



Geospatial Standard Operating Guidance for Multi-Agency Coordination Centers



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Revision Register

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This document may be obtained in electronic format via at <http://www.napsgfoundation.org>.

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CREDITS

Many dedicated leaders in the public safety and GIS communities supported the development of this Geospatial Standard Operating Guidance for Multi-Agency Coordination.

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DOCUMENT BACKGROUND

This Standard Operating Guidance (SOG) document was developed by a team of Geospatial Information Systems (GIS) specialists and professionals, leaders in public safety operations & management, and incident support subject matter experts. This document strives to serve as a template to support national GIS standards for emergency response in Multi-Agency Coordination Centers. The National Wildfire Coordinating Group GIS Standard Operating Procedures (GSTOP, June 2006)¹ served as the primary reference and guide to developing SOPs for Incident Command Systems. Examples are provided from the County of San Diego's Standard Operating Procedures and are for reference purposes only, they are not intended to set a standard.

This document proposes a set of guidelines for coordinating geospatial emergency response efforts. These guidelines are intended to serve as a shared foundation, encouraging improved communication and collaboration amongst GIS and other emergency response staff. This is a living document that provides a starting point to produce guidelines for the organization and management of geospatial data, map creation and output within Multi-Agency Coordination Centers. It is anticipated that this document will be updated as more and more local agencies adopt GIS operating procedures for emergency management and provide best practices back to the NAPSG Foundation.

Intended as a template, agencies are encouraged to modify document content to accommodate local and regional specific details. Modifications may range from referencing local datasets and file locations to adjusting standard map products to better account for local hazards or values at risk. It is recommended that you work with your local emergency service coordinators to create an SOP or SOG that meets the unique needs of your agency and/or jurisdiction.

The Department of Homeland Security's federal interagency geospatial concept of operations (GeoCONOPS) provides additional information on federal geospatial activities undertaken in support of emergency management. The DHS GeoCONOPS is intended to be a blueprint for coordinating geospatial activities in support of the Stafford Act and the National Response Framework. The DHS GeoCONOPS is structured to address key mission areas of life and property saving, damage assessment, recovery, and Federal Operation Centers. To learn obtain a copy of GeoCONOPS visit, http://www.napsgfoundation.org/attachments/article/113/DHS_Geospatial_CONOPS_v3.0_8.5x11.pdf.

TIPS ON HOW TO USE THIS GUIDANCE DOCUMENT

Within this document, *background information* on each section is offered in blue text boxes at the beginning of each chapter. The background information is intended to guide the user on how to utilize the associated guidance. Text which is bold, italicized, and in carrots delineates where **<<LOCAL JURISDICTIONAL INPUT IS NEEDED>>**. Examples are given in motion quotes and are intended to provide the reader with tips on how to use and interpret the examples provided. Diagrams are also marked as examples to indicate where local inputs are required. These examples and diagrams are offered up only for reference purposes and are not intended to set a standard.

It is recommended that once your agency has created a GIS operations document for your agency that it is exercised when emergency management agencies or first responders conduct exercises. This is a good

opportunity to see if the document actual works and provides useful information. If possible GIS staff should provide injects to exercises that specifically test different elements within the document. Exercise after action reports should identify areas of the document and GIS response that worked and did not work. The document should be updated after each exercise to improve its effectiveness.

For more information on how to integrate geospatial technologies within your public safety organization, please visit <http://carat.napsgfoundation.org/> for example best practices and a prototype version of the interactive Capability and Readiness Assessment Tool (CARAT). The CARAT is intended for public safety practitioners interested in learning about and/or building a GIS to support their agencies' work. It is designed to serve as an assessment tools to develop a roadmap for anyone interested in learning about, doing, or directing a GIS in support of public safety.

INTRODUCTION

Purpose: This Standard Operating Guidance document was prepared to provide guidance and key components of a template SOP or SOG that will help to facilitate local agencies and jurisdiction with the creation, preparation, coordination, and dissemination of GIS services and products during emergency events. This is a living document that provides a starting point to produce guidelines for the organization and management of GIS data, map creation and output within Multi-Agency Coordination Centers specifically. Additionally, proper internal and external communication channels for sharing these products are addressed.

