
Layer Management within Dynamic Map Client	A geospatial CAD will need to support an open API to provide any map client with data associated with spatial layers contained within the geodatabase. A geospatial CAD will need to also support the ability to define those layers and switch between the views to prevent screen clutter.
Overlapping Jurisdictional Support	Many agencies have overlapping jurisdiction, where more than one agency may be required to respond to a location for an incident. In addition, an agency may have overlapping jurisdictions within itself. For example, university campus police may be the first to respond to a burglary on a college campus, but local police may also be required to respond if an arrest were to occur. As such, a geospatial CAD will need to support the ability to have overlapping jurisdictions and allow a dispatching application to notify all responsible agencies.
Time-Dependent Polygons	Overlapping jurisdictions may also have a time element associated with them. For example, park police may be responsible for a community park or beach between the hours of 6:00 a.m. and 6:00 p.m., whereas local police are responsible for the other 12 hours. As such, a geospatial CAD will need to support the ability to establish time-dependent geopolygons.
X,Y Coordinate Projection Exposure	A geospatial CAD will need to support an API to expose x,y coordinate projections to be used by any application.
Incident Location Data Store and Query	A geospatial CAD will need to support the ability to store and query incident data associated with a specific location in a record management system except where bandwidth limitations exist in a mobile operating environment.

Dynamic Map Client Functionality

A dynamic map client is required to graphically display location data as well as data corresponding to locations. A dynamic map client could be plug -and- play and provide an API that offers the capability of sharing location data with host applications. The dynamic map client needs to be able to share data by populating the host application's data entry forms and unique user interfaces, such as Active Paper and dispatch command lines.

The user will need to be able to point, click, or touch a point on the map client, and data associated with the location will need to be populated in the host application user interface based on the host application's call for the data.

The map client will need to support the ability for the host application to populate new data associated with a location on the map through an API, and the host application's performance will need to be free of adverse effects caused by interacting with the dynamic map client.

Client-User Interactions	The dynamic map client will need to support the ability for users to interact with the system through the use of a mouse, a touch screen, key commands on a handheld device, voice activation, or pen-based technology. Geographic data is typically displayed as a digitized map

	or orthophotographic image. The dynamic map client will need to provide users with the ability to select, deselect, or change their desired view of location data. View selections are meant for a later release of the solution but will need to include the following actions: ■ Switch from a digitized map to ortho (including oblique) ■ Switch from an ortho to a digitized map view ■ Minimize digitized map to smaller perspective and display ■ Apply static or dynamic dispatch command on map for input ■ "Halo" winder appears over spatially displayed data
Location Data Acquisition	Users require the ability to access location data through a map interface. The acquired location data is to be used by a host application for specific processes. The dynamic map client will need to provide the ability for a user to access location data through the utilization of the following drawing tools: ■ Single-point access ■ Multiple-point access (Ctrl + [Click]) ■ Select by layer ■ Point-to-point line ■ Polygons ■ Circles ■ Ovals ■ Measured distance from a given point or current location ■ Measured radius from a given point or current location
Location Data Viewing	Dynamic map client will need to provide the ability to view and select data associated with a location through the following methods: mouse-over movement, point and click, pen devices, and touch screen access.

Situational Awareness Functionality

The dispatcher or first responder is a person who will be interfacing with the map client to complete a specific task for a specific location or set of locations. The dispatcher or first responder uses the map to obtain an awareness of response boundaries and assigned areas, where they are located in a geographic area, where units from their agency or another agency are located within an area, where incident or response calls are occurring, automatic directions to those calls, detailed information relating to the calls, or detailed information relating to a specific location.

Single- and Multiple-Vehicle/Person Display	Geospatial CAD users want to know their and other users' positions on a map, including direction of travel and travel history. Dynamic map clients need to provide awareness by displaying a solid arrow indicating direction of travel and a dashed line indicating the previous route.
Vehicle/Person Display Toggles	The geospatial CAD user and supervisors will want the ability to toggle on and off whether or not their location is displayed and viewable by others. They may also want the ability to restrict the overall operational view to supervisor level and above. The map solution will need to provide a means to grant authority to specific users for this feature.

