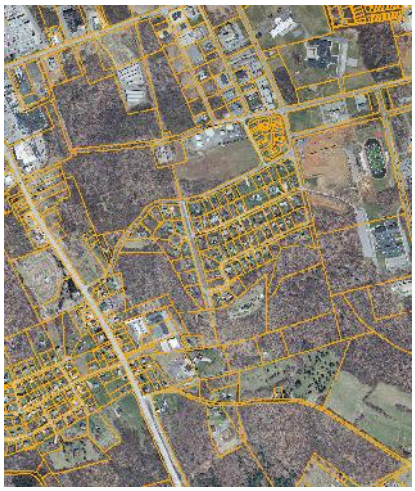

Report for the

San Diego Regional Situational Awareness Map Assessments

submitted to

San Diego

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CDI L.R. Kimball

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EXECUTIVE SUMMARY

The most recent version of the San Diego Regional Strategic Technology Plan identified the need to evaluate technology solutions that support a common operating picture. This report was generated to inform the San Diego region on where agencies should focus their efforts to achieve the highest possible level of effectiveness when it comes to a geographic information systems (GIS) solution to support a regional common operating picture. This report focuses on evaluating the software applications currently deployed in the region that support the concept of regional situational awareness mapping. The intent of this approach is to seek opportunities to leverage existing capabilities in technology solutions already in use in the San Diego region. The applications described in this assessment included;

- ESRI - ArcGIS
- Next Generation Incident Command System (NICS)
- Latitude – Geocortex
- Intermedix – WebEOC
- Google Maps
- TouchShare
- Haystax-CalCop Watchboard

The process to perform this assessment included a combination of identifying the desirable functional capabilities in a map application, assessing the current functional capabilities, identifying essential elements of information and determining the current capabilities of the applications to display information. The process included a briefing for local stakeholders on the project, one-on-one interviews with local stakeholders and product demonstrations from vendors.

All of the applications assessed in the process have strengths and weaknesses. It is unlikely that a single tool can serve all disciplines and stakeholder needs in one solution. However, the assessment process does identify recommendations that would likely yield the best return on investment in attempting to create a regional solution that can best serve a multi-discipline, multi-jurisdictional regional approach. The recommendations are intended to help agencies in the San Diego to region determine where to focus staff and financial efforts on a regional solution.

For the purpose of creating a regional library of common operating data, the ArcGIS Online – San Diego Multiple Agency Public Safety Services (SanMAPS) Group provides an effective tool for sharing among all jurisdictions and disciplines. This tool already has been established and the process for sharing has been started. This approach leverages the existing software licensing of most local agencies and the capacity can be increased at a minimal cost for additional users.

For the purpose of a field tactical map solution, the Next Generation Incident Command System (NICS) has developed a significant user base in the San Diego region. The map application has a well-developed set of essential elements of information and is a user friendly tool requiring minimal training to utilize. While primarily designed to support field operations, NICS also serves as a valuable resource of information for emergency operations centers. Currently, there are no financial costs associated with the use of NICS. The one area of concern is the lack of a clear long-term solution for governance or sustainment.

For the purpose of supporting emergency operations centers, the ArcGIS software provides the highest level of interoperability, scalability, redundancy, portability and functionality. The San Diego region should develop a situational awareness map application utilizing ArcGIS to support emergency operations centers and public information sharing. This approach provides a backup to the NICS application and provides additional functionality. Again, this approach leverages existing software licensing already in use by most public agencies in the San Diego region. The effort to develop this capability would primarily be staff time. As an additional capability, the region should consider the use of an application like Geocortex to provide additional functionality and workflows for mobile devices.

Lastly, the San Diego region should encourage the sharing of data with any other appropriate map viewers in use by agencies. This begins by insuring that GIS data is developed based on open geospatial standards such as what is available in the ArcGIS Online – SanMAPS library. The capability for interoperability should be further supported as a requirement for any procurement process involving geospatial capable software. This approach will allow for the continued use and collaboration with other applications, improve interoperability and ensure stakeholders are using the same information to support decision making.

The recommendations in this report are not intended to supersede any required procurement process.

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1. BACKGROUND

The National Incident Management System describes a common operating picture as:

> "The process of gathering, collating, synthesizing, and disseminating incident information to all appropriate parties. Achieving a common operating picture allows on-scene and off-scene personnel—such as those at the Incident Command Post, Emergency Operations Center (EOC), or within a Multiagency Coordination Group—to have the same information about the incident, including the availability and location of resources and the status of assistance requests. Additionally, a common operating picture offers an incident overview that enables the Incident Commander, Unified Command (UC) and supporting agencies and organizations to make effective, consistent, and timely decisions. In order to maintain situational awareness, communications and incident information must be updated continually. Having a common operating picture during an incident helps to ensure consistency for all emergency management/response personnel engaged in an incident". (FEMA, 2008)

One of the strongest tools available to support situational awareness for a common operating picture is the technology available in GIS. Significant advancements have been made over the last decade to identify ways that information can be captured geospatially and visually on a map to improve a decision maker's situational awareness.

The question frequently asked is – Is there a single common GIS solution for situational awareness?

The answer to that question is not a simple yes or no. Many mapping software solutions are specially designed for a specific discipline and some data is not intended to be shared region wide. While the idea of a single solution may be difficult, there is much we can do to improve the interoperability, scalability, resiliency, portability and reliability in our information sharing environment.

While some difference may occur on the selected technology solution, there is much common ground on what functional capabilities a map application should have and what essential elements of information all parties share a need for. At the foundation of any map solution is good, reliable and current data. An environment that supports a common operating data source is critical to make sure all parties are seeing the same information for decision making.

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2. SCOPE OF PROJECT

The intent of the scope of work is to inform the region on the current capabilities and to recommend a path forward for focusing effort on a regional, multi-disciplinary, multi-jurisdictional map viewer solution.

The scope of this assessment and report includes:

- Identify key functional capabilities – identification of the key functions that are desired in a situational awareness map application.
- Functional capability assessment – an assessment of the current capabilities of the identified software applications.
- Essential Elements of Information Priorities – identification of the high priority elements for use in a map application.
- Essential Elements of Information Current Capabilities – an assessment of the applications current capabilities for the essential elements.

The targeted level of user for this assessment report is the incident or emergency manager. The targeted disciplines include emergency management, fire service, law enforcement, emergency medical service, policy managers and non-governmental organizations who currently utilize some form of geospatial tool for situational awareness.

The intended use for these stakeholders is typically during the response and recovery phase; however, the data for situational awareness substantially supports planning activities as well. This use would typically occur in emergency operations centers, department operations centers or incident command posts.

This assessment is limited to map applications currently deployed at some level in the San Diego region. Narrowing the scope of applications for review helps to make the process more manageable and reinforces the opportunity to leverage existing resources, thus potentially reducing the need for new funding needs.

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3. METHODOLOGY

In order to accomplish this scope of work, a combination of assessments and interviews were conducted to collect the necessary information.

The assessment process consisted of several portions:

- Identify key functional capabilities – identification of the key functions that are desired in a situational awareness map application.
- Functional capability assessment – an assessment of the current capabilities of each identified software application.
- Essential Elements Priorities – identification of the high priority elements for use in a map application.
- Essential Elements Current Capabilities – an assessment of the applications current capabilities for the essential elements.

The interview process included stakeholders from a variety of disciplines, jurisdictions and skill level. Representation included law enforcement, fire services, emergency managers, GIS program managers and software application vendors. Several jurisdictions were represented, including the City of San Diego, County of San Diego and the City of Carlsbad. Skill levels included GIS aware type users to GIS professionals. The intent of this approach is to provide a variety of perspectives from field operators to emergency operations support.

The interview process included:

- Kick-off meeting with key stakeholders
  - Brief on the objective of the report
  - Review the functional capabilities assessment tool
  - Review the essential elements of information matrix sample
- Individual meetings with stakeholders
- Individual meetings with application vendors

4. FUNCTIONAL CAPABILITY COMPONENTS

The requirements for functional capability vary depending on the environment and type of user. The functional needs for a first responder managing an incident in the field will be different than that of an emergency manager in an emergency operations center.

The functional capability components described below attempts to combine the needs of the different types of environments and users. The priority of these capabilities may be different based on a person's role. These categories were used to define appropriate support and are ranked components within the Assessment Summary Table in Section 5.1 of this report.

4.1 Software Hosting Solutions (Scalability and Redundancy)

Software applications can be hosted in a variety of ways. This includes running the application on a local server, a local device like a desktop or laptop and Web or cloud hosted services. A software application hosted on a local server an application without requiring Internet connectivity. A local device like a laptop or desktop also allows the application to be used without Internet connectivity but typically is used by only one user at a time. The biggest advantage of Web hosted solutions is the ability for multiple users to access the application anywhere, anytime an Internet connection is available. This advantage can also be its biggest disadvantage during large scale disasters that may have degraded internet connectivity. Additional benefits for Web hosted solutions include providing the application as software for service. This solution typically has lower up front monetary cost and uses a subscription type of fee with the software company maintaining the hardware and software updates.

An ideal application hosting solution would include locally hosted software that can also be replicated in a cloud service for redundancy. This approach provides for the best of both worlds, a local instance for resiliency and a cloud version for diverse access.

4.2 Interoperability

The ability of a software application to utilize open standards for geospatial data is critical to interoperability. The Open Geospatial Consortium has established standards for geospatial data. They include Web mapping services, Web feature services, data layer formats and key markup language. There are two primary methods for interoperability to occur. They include file types that can be shared physically—as in sharing a disk or emailing a file. The other method is through universal resource locator addressing (URL) that provides a service or feed of information over the internet. Applications were evaluated for both their ability to import and export files or services. Applications that utilize the open standards and can import and export easily have a high degree of interoperability and have minimal cost to integrate with other similar applications or sources of data.

4.3 Types of Users

The types of users for applications can range from a user who just wants to see or view information in a geospatial format to a GIS professional that can create complex maps or analysis. Understanding the targeted audience is

important in determining what capability is needed. If the user needs only basic information in a map viewer, the application can be fairly simple. If complex maps or analysis are needed, a more sophisticated application is necessary.