Audience: The intended audience for this document includes all staff assigned GIS positions supporting an emergency event in a coordination center, including Emergency Operation Center (EOC), Department Operation Center (DOC) and Emergency Medical Services Medical Operations Center (EMS MOC) support responsibilities. This document is meant for use in Multi-Agency Coordination Centers and therefore follows the National Incident Management Structure (NIMS). This document is not intended for use by the Incident Command and therefore does not follow the Incident Command System (ICS). For more information about GIS use within ICS please see the [National Wildfire Coordinating Group GIS Standard Operating Procedures \(GSTOP, June 2006\)](#). For additional information on federal geospatial activities in support of emergency management, please see the Federal Interagency Geospatial Concept of Operations (GeoCONOPS) coordinated by the Department of Homeland Security. However, components of this guidance document can be adopted and applied to the development of SOPs or SOGs for ICS specifically.

Objectives:

Four objectives were set to adequately address GIS needs and practices in an emergency event:

1. Determine key GIS supplies and tools for Multi-Agency Coordination Centers (EOC, DOC, or MOC)
2. Determine data and mapping protocols
3. Determine and document protocols for data/map dissemination/sharing via web applications
4. Determine data and map sharing practices with external contacts

In order to meet these four objectives, this document is broken down into the following eight chapters:

Emergency Management Systems - Outlines the various emergency management organizational structures and physical layout of the Multi-Agency Coordination Center to aid when responding to an emergency operations center (EOC), department operations center (DOC), or medical operations center (MOC).

GIS Staffing and Resource Requirements – Outlines the hardware, software, data, map and general resources necessary for GIS staff to perform their jobs as well as the GIS knowledge, skills and abilities that are required to adequately function in the many GIS emergency support roles that exist.

Staffing and Team Transition – Outlines the procedure for requesting additional GIS support, tracking GIS requests and handling shift changes.

File Naming and Directory Structure – Provides standardized naming conventions for GIS files and directory structure to support data management and facilitate identification.

Mapping Protocols – Details required map elements, data content and format conventions, distribution regulations, symbology guidelines and QA/QC. Outlines cartographic standards for map products.

Data Protocols – Details data format conventions, backup policy, data sharing and the use of web applications.

Data Acquisition and Dissemination – Provides information on briefing cycles and when incident data become available and accessible to GIS users.

Documentation and Metadata – Outlines the documentation/metadata expectations and procedures.

Example Title Page for Your Agency's SOG

Geospatial Standard Operating Guideline for the <<INSERT JURISDICTION/AGENCY>> <<INSERT COORDINATION CENTER>>

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EMERGENCY MANAGEMENT SYSTEMS

Background: This section may be helpful in a Standard Operating Procedure to provide a background on the various emergency management and incident command systems that are in place. In many cases the GIS Responders to the Multi-Agency Coordination Center may be unfamiliar with the layout, hierarchy, and processes taking place. For example, GIS Responders may be asked to physically take a map or digital file, etc. to the Joint Information Center (JIC) or to various agencies sitting within the EOC, and it will be helpful to know where to find them and how the EOC is being run. It may also be helpful to know proper chain of command. Not all Multi-Agency Coordination Centers are alike. GIS responders may also want to refer to and become familiar with the DHS GeoCONOPS. The DHS GeoCONOPS serves as a blueprint for coordinating federal Departments and Agencies and their respective activities in support of incidents per the Stafford Act and National Response Framework. The DHS GeoCONOPS identifies federal geospatial activities based on key mission areas of life and property saving, damage assessment, recovery, and Federal Operation Centers. Please be sure to modify the sections and examples below to fit your Multi-Agency Coordination Center needs. Examples are for reference purposes only and are not intended to set a standard.

- ✓ **Purpose:** In order to respond to an emergency incident as a GIS Responder it is important to understand the various emergency management and incident command systems that are in place. An organizational structure and physical layout of the Operational Area Emergency Operations Center is also provided for reference.