Vehicle/Person Type Indicators	The geospatial CAD will need to support customization of icons and/or shapes to represent different types of conveyance including vehicle, motorcycle, bicycle, walking, and mounted as required, and it will be based on the vehicle class of the resource.
Incoming Unit Flight Following	The geospatial CAD user will want to know the location of other vehicles responding to the same location. As such, the dynamic map client will need to provide the ability to identify incoming units that are off the map by an indication pointing to the incident they are responding to. The indication will need to support a user-defined color variant correlating to the distance from the incident.
Routing Indicators	The geospatial CAD user will need to be provided with the ability to apply individual icons for each of the following: ■ Start of route ■ End of route ■ Location icon ■ Incident ■ Caller location ■ Barriers and intermediate route points
Point-to-Point Directions	The geospatial CAD user will want the ability to search for and receive point-to-point directions. The dynamic map client must support the ability for the user to enter starting and ending locations. The map client will need to then determine the route to take and provide the user with both textual and graphical information pertaining to route, estimated time of arrival, and distance.
Address Lookup	The geospatial CAD user needs the ability to search for and receive location information for a given address or range of addresses. The dynamic map client must support the ability for the user to enter an address or block of addresses. The map client must then determine the location of the address and center the map on that location.
Incident Display	Provide detailed information regarding a given location and incident data associated with it. The user will most commonly want to know address data, street name, premise history, and incident detail (incident type, number of people involved, when it was received, and hazardous conditions). The dynamic map client will need to support a host application interface to present nongeographic data on a map.
Common Place Searching	The geospatial CAD user will want the ability to search for and receive location information for a common place. The dynamic map client will need to support the ability for the user to enter a common place. The map client will need to then determine the location of the common place and center the map on that location.
Traffic Volume Impact (traffic impact on response times)	The geospatial CAD user will want to be made aware of unique travel conditions that may impede a response. The dynamic map client will need to support an interface to alert the user to the impact traffic volumes may have on a route.
Environmental Response Factors	The geospatial CAD user will want to be made aware of unique weather conditions that may impede a response. The dynamic map client will need to support an interface to alert the user to the impact weather may have on a route.

G71511

Wind Direction and Plume Modeling	An awareness of environmental factors is also essential in hazardous material and wildfire incidents. The dynamic map client will need to support an interface that a host application capable of providing meteorological information can utilize to present the impact weather may have on an incident. A geospatial CAD will need to provide an automatic Wind Direction and Plume Notification feature.
Utility Company Availability	The geospatial CAD user must often work with utility companies and other services such as street departments. The dynamic map client must support an interface useable by a host application capable of providing location tracking information from an outside source.
Location Send	A geospatial CAD user is often busy handling the demands of an incident and therefore would gain an advantage by having the ability to send location information to another user such as a person with a map-enabled handheld device, a vehicle equipped with a map client, or aircraft such as helicopters. The following are potential situations: ■ Location-specific concerns ■ Staging area ■ Command post identification ■ Mutual aid response (data share geodata for incidents) ■ Sending GPS coordinates to aviation units (fire and police)
Photo Attaching	A geospatial CAD user will want the ability to attach a photo and/or video file with the location information. A geospatial CAD will need to support the ability to attach a digital photo with corresponding location information for the purpose of sending an email or message. The map is not required to use the location data.
Accident Sketching and Investigation	A geospatial CAD user will want to leverage location information in day-to-day operations such as leveraging GPS technology within vehicle accident investigations through diagramming the accident scene using existing geospatial data with map graphics as well as aerial photography and taking advantage of GPS technology to take measurements of the accident scene. A mobile client would make a request to the dynamic map client for an exported image of the current map extent to support the ability for a user to incorporate location information into a host field-based reporting application.
Crime Analysis Support	A crime investigator will need to view information on a map to better investigate and solve crimes. For example, a field investigator responding to a murder scene understands that the suspect is not out in the community being a model citizen. Thus, the field investigator will want to be made aware of other incidents occurring in close proximity to the scene he or she is working. Location information will also need to be included such as providing premise history of selected locations, a map populated with registered offenders, locations of parolees, and known locations of previous suspects. The dynamic map client will need to support an interface with a record management system for the following activities: ■ Ability to view other agency incidents and/or investigations ■ Automated data sharing

	■ Crime analysis correlation to dates aerial photos were taken ■ Possible concealment locations ■ Seasonal view of the location ■ Crime analysis units ■ Requires access to the data ■ What-if analysis ■ Web-based density analysis ■ Administrative geodashboard (static and dynamic views) ■ Use of Crystal Reports® or other business intelligence tools
Real-Time Location Tracking	The geospatial CAD location tracking system will need to supply the dynamic map client with real-time movement of vehicles, persons, or assets. The reporting system will need to provide real-time location tracking of stationary devices (i.e., sensory and image capturing devices).
Discrete I/O Reporting	The geospatial CAD location tracking system will need to support discrete telemetry tracking such as door-open status and lights/siren status.
Vehicle/Person ID	The geospatial CAD location tracking system will need to extend services to provide a host application with the unit ID, vehicle type, and GPS location to a map client monitoring the geographic area/boundary to which the ID is assigned.
Vehicle/Person Status Message	The geospatial CAD location tracking system will need to provide the active/inactive status of a vehicle/personal device.
Poll On Demand	The geospatial CAD location tracking system will need to receive Poll On Demand requests from the host application and send a location report response back to the host application.
Location Tracking Administration	The geospatial CAD location tracking system will need to provide the ability for a system administrator to modify vehicle and person attributes remotely to eliminate the need for the device to be brought back to a central location.
Status Change Monitoring	When tracking a resource, display the associated status. For example, a resource may be en route, at a location, available, out of service, and so forth. The geospatial CAD location tracking system will need to support receiving a resource status change based on the host application status types. A geospatial CAD will need to provide the information to the host application.
Boundary Assignments	The geospatial CAD location tracking system will need to extend to a host application the ability to determine a geographic boundary and/or limit of all registered vehicular or personal devices.
Response Assignment Tracking	The geospatial CAD location system will need to support the ability for the host application to apply response assignment associations to an individual or group of vehicles/persons.
Location Display	The geospatial CAD location tracking system will need to support the following displays: ■ Single vehicle or person displaying information pertaining to an individual, vehicle, or person to include location identification, speed, and direction of travel