4.4 Publishing and Sharing Maps (Portability)

The ability to publish maps or share in a variety of methods can be very useful. Examples of sharing capability include the ability to print and share maps in a pdf format, printing large scale maps for display, ability to embed maps in a public Website, sharing URL links to maps, providing links through quick response codes and the ability to publish to other applications like Microsoft products.

4.5 User interface features

Depending on the intended end user, a variety of user interface features have been identified that support decision making.

Symbology sets – A set of standard symbols is important for communicating information on a map. There are several sets of standard symbology available through various disciplines. The ability of an application to utilize an approved set of standard symbols improves interoperability.

Instant messaging or chat – The ability to instant message or chat within the application can provide another method of communicating between users.

Private maps or rooms – The ability to create a working or draft map in a private room can be useful in developing plans prior to sharing with the all users.

Drawing or mark-up – The ability to draw or mark-up on a map can be very useful in communicating information. Examples include drawing a shape to display incident perimeters, evacuation areas, inserting text, measuring distances, drawing line types.

Layer control – The aggregation of multiple sources of data in a situational awareness map can overload a map. The ability to turn layers on and off allow for the end user to focus on the information they are interested in.

Display of metadata or links – A point or symbol on a map can provide geospatial context or location of a piece of information. Behind those points on map, an application can show additional information (metadata) through the use of pop-up boxes. These pop-up boxes can provide important information such as name of the item, phone numbers, addressing or links to other sources of data like weather sites or pdf files.

Social media tools – An application can integrate feeds from social media sites such as Twitter, Facebook and Instagram. The location of this crowd sourcing type of information can be useful intelligence information in context of the location of an incident or event.

Dynamic Positions – The ability of an application to view the location of resources such as vehicles, people or assets in real time can be very useful to incident managers or decision makers.
Real-time sharing of map – There are a variety of methods for ensuring end users have the latest information on a map. Some maps are updated in real time as information is added. Others utilize a process that receives updates when a map is manually saved by the contributor of the information.

Geofencing – The ability to filter data to a geographically defined area can be helpful when filtering large amounts of data. For example, a user may only want to see certain data within a certain radius of a location. Another example could include a notification of when an event occurs within a geographical area.

Base maps – The ability to choose what type of base map can be very useful. Different base maps offer different information, for example a street map looks very different than a topographical map.

4.6 Analytics

Examples of analytics include evacuation modeling, census tract analysis for access and functional needs, populations or households affected.

4.7 Mobile applications

The explosion of mobile tablet devices with wireless connectivity has opened up a whole new set of solutions for viewing or collecting information in a mobile environment. The ability to provide field operators with information in a mobile environment improves their decision making ability. Likewise, the ability for field operators to collect field information in real time can greatly enhance the ability of decision makers in emergency operations centers.

4.8 Security and access control (Reliability)

The ability to make sure unauthorized users do not have access to critical information is important. Depending on the classification of the information displayed in a situational awareness map viewer, the level of security could be everything from a basic level to a sophisticated system.

Security can include the network hosting the software solution, the identity management system utilized for users and the ability to control user access levels for viewing and editing information.

4.9 Configuration control

The ability for a user to configure a map application can be very useful. The level of control can vary from complete control to very limited control where only the software developer can make changes. In general, most end users desire the ability to make changes that are not dependent on a vendor or developer to make.

4.10 Continuity of Operations (Resiliency)

In the environment of potentially large scale disasters or events, continuity of operations requires significant consideration. If a software application is dependent on outside resources such as Internet connectivity to function, its operation and use may be significantly degraded. One approach to strengthening a continuity of operations is to utilize an application that has local versions not dependent on Internet connectivity.

4.11 Training Requirements

All applications will require some level of training for staff to use. This can vary from a few minutes to understand how a basic map viewer works to many hours to understand how to create map products or data.

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5. MAP APPLICATION ASSESSMENTS

Each application was evaluated using the functional capability assessment tool. It should be noted that the assessment is a snap shot in time. Many of the vendors for the applications provided information about future enhancements that will improve functionality.

5.1 Assessment Summary Table

The following is a comparison chart of the level of capability for the applications. The level of capability is the opinion and assessment of the author of this report and is supported by the detailed information in Section 10 of this report.

The application has a low level of capability	X
The application has a medium level of capability	XX
The application has a high level of capability	XXX

Table 1—Assessment Summary Table

Function	ArcGIS	NICS	Geocortex	WebEOC	Google	Touchshare	CalCOP
Software hosting solutions							
Local network	XXX	X	XXX	XX		XXX	
Desktop/laptop	XXX	X	XX			XX	
Web/cloud services	XXX	XXX	XX	XXX	XXX	XXX	XXX
Interoperability							
Import files	XXX	XXX	XXX	X	XX	XXX	XX
Export files	XX	XX	XX	X	X		X
Import services	XXX	XXX	XXX	X	X	XXX	XX
Export services	XX	X	XX		X	X	X
Variety of skill level of users							
Ability to be used by a variety of user skill levels	XXX	XX	XX	X	XX	XX	X
Publishing capability							
Map printing	XX	X	XXX	X	X	X	X
Publish to public Websites	XXX		XX		XXX		
Publish in variety of file types	XXX	X	X	X	X	X	X
User Interface Features							
Configuration of symbology	XXX	XX	XXX	X	X	XX	X

Function	ArcGIS	NICS	Geocortex	WebEOC	Google	Touchshare	CalCOP
Instant messaging or chat		XXX					
Private maps or rooms		XXX	XX			XX	
Drawing mark-up	XXX	XXX	XX	X	X	XX	X
Control of data layers	XXX	XX	XXX	X	XX	XXX	XX
Display metadata or links	XXX	XXX	XXX	X	XX	XXX	X
Social Media tools	X		XX				XXX
Real-time sharing	X	XXX	XX	XX	XX	XX	XX
Position location tracking services	XX	XXX	XX			X	X
Geofencing	X		XX			XXX	XX
Multiple base maps	XXX	XX	XXX	X	X	XX	X
Analytics							
Perform analytics	XX	XX	XXX			X	X
Mobile applications (Tablets)							
Mobile applications available	XX	X	XX			XX	XX
Ease of use for field	XXX	XX	XX		XXX	XX	X
Variety of device types	XXX	XX	XXX	X	XXX	XXX	X
Security							
Application security	XXX	XX	XXX	XX	XX	XXX	XX
Identity management and credentials?	XXX	XX	XXX	XX	X	XXX	XX
Control of data access	XX	X	XX	XX	X	XX	XXX
Control of user features	XX	X	XX	X	X	XX	XX
Configuration control							
Ability for local user to modify configuration	XXX		XXX	X	X	X	
Continuity of Operations							
Redundancy capability	XXX	X	XX	X	X	XX	X
Ability to function without internet connection	XXX	X	XX	X		X	X
Training Requirements							
Requires minimal training hours to learn	XX	XXX	XX	X	XXX	XX	XX

Function	ArcGIS	NICS	Geocortex	WebEOC	Google	Touchshare	CalCOP
Training resources available	XXX	X	XX	X	XX	X	X
Software documentation available	XXX	X	XX	X	XX	X	X
Technical Support							
24/7 Availability for live help	XXX	X	X	XX	XX	X	X
Governance and Sustainment							
Governance structure	XXX	X	X	XXX	X	X	X
Funding source	XXX	X	XX	XXX		XX	X
Associated Costs $ - Low $$ - Medium $$$ - High							
Cost for new regional deployment or enhancement	$	?	$	$	?	$$$	$
Annual maintenance cost	$	?	$	$	?	$$$	$$

5.2 ArcGIS Online

ArcGIS Online (AGOL) is part of a suite of software applications developed by Environmental Services Research Institute (ESRI). ESRI was founded in 1969 with early efforts focusing on organizing and analyzing information for land use planners and to help make land resource and environmental decisions. In the mid-1970s, San Diego County selected ESRI to develop a polygon information overlay system, which became one of the company's first efforts into creating a geographic information system. (Esri)

Today, ESRI has a worldwide footprint and is widely accepted as a GIS software solution for many public agencies. In early versions, the ESRI software was seen as software that required a GIS professional to utilize at all levels. Recent enhancements by ESRI have increased the ability for non-GIS professionals to create and share maps.

The ArcGIS suite of software applications includes ArcGIS Server, ArcGIS Desktop and ArcGIS Online. The level of complexity and capabilities varies for each level of ArcGIS. For the purpose of this assessment, the report will focus on the capabilities of the ArcGIS Online solution (AGOL).

The AGOL application leverages the advanced capabilities of the applications available in the ArcGIS suite. The AGOL portion is designed to be used through cloud based services that can be accessed anywhere, anytime there is an Internet connection available. The AGOL application has simplified the complex capabilities that the server and desktop based application can perform. The result is a map creation and viewing process that is more compatible for use by basic map viewers or casual map makers. The combination of AGOL capabilities and the server and desktop applications provides a wide range of types of users.

ArcGIS Online utilizes the Open Geospatial Standards for interoperability. The result is a highly interoperable standard with strong portability. As a core solution, the ArcGIS data standards have become the widely used solution for most local government in the San Diego region.

ArcGIS Online has a variety of solutions for hosting of the application. The application can be hosted on the ESRI servers in the cloud or a local agency can host on their own servers through the ArcGIS Portal solution. Additionally, data can be replicated in the cloud solution and through on premise servers. This gives the organization an option to save data locally that can then be used on a local version of the software. This provides a significant level of resiliency and redundancy that may be needed in the event of a degraded Internet service.

ArcGIS Online has an extensive set of tools for sharing. Options include sharing to the public, sharing to an organization, sharing across different organizations through groups, ability to embed in public Websites, direct access via URLs and a variety of printing options.

ArcGIS Online can create Web map applications that are optimized for the mobile environment. Additionally, ArcGIS has developed an application called Mobile Collector that allows a user in the field to collect data based on a database located on a server. This feature allows updates from the field that can then be seen by anyone viewing the database. This application has the ability to work in a disconnected environment that will sync once a connection is established.

ArcGIS Online has a well-developed set of online tools such as videos, step by step instructions and application documentation to support the training needs of users. ESRI also frequently hosts online training events and holds a large user conference each year in San Diego.