NIMS

The **National Incident Management System (NIMS)** was released in March 2004 by the Department of Homeland Security (DHS). NIMS offers a standardized approach to incident management and response. It was developed to allow first responders from different jurisdictions and disciplines to better work together in an effort to respond to all hazards including natural disasters and emergencies. Benefits of NIMS include a unified approach to incident management, standard command and management structures, and emphasis on preparedness, mutual aid and resource management. NIMS lays out the standardized structure of an Incident Command System (ICS) and definitions of an (EOC). For more information about NIMS see: <http://www.fema.gov/emergency/nims/>

ICS

The **Incident Command System (ICS)** is a command structure set up in the field for first responders. Some of these command systems have GIS staff. ICS provides a flexible mechanism for coordinated and collaborative incident management for first responders in the field. The physical location where the ICS is set up is called the Incident Command Post (ICP). If you are requested to respond or drop off information to the ICP, the following organizational structure is helpful for finding the right people. For more information about ICS see: <http://training.fema.gov/EMIWeb/IS/ICSResource/index.htm>

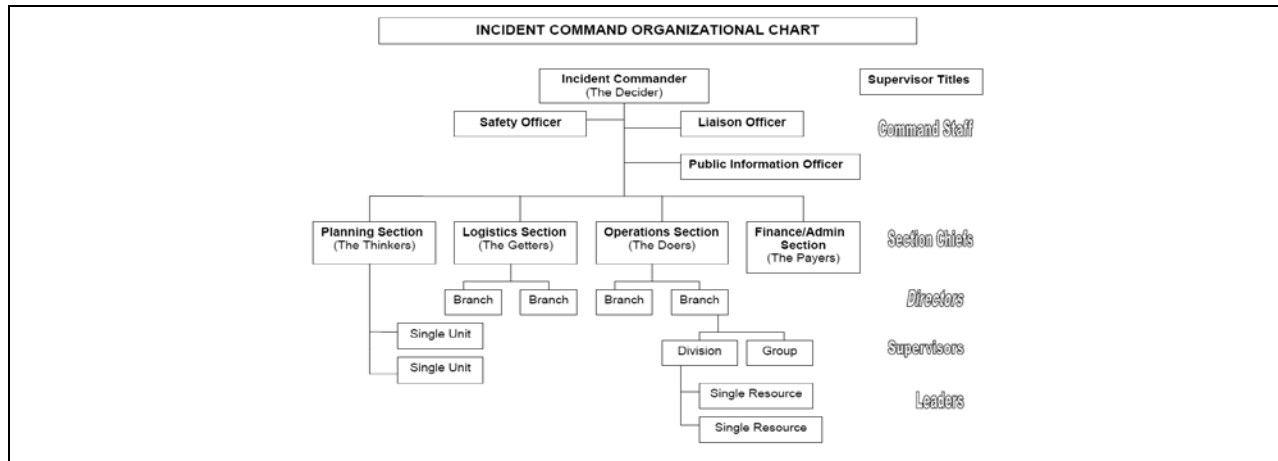


Figure 1 – EXAMPLE ICS ORGANIZATIONAL STRUCTURE. Examples are for reference purposes only and are not intended to set a standard.

EOC

According to NIMS an EOC is activated to support the on-scene response during an escalating incident by relieving the burden of external coordination and securing additional resources.

An EOC is the physical location where organizations and agencies come together during an emergency to coordinate response and recovery actions and resources. It is also where management decisions are facilitated. The organization structure of an EOC in <<STATE>> is laid out in the <<SYSTEM>>.

Example Multi-Agency Coordination Center Layout

The organization structure of an EOC in California is laid out in the Standardized Emergency Management System (SEMS). Figure 2 provides an example of the physical layout and design of a Multi-Agency Coordination Center.

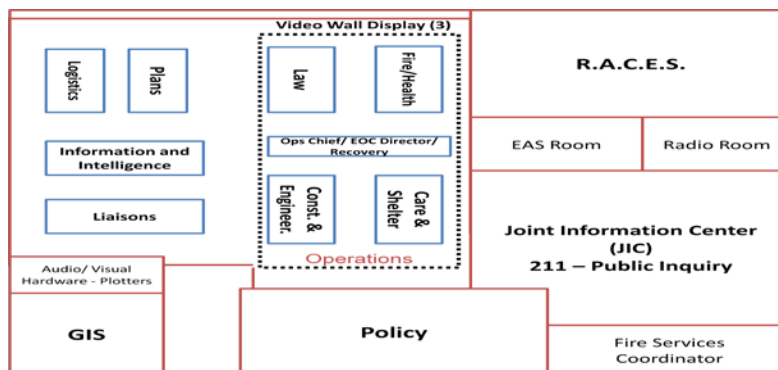


Figure 2 – EXAMLE MULTI-AGENCY COORDINATION CENTER PHYSICAL LAYOUT. Examples are for reference purposes only and are not intended to set a standard.