	■ Multiple vehicles or persons displaying information for multiple vehicles or persons within a user-defined group or system including individual location, speed, identification, and direction of travel ■ GPS status displaying identification as to whether or not an active GPS signal is being captured as determined by a configurable length of time from the last tracking report (This will need to also include a time stamp of the last recorded location report.)
Location Tracking Data Formats	The geospatial CAD location tracking system will need to provide the following data within the dynamic map client as a tabular halo field attached to the respective vehicle/person location: ■ Date/Time ■ ID/Status ■ Call Sign ■ Incident/Assignment ID ■ Latitude/Longitude ■ Associated Address ■ Speed/Heading/Altitude ■ GPS Time (UTC) ■ Satellite Count and Reporting Source
Administrator User Interface	The geospatial CAD location tracking system will need to support both thick- and thin-client administration user interfaces.
Route History	The geospatial CAD location tracking system will need to support the ability to play back a route of travel for registered devices within the following time intervals: ■ Route playback within user-specified time increments ■ Boundary comparison ■ Distance traveled –(feet/miles and meters/kilometers) ■ Rate and speed—(feet/miles and meters/kilometers)
Vehicular/ Personal Devices Registration	The geospatial CAD location tracking system must support the access of a host application vehicular/personal device registration file or provide a generic file within the system in the event that a host file does not exist. The generic file must include data fields required to support the location tracking capabilities outlined in this section.
Vehicle/Person Location Cloaking	The geospatial CAD location tracking system will need to support a system administrator's ability to determine vehicles/persons that will not be sent/displayed on the dynamic map client or host application. A geospatial CAD will only need to provide authorized users with the ability to view cloaked locations.
Vehicle/Person Location Grouping	The geospatial CAD location tracking administration will need to support grouping resources in the following configurations to be used in application functions like messaging and chat: ■ Team of selected vehicles/persons ■ Jurisdictional boundaries ■ Individual unit ■ Unit/Person role (e.g., patrol, detective, supervisor) ■ Unit status (en route, in service/staging/standby, out of service

Location Tracking Data Repository	Location tracking data will need to be retained within a record management system and will need to contain location key indices to a centralized GIS service.
Location Tracking Alerts	The geospatial CAD location tracking system will need to support the provision of location alerts to be displayed in the dynamic map client or to a host application. Style, method, and configuration of alerts will need to be determined by the application receiving the data.
GPS Failure (device dependent)	The geospatial CAD location tracking system will need to store and provide reports for any device's failure recognition capabilities.
Violation Logging	The geospatial CAD location tracking system will need to support violation logging within a centralized record management system.
Vehicle/Person Location Violations	The geospatial CAD location tracking system will need to provide the ability to detect and determine whether a vehicle or person has violated either standard or user-configured location violation parameters and provide the alert to the dynamic map client or host application: ■ Standard parameters ■ Speeding (maximum speed by vehicle type) ■ Assigned beat/boundary crossing ■ Device disabling

Conclusion

Every CAD or RMS requires a geographic database or geofile to ensure that the right resources are directed to the right location. This white paper focused on the various geographic data sources utilized in the emergency call-taking, dispatch, and record management processes and included exploration into generic CAD system overviews and data flows; the advantage of a geospatial CAD; and the value GIS provides to overall call management, storage, and analysis.

Emergency dispatching and response are inherently spatial. Obtaining an accurate location of a caller is essential whether the call originates through a landline or wireless device. Dispatching resources that are closest to the incident requires geographic understanding of the location for the call for service. GIS technology increases location accuracy and resource allocation. The results are reduced response times and increased response effectiveness through enhanced operational understanding.

The use of proprietary call-taking, CAD, and RMS mapping systems poses challenges in maintaining and reusing GIS data, analyzing spatial intelligence, or managing geofiles. The ArcGIS® platform improves data management and analytic capability, resulting in improved emergency response and operational understanding.

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.

Contact Esri

380 New York Street
Redlands, California 92373-8100 USA

1 800 447 9778
T 909 793 2853
F 909 793 5953
info@esri.com
esri.com

Offices worldwide
esri.com/locations

Printed in USA