The AGOL application has limited configuration controls of the map layout. However, the supporting server and desktop applications allow considerable control over what the AGOL map will display and its function.

The ArcGIS software is widely used by most local government agencies in the San Diego region. Their use began primarily as a land use and planning tool but is expanding into other areas such as asset and emergency management. Additionally, the ArcGIS software has been institutionalized in the region under the SanGIS Joint Powers Agreement between the City of San Diego and the County of San Diego. The ArcGIS solution is the application used by the San Diego Regional Public Safety Geodatabase under the Unified Disaster Council. This widespread deployment by local government means that the product is already institutionalized and supported by general fund resources and governance by the local agencies. This factor provides a strong sustainment model for the platform.

The ArcGIS software has long been seen as software that could only be used by a GIS professional. The ArcGIS Server and Desktop software remains complex software and requires significant training. The AGOL application is much simpler and designed for the basic viewer and casual map maker. The development of rich data sources or services does require the availability of GIS professional support.

The full access to AGOL features requires a user name and password. The number of available user licenses depends on what level of software has been purchased by the local agencies. It is likely that additional user licenses would be necessary to deploy the full capability of AGOL region wide at the manager level.

The estimated cost to purchase an additional 100 user names is $17,000.

5.3 WebEOC

WebEOC is a Web based system designed to help manage event reporting, situational awareness, resource management and after action reporting. The application provides "boards" for reporting events, a WebEOC Mapper to support situational awareness in geospatial terms, a resource inventory database to manage resources and logging systems to support after action reporting. (Intermedix - WebEOC)

Utilizing Homeland Security grant funds, the County of San Diego Office of Emergency Services in collaboration with Unified Disaster Council implemented WebEOC for the San Diego Operational Area. The application has been deployed for several years with significant participation from most local government agencies. WebEOC is the recognized tool for communicating between emergency operations and department operations centers. The primary tool used in WebEOC has been the "events board", where text based information is shared. The WebEOC Mapper tool has seen limited use due to the limited capabilities.

The map is accessed directly from within the WebEOC application. This allows end users to launch the map without logging into another system. The map viewer is fairly simple and most users can learn to use the basic features pretty quickly. Data from within the application can be displayed directly to the map.

The application does have a mechanism for long-term support through the Unified Disaster Council and County OES. The functional capabilities of the map application are very limited. The user interface features are limited and do not include the ability to modify symbology, has limited mark-up, no social media monitoring tools, no mobile applications and no geofencing capabilities. Attempts to make the map more meaningful by importing data into the map have met a low rate of success. The application does not allow much configuration and appears to have a low level of interoperability. The application has limited printing capability and does not produce mapping that is pushed to the public.

The WebEOC application is maintained by the County Office of Emergency Services. There is no known additional cost associated with developing the WebEOC mapper application as a regional situational awareness map.

5.4 CalCOP – Watchboard

CalCop for Threat Awareness is a cloud based, data sharing environment available to all public safety agencies within the eight California Urban Area Security Initiative regions. The stated vision for CalCOP is to leverage local and regional risk management and critical infrastructure assessments, layered with real time threat information, to create a vertically integrated, statewide threat situational awareness picture for use across the public safety sector to effectively and efficiency understand complex emergencies as they emerge across disciplines, agencies and jurisdictional boundaries. (CalCOP, 2015)

The CalCOP application began as risk assessment software developed by Digital Sandbox, which was later acquired by Haystax. The San Diego region acquired the application utilizing Urban Area Security Initiative (UASI) grant funds in 2008. The primarily goal of the application was to function as a risk assessment center for the region. This

includes gathering information on assets, site assessments, threats and capabilities. This information has been used to support and inform the San Diego Urban Area Security Strategy.

This application was later adopted and implemented across the State of California by all eight regions receiving UASI grant funds from the states' retention fund. As a part of that statewide adoption, an enhancement to the software allowed data from the individual regions to be shared across the state. The result is a collection of risk assessment information for much of the state in one place.

The CalCOP-Watchboard map is still in the development phase and is supported by steering and project committees. The goal is to have the enhancements to the application available in 2015.

The primary use in the San Diego region has been to catalog critical infrastructure and key resources and to perform capabilities assessment to inform the Security Strategy. With the enhancements of a statewide inter-connectivity between the UASI regions, a significant portion of the state has access to a common application. This statewide capability is attempting to leverage this opportunity to create a California Common Operating Picture for Threat Assessment.

The CalCOP application is well-developed risk assessment software. Currently, this data repository of critical infrastructure and key resources is its greatest strength. The Watchboard map viewer does a nice job of displaying the location of critical infrastructure and providing a link to the database. The other strong features in the application are the ability to add feeds from outside sources such as news sources and computer aided dispatch systems. The application has a built in social media monitoring tool that can be easily displayed on the map. The application has a field data collection tool that can capture data from the field and display on the map in real time. If the application is able to achieve its goal of adding other state and local sources of data, the application will provide a good statewide platform for situational awareness and threat assessment.

The Watchboard does have an ArcGIS Server available to support the map viewer. The ArcGIS application is a highly interoperable solution. The Watchboard map viewer is fairly intuitive and most users can learn how to view and perform simple filtering with limited training.

The application has developed a few mobile applications. This includes Mobile Command (mobile view of Watchboard), Mobile Indicator (mobile field reporting), and Mobile Assessor (critical infrastructure data collection).

The software license is currently funded by the State of California, with no current ongoing cost to the UASI's. Other than requests for enhancements, there is currently no ongoing cost to the San Diego UASI. This licensing model includes unlimited user accounts.

The only hosting solution for the application is a single server in the cloud accessed through an Internet browser or mobile application. This solution provides a very limited resiliency or redundancy solution. This solution is adequate as long as the application is not seen as a mission critical resource. Currently, the configuration is primarily in the hands of the software developers. This significantly limits the ability for local users to add data or configure for their local needs.

The Watchboard is designed to function within the application and as a result, it has very limited capability to share outside of its environment. This limits the ability to share with others and limits its export interoperability. The map viewer has a very limited mark-up capability in the way of text labels or dropping in a unique symbol. The application has a limited set of base maps available for use.

Currently, the application has limited set of data layers available to users. Until additional data is added, the critical infrastructure data is the primary useful tool.

The CalCOP application is currently a cooperative effort between the UASI regions in the state and funded by the State of California Office of Emergency Services utilizing Homeland Security funds. This approach makes funding subject to available grant funds on a year to year basis and does not provide a formalized governance structure.

As long as State OES continues to fund the application, there is no associated cost for the San Diego region.

5.5 TouchShare

TouchShare was founded in 2006 as TouchTable, Inc. as a spin-out of Applied Minds, LLC. The company has focused on solving complex problems related to geospatial information management in life critical situations. The application developed collaboration tools that support the ability to manage many data streams, assemble the right experts regardless of location, identify the relevant information, make insightful decisions quickly, and communicate effectively. (TouchShare Overview, 2015)

In San Diego, TouchShare is currently deployed at the American Red Cross, San Diego Gas and Electric and the City of Carlsbad. At the time of this assessment, the application was experiencing some difficultly in the interconnectivity between the agencies. Local users have also expressed concern over the level of customer support to fix technical problems. It should be noted that this assessment is primarily based on the newer web-based version capabilities.

The greatest strength of TouchShare is the ability to collaborate in real time using an Internet connection. This allows stakeholders in various locations to visualize and share map views in order to communicate information. This is done through shared “sessions” that can be shared with many or limited to a small group. The application can be hosted in an on premise server or in a cloud based software as a solution.

The application has a strong partnership with the ArcGIS software and has created tools that allow the data from an ArcGIS application to be easily ingested into the map viewer. The ArcGIS application utilizes widely accepted open geospatial standards and is highly interoperable. Data layers are easily managed and the application has a unique feature called a “lens”. The lens feature allows the viewer to overlay or highlight data in a defined area like a geofence that can be moved around.

In order for the high level of collaboration to occur, all participants must be in the same version of the software. If there are multiple instances of the on premise version, maintaining the interoperability could be a challenge. If all participants are connected through the cloud based software as a service, this is less of an issue.

The application is primarily designed to be used within the software and has limited ability to export data directly, depending on the ArcGIS application for that function. It does not have the ability to publish maps to the public in a direct method. Adding custom symbology or shapes within the application directly is currently not possible. The application does not use mobile device applications, depending solely on Internet browser viewing on mobile devices.

The on premise solution is approximately $37,500 with five concurrent licenses (not including hardware costs). Additional concurrent licensing would be $1,000 per license. Assuming a region wide deployment, requiring an additional concurrent 50 licenses, the estimated total costs are about $100,000, including the hardware.
The cloud based software as a service is $15,000 per year with five concurrent licenses. An additional 50 concurrent licenses would add another $50,000 to the cost.

5.6 Google Maps

For the purpose of this assessment, the use of Google Maps was evaluated in the environment used by the San Diego Chapter of the American Red Cross (ARC). The ARC utilizes the Google Apps for Education (Google API) through a collaborative licensing effort with San Diego State University. Google Apps for Education is a free Web based collaborative tool that provides a variety of cloud based tools such as email, document storage and calendars to name a few. The ARC uses the Google Maps tool to create and share maps within their organization and for sharing with partners. (Google Apps for Education, 2015)

Google Maps is a desktop and mobile Web mapping service application and technology provided by Google, offering satellite imagery, street maps and Street View perspectives, as well as functions such as a route planner for traveling by foot, car, bicycle (beta test) or with public transportation. (Google Apps for Education, 2015)

The ARC has developed a set of essential elements of information data that are important in their operation. This set of data is accessed and utilized within the Google map viewer application. While Google Maps is not the only GIS tool in use by the ARC, it is the map application that they have deployed as their common operating picture for wide use by their staff.

The Google application is a widely used map viewer that provides simple, easy to use tools for the masses. It is a cloud based solution that can be viewed on any device with an Internet browser. The simplicity of the map application and familiarity by most users, make the application a good choice for information sharing for a variety of types of users.