<<STATE/REGIONAL/LOCAL SYSTEM NAME>>

<<Include a description or reference to state, regional, or local systems or documents which impact emergency operations in the area. >>

Example Organizational Chart for SEMS - The Standardized Emergency Management System (SEMS) is a set of emergency management principles developed as a result of the 1991 Oakland East Bay Hills fire for coordinating state and local emergency response in California. Homeland Security Presidential Directive 5 (HSPD-5) directed the use of NIMS for emergency response. SEMS principles have been integrated into NIMS. Full compliance was reached in California in 2007.

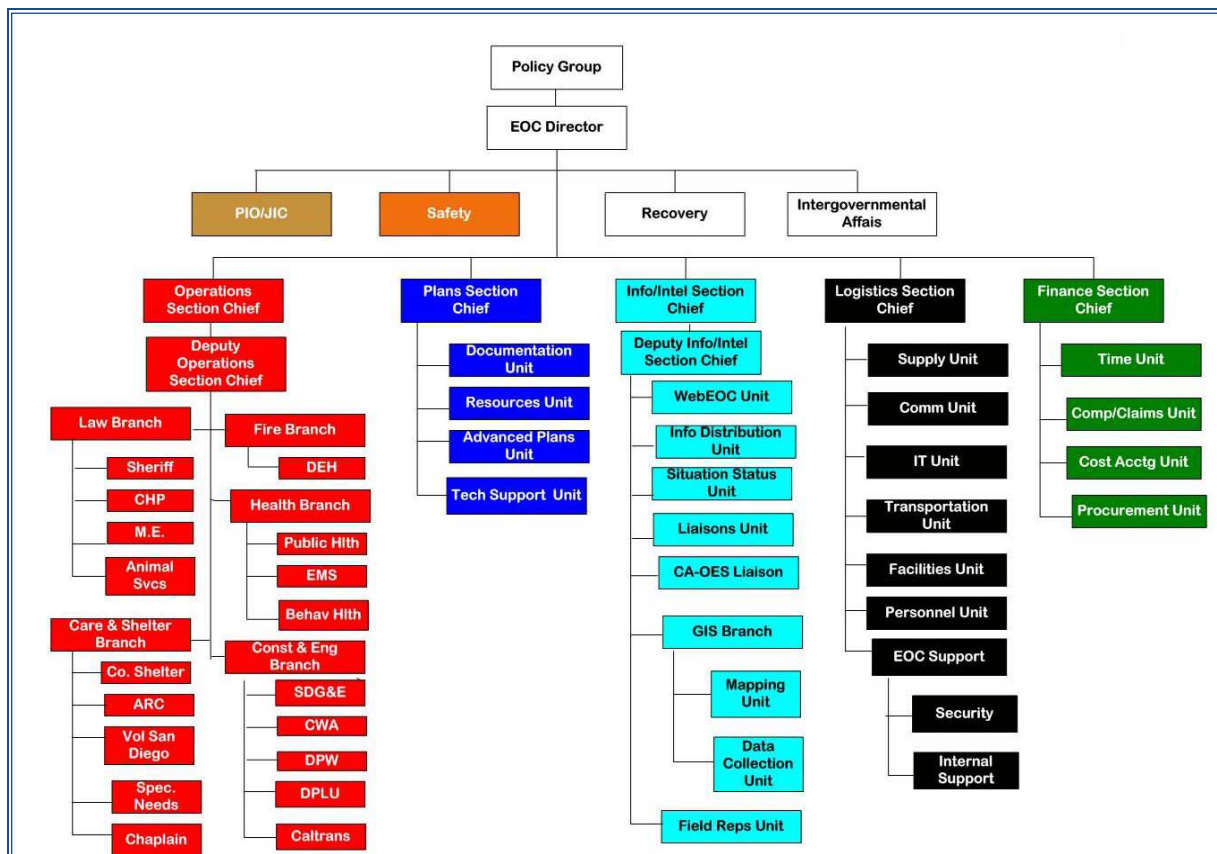


Figure 3 – EXAMPLE OAEOC LEVEL III ORGANIZATION CHART. Examples are for reference purposes only and are not intended to set a standard.