The application utilizes Key Markup Language (KML) as their standard format. The KML is a part of the Open Geospatial Consortium standard. This includes comma separated value (CSV), Shape, KML, Excel and File Geodatabase. When importing or exporting KML files with other applications using KML, there is a high level of file sharing interoperability and portability. Google Maps does provide a networked KML server that functions like a service. The benefit of this KML networked service is that users are accessing a single point of data for the most current information

Maps created in the application can easily be shared with the public through URLs or Website embedded iframes.

The application has a limited set of user interface features. Features include a limited symbology set, drawing and mark-up capability, ability to turn layers on and off, pop-up windows with metadata and real-time map sharing. The application does not support multiple base maps, geofencing, position location for resources or social media monitoring.

Other than the ability to add data, the end user has limited ability to modify the configuration of the application. The application has very limited printing capability for its maps. The application is highly dependent on Internet service to function. Without internet service, the application will not function. There is no capability to create a local instance for use during internet outages.

Google Maps can provide very useful information to support decision making and should be a part of the toolbox. However, the application does not offer the level of capabilities that other GIS applications provide.

At the time of this report, Google products such as Google Earth Enterprise and Google Maps Engine were scheduled for deprecation. Google has announced a partnership with ESRI to help those users transition to ESRI software by offering free software for one year and free training. The full effect of this partnership on the Google set of mapping solutions is not yet clear. (Google and ESRI, 2015)

Under the current arrangement with San Diego State University, ARC utilizes the Google Apps for Education application at no cost.

5.7 Geocortex

Latitude Geographic's first developed Geocortex software in 1999. Geocortex leverages ESRI-ArcGIS software to provide an off the shelf application to support GIS and Web-based mapping needs. Geocortex has evolved through several generations of ESRI mapping and GIS technology to meet the latest technology and user needs. (Geocortex, 2015)

Geocortex is currently in early use and development by the County of San Diego - Land Use and Environmental Group and the San Diego Sheriff.

The primary strength of the Geocortex application is the ability to translate complex mapping functions into a Web mapping solution that can be easily used by end users.

The Geocortex application is typically hosted on a local server network. This does allow the application to function locally without Internet connectivity. End users can access the application through any device that has an Internet supported browser. The application is designed to leverage ArcGIS software and infrastructure. This use of ArcGIS allows a high level of interoperability to import and export files and services in a variety of standardized formats.

The configuration of the application is targeted to the level of a GIS professional with the idea of creating map viewers for general consumers of the maps. The application focuses on providing a user experience that is easy to use and is highly configurable for the intended workflow.

The application has the ability to print and publish maps in a wide range of scale, type and resolution. This includes strong analytic capability that can create pre-designed reports.

The application adopts many of the user features created in the underlying ArcGIS server. This includes the ability to configure symbology, turn layers on and off, and provide pop-up tools with metadata and multiple base maps.

The application does not develop separate mobile applications but does utilize the HTML 5 capabilities for optimizing the viewer experience on mobile devices. The application has several security configuration options for accessing the application. This includes user name/password security within the application or credential authorization through a network identity management system. With the addition of the Active Operating Picture extension, a level of private sharing space is available with some limited mark-up capability.

The configuration does require a GIS professional type person to develop the Web mapping applications. This means that the creation of new applications requires technical expertise support to deployment. The end user experience is primarily as a viewer but can have significant functionality and workflow capability built in to the viewer by the GIS professional. The down side to this approach is the reliance on GIS support to create applications. The application currently has limited deployment in the San Diego region.

The Geocortex Essentials is approximately $18,500 for the server software (does not include required hardware). An additional license could be purchased to create a replicated copy in a cloud service for about $9,500. The Active Operating Picture extension is about $ 9,500. The estimated cost for a new deployment is about $40,000. The annual maintenance would be approximately $9,000. This cost could be greatly reduced if there is an opportunity to leverage current licensing owned by the County of San Diego.

5.8 Next Generation Incident Command System

The NICS was developed using grant funds from the Department of Homeland Security Science and Technology Directorate, and is being developed by Massachusetts Institute of Technology Lincoln Laboratory.

The NICS is a Web-based command and control environment for small to large to extreme scale incidents that facilitates collaboration across federal, tribal, military, state, county and local/municipal levels of preparedness, planning, response and recovery for all-risk/all-hazard events. The NICS facilitates situational awareness for widely dispersed responders. (Next Generation Incident Command System, 2014)

As of July 2012, more than 700 first responders across more than 50 organizations have been trained in the use of NICS and are employing NICS daily (as examples, all CAL FIRE regional units, California Emergency Management Agency, all CAL FIRE Incident Management Teams, City of Carlsbad, Riverside County Fire and Sheriff's Departments, Riverside County Office of Emergency Services, Sycuan Fire Department and the Golden Eagle Hotshots [Bureau of Indian Affairs], San Marcos Fire Department, San Diego Fire-Rescue Department, and the U.S. Border Patrol, to cite a few.) (Next Generation Incident Command System, 2014)

CAL FIRE units and local departments (county and municipal) in Riverside and San Diego, as well as other California Counties, are integrating NICS into their day-to-day operations to train personnel and respond to incidents, such as wildland fires. During the 2011 Southern California fire season (June to November), the system was used in

operational evaluations on a number of large wildland fires (Riverside and San Diego) that progressed beyond initial attack. Since 2010, NICS has been used on over 200 actual incidents. It has been used in the Los Angeles, Boston, and San Diego marathons for management of medical team response. (Next Generation Incident Command System, 2014)

A good recent example of the use of NICS can be found during the May 2014 fire activity. The Carlsbad Emergency Operations Center and the Poinsettia Fire Incident Command Post utilized NICS to support the incident decision making. Through NICS, fire perimeter data was available within the first two hours of the Poinsettia Fire.

NICS proved indispensable to achieving situational awareness and a common operational picture during the county-wide firestorm. Although it is difficult to establish a precise cause and effect relationship, the fire and fire response situational awareness created using NICs likely saved lives and property. NICS positively contributed to the rapid Federal Emergency Management Agency Fire Management Assistance Grant (FMAG) approval, which could result in millions of dollars in federal reimbursement for firefighting and emergency protective measures costs associated with the Poinsettia Fire. (City of Carlsbad, 2014)

The NICS application is a Web-hosted solution that can be accessed anytime or anywhere a user can get internet connectivity. While it is dependent on internet connectivity to function, it has been optimized to operate at a low band width and has the ability to cache information on the local device, with updates occurring once the device reconnects.

The NICS has been built on an open source code platform and utilizes open geospatial consortium standards for mapping and tracking functions. The use of these standards allows for a high degree of interoperability that allow for the import of GIS data and multiple methods for providing tracking services. Additionally, the application has a strong set of other ingestion services, allowing for a variety data sources to be displayed.

The NICS application was developed with the field operations person in mind. The foundation of the application has been to serve the “tired, dirty and hungry”. In order to meet that need, the developers have created an application that is fairly easy to learn and use. The features of the application have been developed with significant input from the user group, resulting in functionality that meets their need.

The application shares the maps in real time, allowing everyone to see important updates to the map as features are added. At the same time, the individual user can add data layers to their individual view. Another frequently used feature in the application is the use of “rooms”. These rooms allow for private collaboration. The application has a space to support chat between users in both the incident room and private rooms.

The application supports the ability to perform mark-up such as points, lines, shapes and text based on a fixed set of tools. Features or points on the map support the ability to view metadata or link to other sites or files.

The application currently has a mobile application for the Android device, with plans to add Apple IOS. The mobile application can view the map, automatic vehicle locating, supports chat, can generate field reports such as damage surveys and is integrated into the global positioning system (GPS) tracking system.

The user interface for the application is fairly easy to learn and most users can become efficient in its use within a couple of hours. Additional training is typically limited to new release of features information.

The application is dependent on Internet connectivity and as a result, it has a limited back-up plan for continuity of operations. The NICS does cache data and will update the map when connectivity is re-established. The application can be saved to a local network or device, but it is not deployed in that way locally. The application is hosted on a single server at the University of California, San Diego Super Computer Center and is replicated at the Massachusetts Institute of Technology (MIT) Lincoln Lab. If the main server fails, a manual process for transferring users to the back-up copy could be accomplished.

The user interface has limited export capability of files to KML or Shape files. The ability to share map services from the user interface is not possible. The capability of sharing the maps mostly resides within the application and has limited ability for an end user to share outside that environment from the user interface.

Configuration of the map is limited to the agreed upon changes by the user group. This limits the ability of an end user to modify the user experience to any special needs or workflows. An example of this limitation is the addition of other sources of data that may be relevant for users. The typical end user is not allowed to add data layers.

The current technical support option is somewhat limited. Support is available at least during business hours, with possible support after hours. Because there is no existing contract agreement for a service level, support is not guaranteed within a certain time frame.

The most significant concern for the application has been the unknown plan for long term governance or sustainment. The user group has provided the short term governance for decision making and a variety of sources have provided limited term funding to keep the application supported. Leadership on adopting the application as an official long term solution with governance and sustained funding has been lacking. The result is an uncertainty on the future status of the application.

The application has created a non-profit organization called Worldwide Incident Command System in hopes of attracting funding sources.

The base application is available at no cost to the current users. The MIT-Lincoln Lab has been able to find short term funding to continue some enhancements and maintenance. If future funding is not identified, there would likely be some cost associated with ongoing support. The potential cost for the San Diego region to support the application has not been identified.

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6. ESSENTIAL ELEMENTS OF INFORMATION

An important question in this assessment process is to understand what the essential elements of information are. The Unified San Diego County Emergency Services Organization and the County of San Diego have adopted an Operational Area Emergency Operations Plan (EOP). As a part of that plan, a list of essential elements of information have been identified that are critical information for leadership to support decision making. Many of these elements can be displayed geospatially in GIS products. In addition to the elements found in the EOP, local responders and others have identified elements of information that are important to field operations to support decision making. A combined list of these elements of information was developed for the purpose of this assessment process. This combined list reflects the desire to identify elements that are important to both emergency operating centers and field operations in the response and recovery phase.

After the list of elements was developed, the next step was to ask the question of priority. Depending on discipline and perspective, some elements are of a high priority while others may be a low priority.

The following list represents the essential elements of information that received a high priority score for inclusion into a map viewer:

Table 2—Essential Elements of Information

Essential Elements of Information
Boundaries of Disaster or Incident
Geographic limits or perimeter of damage (ie: fire perimeter, flooding area)
Damage assessment information
Evacuated areas
Access points to disaster/incident area
Access control points (road closure)
Jurisdictional Boundaries
Cities
State
Federal
Tribal
Community Support
Temporary Evacuation Points
Shelters locations
Hazard Specific Information
Digital Target Hazard Preplans
Wildland Urban Interface Fire Emergency Preplans
Power transmission line locations (aerial hazards)
Remote cameras (HPWREN)
Fire history

Essential Elements of Information
Seismic or geophysical information
Location of epicenter
Location of mud flow or landslides
Location of ground liquefaction
Potential for tsunamis
Earthquake faults
Flood plains
Weather
National Weather Service
SDGE Weather Stations
RAWS Weather Stations
Demographics
Population of impacted areas
Number and type of housing units
Access and Functional Needs Population
Transportation
Status of major/primary roads
Live Traffic flow
CalTrans Live Cameras
CalTrans Message Boards
Critical Infrastructure
Location of medical facilities
Location of schools and other public buildings
Location of fire and police facilities
Energy Systems
Location and status of electrical generating
Location and status of natural gas supply
Location and status of refineries and gasoline distribution
Field Incident Management
Active Incidents
Incident Command Post
Incident Branches/Divisions
Perimeter Objectives
Specialized Resources
Hazardous Material Teams
Mobile Field Force
Urban Search and Rescue
Mobile Communications

Essential Elements of Information
Social Media Monitoring
Twitter
Facebook
Instagram
Position Location Indication
Fire vehicle location
Law vehicle location
Personnel location
Aircraft location
Marine location

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7. CURRENT CAPABILITIES FOR ESSENTIAL ELEMENTS OF INFORMATION

An assessment of the current capabilities for existing applications to display essential elements of information was completed.

Table 3—Current Capabilities for Essential Elements of Information

	Currently available in the application
	Not currently available, but is possible technically
	Unknown Capability

Essential Elements of Information	ArcGIS	NICS	Geocortex	Google	TouchShare	CalCOP	WebEOC
Boundaries of Disaster or Incident							
Geographic limits or perimeter of damage (ie:Fire Perimeter)							
Damage assessment information							
Evacuated areas							
Access points to disaster/incident area							
Access control points (road closure)							
Jurisdictional Boundaries							
Cities							
State							
Federal							
Tribal							
Community Support							
Temporary Evacuation Points							
Shelters open/population							
Hazard Specific Information							
Digital Target Hazard Preplans							
Wildland Urban Interface Fire Emergency Preplans							

	Currently available in the application
	Not currently available, but is possible technically
	Unknown Capability

Essential Elements of Information	ArcGIS	NICS	Geocortex	Google	TouchShare	CalCOP	WebEOC
Power transmission line locations (aerial hazards)							
Remote cameras (HPWREN)							
Fire history							
Seismic or geophysical information							
Location of epicenter							
Location of mud flow or landslides							
Location of ground liquefaction							
Potential for tsunamis							
Earthquake faults							
Flood plains							
Weather							
National Weather Service							
SDGE Weather Stations							
RAWS Weather Stations							
Demographics							
Population of impacted areas							
Number and type of housing units							
Access and Functional Needs Population							
Transportation							
Status of major/primary roads							
Live Traffic flow							
CalTrans Live Cameras							

	Currently available in the application
	Not currently available, but is possible technically
	Unknown Capability

Essential Elements of Information	ArcGIS	NICS	Geocortex	Google	TouchShare	CalCOP	WebEOC
CalTrans Message Boards							
Critical Infrastructure							
Location of medical facilities							
Location of schools and other public buildings							
Location of fire and police facilities							
Energy Systems							
Location and status of electrical generating							
Location of transmission lines							
Location and status of natural gas supply							
Location of refineries and gasoline distribution							
Field Incident Management							
Active Incidents							
Incident Command Post							
Incident Branches/Divisions							
Perimeter Objectives							
Specialized Resources							
Hazardous Material Teams							
Mobile Field Force							
Urban Search and Rescue							
Mobile Communications							
Social Media Monitoring							
Twitter							

	Currently available in the application
	Not currently available, but is possible technically
	Unknown Capability

Essential Elements of Information	ArcGIS	NICS	Geocortex	Google	TouchShare	CalCOP	WebEOC
Facebook							
Instagram							
Position Location Indication							
Fire vehicle location							
Law vehicle location							
Personnel location							
Aircraft location							
Marine location							

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8. COMMON OPERATIONAL DATA

One of the challenges for geospatial technology has been the ability make the information easily available across various levels of users, workgroups, departments and agencies. The types of users can be described in these broad categories:

- GIS Professionals – this group has the technical skills and knowledge on how to create and develop simple to complex database systems and mapping products.
- Public Safety Responders – this group can include emergency managers, fire services, law enforcement and emergency medical services. This group primarily just needs the ability to view content.
- Public Safety Support Services – this group can include communications centers and public information officers. This group may require read and write access to create and collaborate on technical solutions.
- Executive Leadership – this group includes fire chiefs, police chiefs, sheriff, and emergency management directors. This group primarily just needs to view content.
- Elected Officials – this group includes elected officials who need information in support of incidents, policy and funding decisions. They will primarily just view the content.
- Public – this group for the most part are just viewers of vetted and approved products.

Some agencies have well developed GIS resources and capabilities, while others may have very limited resources. The development of a solution to provide geospatial data and maps across a variety of public safety users will result in better informed decision making across all phases of our homeland security goals. Another aspect of this challenge is the ability to ensure that the geospatial data used is accurate and timely. If a common source of information can be identified and a process developed for timely updates can be created, public safety stakeholders can make decisions utilizing a common set of operational data or maps.

An effective solution to create, collaborate, catalog, share maps, data and applications for public safety stakeholders should meet the following requirements:

- Share the same data across jurisdictions.
- Share the same data across disciplines.
- Provide a common source for accurate and timely data.
- Develop common, regional templates for map products.
- Serve various levels of users.
- Have the ability to share with other partners through agreements.

Over the last few years, new capabilities have been developed by ESRI that support the concept of creating, collaborating, cataloging, sharing maps, data and applications. ESRI has developed a solution called ArcGIS Online.

ArcGIS Online is a cloud-based mapping platform for organizations. From anywhere on any device, Web browser or desktop application, users get access to dynamic, authoritative content to create, collaborate, catalog, and share maps, data and applications with members of their organization, other organizations or the general public.

Organizations can subscribe to this secure platform and use it to manage, create, store, and access hosted services, maps and applications.

For the purpose of supporting regional public safety stakeholders, the following key capabilities are provided in ArcGIS Online.

- Provides a cloud-based storage location that is available from any Internet browser support device.
- Ability in organize map services, Web maps, Web mapping applications.
- Ability to create and control functional, invitational only groups for collaboration of non-public geospatial data and products.
- Ability to publish map products to the public (open URL, Website embed)
- Ability to serve various types of users. Includes the range from GIS professional to public viewers.

In a collaborative effort between the County of San Diego, the City of San Diego and the UDC - Regional Public Safety Geodatabase, the use of the group titled San Diego Multiple Agency Public Safety (SanMAPS) has been created to provide the central, regional location for common operating data.

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9. RECOMMENDATIONS

The following recommendations are provided:

Recommendation #1

Continue to develop the ArcGIS Online solution for creating a shared library of common operational data.

The foundation for an accurate, reliable situational awareness map is a good data source. The San Diego region has developed a group in the ArcGIS Online application. The group is called SanMAPS.

The ArcGIS Online SanMaps Group is a cloud-based mapping platform. From anywhere on any device, Web browser, or desktop application, users get access to dynamic, authoritative content to create, collaborate, catalog, and share maps, data and applications with members of their organization, other organizations or the general public. Organizations can subscribe to this secure platform and use it to manage, create, store and access hosted services, maps and applications.

This solution offers a very high level of interoperable GIS data sharing and leverages the existing licensing and capability available in the region.

Recommendation #2

Continue to utilize the NICS application for tactical situational awareness.

The NICS is a Web-based command and control environment for small to large to extreme scale incidents that facilitates collaboration across federal, tribal, military, state, county and local/municipal levels of preparedness, planning, response, and recovery for all-risk/all-hazard events. The NICS facilitates situational awareness for widely dispersed responders.

The NICS has been utilized multiple times in the San Diego region to support first responders and emergency operations centers during wildland incidents and special events. The NICS application has a well-developed set of data sources and several tools that support field operations and can provide emergency operations centers with important information for decision making.

This solution is an established solution in the region and offers an easy to use tool for tactical situational awareness.

Recommendation #3

Develop an ArcGIS based regional situational awareness map solution to support emergency operations centers and public information sharing.

ArcGIS has a suite of solutions that offer the highest level of interoperability, redundancy, portability, scalability and reliability. The suite of software solutions support the Web-based ArcGIS Online solution that can be accessed

anywhere, anytime, on any device where an Internet connection is available. The ArcGIS Online solution is designed for use by the GIS aware and non-GIS aware users.

ArcGIS is an established software application utilized by most local government agencies and other interested parties in the San Diego region. Developing this solution leverages existing software licensing and does not require significant new financial investment. The ArcGIS solution currently plays an important role in support of incident management teams and emergency operations centers.

An ArcGIS based solution may include the use of a partner application like Geocortex. An application like Geocortex provides additional functionality to the ArcGIS application for creating user friendly applications that are designed for mobile applications, custom workflows and non-GIS users.

This solution offers the highest level of capability for GIS services. This increased capability provides critical support for and a high level of interoperability for emergency operations centers.

Recommendation #4

Support a high level of collaboration between the all appropriate solutions to make sure all parties have access to common operational data.

Many agencies have adopted solutions that serve their discipline or agency needs. The San Diego region should continue to support a high level of collaboration with these other solutions. The primary vehicle for that collaboration is the use of open geospatial standards and the use of the SanMAPS group to share common operational data. This commitment to collaboration will support other efforts deployed such as CalCOP, TouchShare, WebEOC , Google and other specialized map applications.

10. APPENDIX

Table 4—ArcGIS Online

ArcGIS Online		
Function	Capability	Detail
Software hosting solutions		
Local network	XXX	ArcGIS Online can be hosted on premise through ArcGIS Portal or application files can be utilized through ArcGIS Server or Desktop
Desktop/laptop	XXX	Application files can be utilized through ArcGIS Desktop suite of applications
Web/cloud services	XXX	ArcGIS Online is hosted on ESRI cloud services and accessed through internet services.
Interoperability		
Import files	XXX	ArcGIS Online can import Shape files, comma separated value, text delimited, GPS exchange format, GEORSS file
Export files	XX	ArcGIS Online does not have an export function within the Web based map application. The ArcGIS Server and Desktop suites can export all file types.
Import services	XXX	ArcGIS Online can utilize several types of services including Web mapping services, GEORSS feeds, KML
Export services	XX	ArcGIS Online does not create services but does provide a library of services organized through a group. The ArcGIS Server can create WMS, WFS, KML services
Variety of skill level of users		
Ability to be used by a variety of user skill levels	XXX	ArcGIS Online is designed for use by basic viewers, casual GIS map creators and GIS Professionals
Publishing capability		
Map printing	XX	A basic print function is available through the AGOL application for basic printing. Additional robust printing functionality is available using the ArcGIS Server or Desktop application
Publish to public Websites	XXX	The application has a share function that will produce iframe configuration with html link
Publish in variety of file types	XXX	Print function within ArcGIS online for basic printing. Additional capabilities in ArcGIS Server and Desktop suites
User Interface Features		
Configuration of symbology	XXX	Large selection online from ESRI and can configure ArcGIS Online Portal with custom symbols
Instant messaging or chat		Not a capability in AGOL

ArcGIS Online		
Function	Capability	Detail
Private maps or rooms		Not a capability in AGOL
Drawing mark-up	XXX	Very good selection of mark-up tools
Control of data layers	XXX	Very good control and organization of data layer viewing
Display metadata or links	XXX	Very good control and display capability of metadata and links for features
Social Media tools	X	Basic social media tool is available in Web map application template
Real-time sharing	X	Maps are only shared after a save and share process.
Position location tracking services	XX	Position location services can be built in the geoevent processor and displayed in ArcGIS Online
Geofencing	X	AGOL has limited geofence capability. ArcGIS Server has more robust capability
Multiple base maps	XXX	Very good set of base maps with ability to add custom base maps
Analytics		
Perform analytics	XX	AGOL has limited analytic built in tools. ArcGIS Server or Desktop has very good analytic tools to support
Mobile applications (Tablets)		
Mobile applications available	XX	Custom mobile applications can be created for viewing maps. ESRI Collector application can also be built for field data collection
Ease of use for field	XXX	Web map applications are designed for easy viewing
Variety of device types	XXX	AGOL works on all internet browser capable devices and most operating systems are supported for mobile apps
Security		
Application security	XXX	ArcGIS provides a variety of solutions for security, depending on the type of product. The ArcGIS Online product is certified compliant with TRUSTe Certified Privacy Seal and EU Safe Harbor for privacy. The application has received Federal Information Security Act Low Authorization and accreditation from the US Department of Agriculture. Enterprise logins are supported by SAML 2.0 providing federated identity management. Developers can utilize OAuth 2 based API's to manage their user and app logins.
Identity management and credentials	XXX	User name and password utilizing organizational accounts or public maps-personal account
Control of data access	XX	Good control of access to data based on user level
Control of user features	XX	Good control of access to user features based on user level

ArcGIS Online		
Function	Capability	Detail
Configuration control		
Ability for local user to modify configuration	XXX	AGOL is highly configurable by the local user to meet their needs
Continuity of Operations		
Redundancy capability	XXX	ArcGIS Online Portal can provide on premise back-up and ArcGIS Server can operate on a local network with local data files
Ability to function without internet connection	XXX	The ArcGIS Online Portal can operate locally without internet connectivity
Training Requirements		
Requires minimal training hours to learn	XX	ArcGIS Online basic Web map viewing application requires minimal training. The Web map introduces a higher level of skill with additional training.
Training resources available	XXX	ArcGIS has very good training resources available through Web hosted training, online videos and training documents
Software documentation available	XXX	Very good software documentation available
Technical Support		
24/7 Availability for live help	XXX	Live technical support is available 24/7
Governance and Sustainment		
Governance structure	XXX	ArcGIS licensing is owned by most public agencies and is the core GIS solution for SanGIS, Public Safety Geodatabase under the UDC and County OES.
Funding source	XXX	ArcGIS is funding by a combination of general fund sources and UASI grant funds
Associated Costs $ - Low $$ - Medium $$$ - High		
Cost for new regional deployment or enhancement	$	Additional enhancements to coordinate a regional map viewer application are minimal. Additional user licenses would be purchased to expand existing user licenses owned by agencies in the region. Additional 100 users is $17,000
Annual maintenance cost	$	Minimal additional cost for regional deployment

Table 5—CalCop – Watchboard Map Viewer

CalCop - Watchboard Map Viewer		
Function	Capability	Detail
Software hosting solutions		
Local network	X	Not currently deployed on premise
Desktop/laptop		Not currently deployed on local devices
Web/cloud services	XXX	CalCOP-Watchboard is hosted on a cloud based server accessed through an internet connection.
Interoperability		
Import files	XX	The ability to import files is not a capability within the application. CalCOP application is supported with an ArcGIS Server capable of importing typical open geospatial standard file types. This feature is significantly limited currently because this function can only be done by the developer
Export files	X	CalCOP is supported with an ArcGIS Server capable of exporting open geospatial standard file types. Can right click on a geofenced area and export csv file.
Import services	XX	The ability to import GIS services is not a capability within the application. CalCOP is supported with an ArcGIS server capable of importing automated services. This feature is significantly limited currently because this configuration can only be done by the developer.
Export services	X	The ability to export services is not a capability within the application. CalCOP is supported with an ArcGIS server capable of exporting automated services. This feature is significantly limited currently because this configuration can only be done by the developer.
Variety of skill level of users		
Ability to be used by a variety of user skill levels	X	The CalCOP-Watchboard is currently designed primarily as an end point viewer with limited need for a higher level of user
Publishing capability		
Map printing	X	Basic browser supported print screen function
Publish to public Websites		Current version does not push maps to the public
Publish in variety of file types	X	Types of files based on available file types in the internet browser.
User Interface Features		
Configuration of symbology	X	Limited capability to configure symbols within the application. The application can display the symbols inherited by the ArcGIS server.
Instant messaging or chat		Not a current feature

CalCop - Watchboard Map Viewer		
Function	Capability	Detail
Private maps or rooms		Not a current feature
Drawing mark-up	X	Limited mark-up capability
Control of data layers	XX	Good control of data layers and feeds. The organization of the layers could be improved.
Display metadata or links	X	Limited control and display capability of metadata and links for features - inherited from ArcGIS
Social Media tools	XXX	Very good social media tool
Real-time sharing	XX	Good capability to share updates to the map in real time
Position location tracking services	X	Not a current feature within the application. Can ingest feeds from outside source
Geofencing	XX	Good geofence feature to filter data geographically
Multiple base maps	X	Limited set of base maps
Analytics		
Perform analytics	X	Some good ability to perform analytics - example:feed monitor
Mobile applications (Tablets)		
Mobile applications available	XX	Mobile applications include Mobile Command (version of Watchboard), Mobile Assessor (site assessment tool), Mobile Indicator (field reporting)
Ease of use for field	X	Mobile application has medium level of difficulty
Variety of device types	X	Mobile application currently only available in Android operating system. Main application can be viewed on any internet browser capable device
Security		
Application security	XX	Standard HTTPS internet security
Identity management and credentials	XX	User name and password managed by administrators.
Control of data access	XXX	Very good control of data based on user credentials
Control of user features	XX	Basic control of access to user features based on user level
Configuration control		
Ability for local user to modify configuration		Configuration is limited to effort by developers. No local user control
Continuity of Operations		
Redundancy capability	X	Application is hosted on a single server . The application is not replicated at an alternate site

CalCop - Watchboard Map Viewer		
Function	Capability	Detail
Ability to function without internet connection	X	The application requires internet to function.
Training Requirements		
Requires minimal training hours to learn	XX	CalCOP Watchboard is primarily an end use viewer and requires minimal training
Training resources available	X	Training is done through a combination of onsite training, Web hosted training and limited online information.
Software documentation available	X	Basic information is online, supported by user manuals.
Technical Support		
24/7 Availability for live help	X	24/7 hotline service is in place. Can access additional resources in emergency situations
Governance and Sustainment		
Governance structure	X	CalCOP is currently governed by a coalition of the UASI Regions in collaboration with State OES. This group provides guidance and direction for the project through a project, steering and executive committee model. A more formal governance model has not been identified for the long-term
Funding source	X	CalCOP is currently funded by State OES utilizing Homeland Security Funds. A long-term funding source has not been identified.
Associated Costs $ - Low $$ - Medium $$$ - High		
Cost for new regional deployment or enhancement	$	State of California Master Contract with perpetual license for current software. No limit on number of users for the application
Annual maintenance cost	$$	State of California Master Contract with annual maintenance cost of $1,263,000/year (paid by State OES)

Table 6—Geocortex

Geocortex		
Function	Level	Detail
Software hosting solutions		
Local network	XXX	Geocortex runs on a local or cloud-based Windows server.
Desktop/laptop	XX	Geocortex can be installed on a desktop/laptop running a supported version of Windows.
Web/cloud services	XXX	Geocortex runs on a local or cloud-based Windows server.

Geocortex		
Function	Level	Detail
Interoperability		
Import files	XXX	Geocortex can consume WMS, WFS services, and ArcGIS Online Web maps; shape files and file geodatabases can be consumed when published from ArcGIS; end users can add shape files, CSV files, and KML.
Export files	XX	Geocortex Viewers can export data to CSV, file geodatabases, and Shape files.
Import services	XXX	Geocortex can consume WMS, WFS services, and ArcGIS Online Web maps; shape files and file geodatabases can be consumed when published from ArcGIS; end users can add shape files, CSV files, and KML.
Export services	XX	Geocortex does not natively export Web services; certain functions in Geocortex (like Reporting) are exposed as REST endpoints that can be called from other applications if required.
Variety of skill level of users		
Ability to be used by a variety of user skill levels	XX	Geocortex Viewers are designed to be used by GIS-aware end users, as well as non-GIS users. Geocortex Viewers can be configured to target the knowledge-level of a particular set of end users.
Publishing capability		
Map printing	XXX	Geocortex includes very good print capability that can be customized to meet specific print requirements.
Publish to public Websites	XX	Geocortex Viewer can be embedded in Web pages, or simply launched from a Web page in a new window.
Publish in variety of file types	X	Geocortex has limited ability to publish in other file types
User Interface Features		
Configuration of symbology	XXX	Geocortex honors symbology defined in ArcGIS; users have some capability to override the default symbology in the layers in their Geocortex applications.
Instant messaging or chat	X	Not a current capability
Private maps for working draft	XX	Geocortex utilizes "Channels" to collaborate privately based on user credentials
Drawing mark-up	XX	Geocortex includes a very good mark-up toolset.
Control of data layers	XXX	Geocortex Viewers include a layer list where users can turn on/off layers. Layers access can be organized
Display metadata or links	XXX	Geocortex viewers can hyperlink users to related Web pages, applications, or documents.

Geocortex		
Function	Level	Detail
Social Media tools	XX	Geocortex AOP has good built-in social media monitoring tools.
Real-time sharing	XX	Updates made to map services and features services will show up immediately to other map users.
Position location tracking services	XX	The Geocortex HTML5 Viewer has a geolocation feature that can show a users' current position, or track their movement if they are mobile.
Geofencing	XX	Geocortex AOP is designed to work with ESRI's Geoevent Processor, which can provide geofencing functionality inside Geocortex.
Multiple base maps	XXX	Geocortex supports as many base maps as required.
Analytics		
Perform analytics	XX	Geocortex includes a reporting engine that can provide analytics; Geocortex AOP includes demographic analysis and charting.
Mobile applications (Tablets)		
Mobile applications available	XX	Geocortex HTML5 Viewer is designed to run on any mobile device with a Web browser.
Ease of use for field	XX	Geocortex can be configured to provide streamlined tools and workflows suited for field use.
Variety of device types	XXX	Geocortex Viewers are browser-based and therefore run on multiple device types, including Windows, iOS, and Android.
Security		
Application security	XXX	Applications can be secured using existing credential databases from a client server. Active Directory, ArcGIS Online credentials). Data layers with access credentials can be consumed securely inside Geocortex.
Identity management and credentials?	XXX	Geocortex supports Windows Authentication, Active Directory, LDAP, SQL Server authentication. Existing roles/credentials from these systems can be consumed by Geocortex.
Control of data access	XX	Geocortex offers good user-level authentication to map services, features services, layers, and hyperlinks to related data sources.
Control of user features	XX	Geocortex offers good user-level authentication to tools, workflows, reports, print templates and more.
Configuration control		
Ability for local user to modify configuration	XXX	Geocortex Administrators have the greatest control on application set-up; end users have access to limited tools in the viewer to change configuration.
Continuity of Operations		

Geocortex		
Function	Level	Detail
Redundancy capability	XX	Application files can be manually backed up to ensure continuity. Some clients use a fail-over installation of Geocortex to ensure continuity.
Ability to function without internet connection	XX	Most Geocortex clients require an Internet connection, but it can be used on a closed local network; Geocortex can also be configured to allow end-users to operate in a disconnected mode on their device.
Training Requirements		
Requires minimal training hours to learn	XX	Training is offered to Geocortex Administrators so they can configure and update their own viewer applications. End-users typically require little to no training.
Training resources available	XX	Scheduled virtual training is offered throughout the year; the Geocortex Support Center is a self-help resource with discussion forums, documentation, and code samples.
Software documentation available	XX	Geocortex ships with several Installation and Administrator Guides. The Geocortex Support Center also assists with discussion forums, feature videos, knowledgebase articles and more.
Technical Support		
24/7 Availability for live help	X	Technical Support is available Monday to Friday, 8:30AM - 5:00PM Pacific Time.
Governance and Sustainment		
Governance structure	X	Geocortex is currently utilized by the County of San Diego Land Use and Environmental Group who supports the County OES. Need to work through regional deployment model
Funding source	XX	General fund by county
Associated Costs $ - Low $$ - Medium $$$ - High		
Cost for new regional deployment or enhancement	$	Geocortex licensing starts at $18,500 and increases depending on the number and size of the production installations. Additionally, clients budget for training, support, and professional services assistance to ensure their Geocortex deployments are successful.
Annual maintenance cost	$	Geocortex uses a 20% maintenance model to provide clients ongoing product updates.

Table 7—Google Maps

Google Maps		
Function	Capability	Detail
Software hosting solutions		
Local network		Application not capable of being hosted on premise or local server
Desktop/laptop		Application not capable of being hosted on a desktop or laptop
Web/cloud services	XXX	Google Maps runs on a cloud-based server.
Interoperability		
Import files	XX	Application is designed to accept KML, CSV, TSV, or XLSX file
Export files	X	The application can export KML files
Import services	X	Application can share KML networked services
Export services	X	Application can share KML networked services
Variety of skill level of users		
Ability to be used by a variety of user skill levels	XX	Application is designed mostly for the basic map viewer user and can have advanced configuration by GIS professional
Publishing capability		
Map printing	X	Basic internet browser print function
Publish to public Websites	XXX	Maps can be embedded in public Websites easily
Publish in variety of file types	X	Basic internet browser print function
User Interface Features		
Configuration of symbology	X	Limited to symbology set within the application
Instant messaging or chat		Not a current feature
Private maps or rooms		Not a current feature
Drawing mark-up	X	Basic drawing and mark-up capability
Control of data layers	XX	Basic control of data layers
Display metadata or links	XX	Good display of metadata related to points or features
Social Media tools		Not a current feature
Real-time sharing	XX	Single map is shared for all users with updated information in real time
Position location tracking		Not a current feature

Google Maps		
Function	Capability	Detail
services		
Geofencing		Not a current feature
Multiple base maps	X	Basic set of base maps
Analytics		
Perform analytics		Not a current feature
Mobile applications (Tablets)		
Mobile applications available		No custom mobile application. Google Maps is designed to run on any mobile device with a Web browser.
Ease of use for field	XXX	Most internet browser features are not too difficult
Variety of device types	XXX	Google Maps is a browser-based and can run on multiple device types, including Windows, iOS, and Android.
Security		
Application security	XX	The American Red Cross uses their own domain security capability
Identity management and credentials?	X	The American Red Cross manages users through their own network (domain) access identity system.
Control of data access	X	Google Maps has basic capability to control access to data based on user credentials
Control of user features	X	Google Maps has basic capability to control access to data based on user credentials
Configuration control		
Ability for local user to modify configuration	X	Google Maps have limited ability for the local user to modify the configuration
Continuity of Operations		
Redundancy capability	X	Google is a cloud based application with no local redundancy. Any redundancy is supplied by the Google through backup servers.
Ability to function without internet connection		Google requires an internet connection to function
Training Requirements		
Requires minimal training hours to learn	XXX	Google Maps is an easy map viewer that requires minimal training to use
Training resources available	XX	Good resources are available from Google and third party providers.
Software documentation available	XX	Basic software documentation provided

Google Maps		
Function	Capability	Detail
Technical Support		
24/7 Availability for live help	XX	Basic live technical support is available 24/7
Governance and Sustainment		
Governance structure	X	American Red Cross currently utilizes a free version of the Google Apps for Education in collaboration with San Diego State University
Funding source		Free Google Apps for Education
Associated Costs $ - Low $$ - Medium $$$ - High		
Cost for new regional deployment or enhancement	?	Unknown cost for a regional deployment utilizing anything other than the free application currently used by the American Red Cross
Annual maintenance cost	?	Managed by American Red Cross in collaboration SDSU

This assessment is done in the context of how American Red Cross utilizes the Google Apps for Education. Additional functionality is available by purchasing additional service levels or products from Google

Table 8—Next Generation Incident Command System

Next Generation Incident Command System		
Function	Level	Detail
Software hosting solutions		
Local network	X	NICS can be deployed on a local network but typically not deployed in the method
Desktop/laptop	X	NICS can be deployed on a desktop but typically not deployed in the method
Web/cloud services	XXX	NICS is hosted on a server accessed through an internet connection.
Interoperability		
Import files	XXX	NICS can import a variety of file types including WMS, WFS, GeoRSS, KML, and tracking files
Export files	XX	NICS can export a variety of file types including WMS, WFS, GeoRSS, KML, and tracking files
Import services	XXX	NICS can import a variety of types of services including WMS, WFS, GeoRSS, KML, and tracking files
Export services	X	NICS can export some services including WMS, WFS, KML
Variety of skill level of users		

Next Generation Incident Command System		
Function	Level	Detail
Ability to be used by a variety of user skill levels	XX	NICS is designed for first responders with basic viewing skills. There is limited utility for a GIS professional to configure
Publishing capability		
Map printing	X	Basic browser supported print screen function
Publish to public Websites		Current version does not push maps to the public
Publish in variety of file types	X	Types of files based on available file types in the internet browser.
User Interface Features		
Configuration of symbology	XX	The application has a good standard set of symbology within the application. Changes or configuration of the symbology cannot be done by the local users, must be done by developers.
Instant messaging or chat	XXX	Very good chat feature within the application
Private maps or rooms	XXX	NICS has very good ability to create private rooms for draft mapping
Drawing mark-up	XXX	Very good selection of mark-up tools
Control of data layers	XX	Good control of data layers. The organization of the layers could be improved.
Display metadata or links	XXX	Very good control and display capability of metadata and links for features
Social Media tools		Not currently available
Real-time sharing	XXX	Very good capability of sharing maps in real time
Position location tracking services	XXX	Very good set of position location and tracking services
Geofencing		Not currently available
Multiple base maps	XX	Good set of base maps available
Analytics		
Perform analytics	XX	Some good ability to perform analytics - example: Census report.
Mobile applications (Tablets)		
Mobile applications available	X	Mobile application currently available provides map, avl, chat, creation of field reports and position location tracking.
Ease of use for field	XX	Mobile application is easy to use
Variety of device types	XX	Mobile application currently only available in Android operating system. Main application can be viewed on any internet browser capable device

Next Generation Incident Command System		
Function	Level	Detail
Security		
Application security	XX	NICS is migrating to Open Identity Stack -OpenDJ. OpenDJ is an open source Lightweight Directory Access Protocol (LDAPv3) and Directory Service Markup Language (DSMLv2) compliant directory service written in the Java programming language.
Identity management and credentials?	XX	User name and password managed by administrators.
Control of data access	X	Basic control of access to data based on user level credentials
Control of user features	X	Basic control of access to user features based on user level credentials
Configuration control		
Ability for local user to modify configuration		Configuration is limited to effort by developers. No local user control
Continuity of Operations		
Redundancy capability	X	Application is hosted on a single server for operational use. The application is replicated at the MIT-Lincoln lab as a back-up copy.
Ability to function without internet connection	X	The application requires internet to function. The application does have caching capability and uses low bandwidth for updates.
Training Requirements		
Requires minimal training hours to learn	XXX	NICS is designed with the first responder in mind and is fairly easy to learn with minimal training hours
Training resources available	X	Basic online resources available
Software documentation available	X	Basic online documentation available
Technical Support		
24/7 Availability for live help	X	Live technical support only available during business hours
Governance and Sustainment		
Governance structure	X	Current governance structure consists of user group decision making. A long term governance model under a public agency has not been identified.
Funding source	X	NICS has primarily been funded by Homeland Security Grants
Associated Costs $ - Low $$ - Medium $$$ - High		
Cost for new regional	?	NICS was developed using Department of Homeland Security funds and

Next Generation Incident Command System		
Function	Level	Detail
deployment or enhancement		is available at no cost. Future enhancements and ongoing technical support potential cost to the San Diego region are unknown at this time.
Annual maintenance cost	?	NICS was developed using Department of Homeland Security funds and is available at no cost. Potential annual maintenance costs for the San Diego region are unknown at this time.

Table 9—TouchShare

TouchShare		
Function	Level	Detail
Software hosting solutions		
Local network	XXX	TouchShare runs on a local or cloud-based Windows server.
Desktop/laptop	XX	TouchShare can be installed on a desktop/laptop running a supported version of Windows.
Web/cloud services	XXX	TouchShare runs on a local or cloud-based Windows server.
Interoperability		
Import files	XXX	TouchShare can consume WMS, WFS services, and ArcGIS Online Web maps; shape files and file geodatabases can be consumed when published from ArcGIS; end users can add shape files, CSV files, and KML.
Export files		Not a current capability from within the application
Import services	XXX	TouchShare can consume WMS, WFS services, and ArcGIS Online Web maps; shape files and file geodatabases can be consumed when published from ArcGIS; end users can add shape files, CSV files, and KML.
Export services	X	TouchShare does not natively export Web services; the supporting ArcGIS server could perform that function.
Variety of skill level of users		
Ability to be used by a variety of user skill levels	XX	TouchShare is designed for use by GIS-aware end users, as well as non-GIS users.
Publishing capability		
Map printing	X	Limited to browser supported print function within the application
Publish to public Websites		Not a current capability
Publish in variety of file types	X	TouchShare has limited ability to publish in other file types
User Interface Features		

TouchShare		
Function	Level	Detail
Configuration of symbology	XX	TouchShare uses the symbology defined in ArcGIS. No configuration within the application
Instant messaging or chat		Not a current capability
Private maps or rooms	XX	TouchShare creates private, invitation only “sessions”
Drawing mark-up	XX	TouchShare includes a good mark-up toolset.
Control of data layers	XXX	TouchShare includes a layer list where users can turn on/off layers. Layers access can be organized
Display metadata or links	XXX	TouchShare can hyperlink users to related Web pages, applications, or documents.
Social Media tools		Not a current feature
Real-time sharing	XX	Very good real time map sharing and collaboration
Position location tracking services	X	Not a current capability within the application. Could utilize the ArcGIS geoevent processor to support tracking
Geofencing	XXX	TouchShare utilizes a "lens" feature that provides a gepfence type of capability for data filtering
Multiple base maps	XX	TouchShare supports multiple base maps
Analytics		
Perform analytics	X	Limited analytic tools
Mobile applications (Tablets)		
Mobile applications available	XX	TouchShare uses HTML5 Viewer is designed to run on any mobile device with a Web browser.
Ease of use for field	XX	TouchShare features are generally easy to use.
Variety of device types	XXX	TouchShare is browser-based and therefore run on multiple device types, including Windows, iOS, and Android.
Security		
Application security	XXX	Applications can be secured using existing credential databases from a client server. Active Directory, ArcGIS Online credentials). Data layers with access credentials can be consumed securely inside Geocortex.
Identity management and credentials?	XXX	TouchShare supports Windows Authentication, Active Directory, LDAP, SQL Server authentication. Existing roles/credentials from these systems can be consumed by Geocortex.
Control of data access	XX	TouchShare offers good user-level authentication to map services, features services, layers, and hyperlinks to related data sources.

TouchShare		
Function	Level	Detail
Control of user features	XX	TouchShare offers good user-level authentication to tools, workflows, reports, print templates and more.
Configuration control		
Ability for local user to modify configuration	X	TouchShare has limited capability to modify the configuration of the map viewer
Continuity of Operations		
Redundancy capability	XX	Application files can be manually backed up to ensure continuity. Cloud version redundancy depends on vendors backup services
Ability to function without internet connection	X	TouchShare requires an internet or network connection to function
Training Requirements		
Requires minimal training hours to learn	XX	End user training requirements are minimal. Administration or system configuration requires significant training.
Training resources available	X	Basic online resources, Web hosted training and onsite training available
Software documentation available	X	Basic software documentation available
Technical Support		
24/7 Availability for live help	X	Technical Support is available Monday to Friday, 8:30AM - 5:00PM Pacific Time.
Governance and Sustainment		
Governance structure	X	TouchShare is currently deployed at the American Red Cross, San Diego Gas and Electric and City of Carlsbad. Each of these instances is supported by their internal governance and budget process. There currently is no regional approach for deployment of TouchShare
Funding source	XX	Individual agency general fund
Associated Costs $ - Low $$ - Medium $$$ - High		
Cost for new regional deployment or enhancement	$$$	The on premise or local solution is approximately $37,500 with 5 concurrent licenses. Additional concurrent licenses are $1000 each. An on premise solution with hardware and 50 additional licenses would be approximately $100,000. An alternative cloud hosted solution with a software as a service is $15,000 per year with 5 concurrent licenses. With an additional 50 licenses, the annual subscription would be approximately $65,000 per year.
Annual maintenance cost	$$$	20% of initial cost

Table 10—WebEOC Mapper

WebEOC Mapper		
Function	Level	Detail
Software hosting solutions		
Local network	XX	WebEOC can be hosted on a local, on premise server
Desktop/laptop		WebEOC is typically not hosted on a desktop or laptop
Web/cloud services	XXX	WebEOC runs on a cloud-based Windows server.
Interoperability		
Import files	X	WebEOC mapper has basic capability to import GIS files such as AGS tiled, dynamic and image layers and WMS
Export files		WebEOC mapper does not have export capabilities
Import services	X	WebEOC has basic capability to import services such as GeoRSS and KML
Export services		WebEOC mapper does not support export of map services
Variety of skill level of users		
Ability to be used by a variety of user skill levels	X	WebEOC mapper is designed to be used at a basic level. Does not perform more complex functions
Publishing capability		
Map printing	X	Basic internet browser print function
Publish to public Websites		Does not support publishing to public Websites
Publish in variety of file types	X	Basic internet browser print function
User Interface Features		
Configuration of symbology	X	Basic symbology capability
Instant messaging or chat	X	Sharing through WebEOC Boards is a core function, but not a feature within the map
Private maps or rooms		Not a current feature
Drawing mark-up	X	Basic drawing and mark-up capability
Control of data layers	X	Basic control of data layers
Display metadata or links	X	Basic display of metadata related to points or features
Social Media tools		Not a current feature
Real-time sharing	X	Single map is shared for all users with updated information in real time
Position location tracking services		Not a current feature

WebEOC Mapper		
Function	Level	Detail
Geofencing		Not a current feature
Multiple base maps	XX	Basic set of base maps with ability to add custom base maps
Analytics		
Perform analytics		Not a current feature
Mobile applications (Tablets)		
Mobile applications available	X	No custom mobile application. WebEOC is designed to run on any mobile device with a Web browser.
Ease of use for field	X	Most internet browser features are not too difficult
Variety of device types		WebEOC mapper is a browser-based and can run on multiple device types, including Windows, iOS, and Android.
Security		
Application security	XX	WebEOC application supports standard secure security capabilities
Identity management and credentials?	XX	WebEOC utilizes a user name and password to access the application
Control of data access	X	WebEOC has basic capability to control access to data based on user credentials
Control of user features	X	WebEOC has basic capability to control access to data based on user credentials
Configuration control		
Ability for local user to modify configuration	X	WebEOC has limited ability for the local user to modify the configuration
Continuity of Operations		
Redundancy capability	XX	The local-on premise server provides a good redundancy solution. The Intermedix hosted solution has redundant servers in different geographical locations.
Ability to function without internet connection	XX	The cloud hosted WebEOC requires an internet connection to function. The local hosted solution does not require connectivity.
Training Requirements		
Requires minimal training hours to learn	XX	The WebEOC application requires a moderate amount of training to utilize all of the features of the system. Simple viewing of the map requires minimal training
Training resources available	X	Limited resources beyond user manuals, training sessions and online videos
Software documentation available	X	Basic software documentation provided

WebEOC Mapper		
Function	Level	Detail
Technical Support		
24/7 Availability for live help	XX	Basic live technical support is available 24/7
Governance and Sustainment		
Governance structure	XXX	WebEOC is currently hosted by the County of San Diego Office of Emergency Services and made available to the members of the Unified Disaster Council. This solution provides a long-term governance solution
Funding source	XXX	Funded by County OES
Associated Costs $ - Low $$ - Medium $$$ - High		
Cost for new regional deployment or enhancement		No new cost for regional deployment
Annual maintenance cost	$	Managed by County OES

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