GIS RESOURCE & STAFFING REQUIREMENTS

Background: This chapter details the physical resources and personnel skill sets required for GIS Responders to fulfill GIS needs & expectations in an emergency event. Potential GIS responders should be identified prior to an incident.

Not all Multi-Agency Coordination Centers are alike. Please be sure to modify the sections and examples below to fit your Multi-Agency Coordination Center needs. For example if the local Multi-Agency Coordination Center does not have computers loaded with GIS software or data the document will need to provide instructions on where the equipment is located. The GIS Staffing requirements are also solely provided as an example and should be modified based on your jurisdictional needs. *Examples are for reference purposes only and are not intended to set a standard.*

✓ **Purpose:** This chapter details the resources and skill sets required for GIS Responders to fulfill GIS needs & expectations in an emergency event.

RESOURCE REQUIREMENTS

Example GIS Supply List

The table below serves as an example for the “GIS Supply List”. The needs and availability of resources for each agency or jurisdiction will vary. Use this list as a guiding example and not as a fixed set of requirements.

	REQUIRED		Location		
	Office	Field	Primary	Secondary	Tertiary
HARDWARE (Where possible, field hardware should be ruggedized)					
Laptop and/or Desktop	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
License keys, dongles and codes written down	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plotter &/or printer	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Projector	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GPS Hardware		√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Projection Screen			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Multi-Gb Flash Drive (32 Gb or more)	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Portable, External Hard Drive (1 Terabyte or more)	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Backup Laptop Battery		√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3G Broadband Access Card Activated	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cell phone with published number and	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TXT or SMS activated					
SOFTWARE					
GIS Software license to machine	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MS Office	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adobe Reader	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Adobe Acrobat Full Version			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GPS device and GIS software support GPS analyst (e.g. ArcGIS GPS Analyst extension)		√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Metric Converter	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DATA RESOURCES					
Commercially Available Imagery	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Locally Available Downloaded Data	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spare Copies of the above	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAP RESOURCES					
Department Specific Maps			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wall Maps			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Locally Used Road Maps	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Campus Maps			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transit Maps			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tourist (POI) Maps			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GENERAL RESOURCES					
GIS Desk Book*	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Markers (Dry Erase)/Pens/Pencils	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Compass (Magnetic not scribing type)			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Protractor			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ruler or map scale	√	√	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CDs/DVDs - Writeable	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Push Pins	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plotter Ink Cartridges	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plotter Paper (to include Mylar)	√		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phone Books			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SAFETY					
Personal Phone with Texting ability or SMS (to communicate with relatives)	√	√			
Personal hot drink cup	√	√			
A supply of your business cards (Current business cell phone on card)	√	√			
Snack Food, e.g., energy bar	√	√			
Your emergency contact list printed up and current – The emergency GIS group members, your family personal contacts.	√	√			

Figure 4 Example GIS SUPPLY LIST, this example is provided for reference purposes only and is not intended to set a standard.

**GIS Desk book to include – SOP, Contact List, Data/Map Matrix, Symbology Quick Guide, GIS EOC Staff Checklist, Map/Schematic of the Room (where are resources located), GIS Software Tips/Tricks, How to Access/Use your EOC Software.*

STAFFING REQUIREMENTS

To ensure access to critical geospatial information and products, personnel must be readily available to support the many entities engaged in incident operations. This level of specific operational support provides situational awareness and geospatial tools to the managers of Multiagency Coordination Centers (MACC) and field facilities.

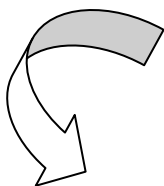
The skills required for a GIS support staff are varied by the event and duration of the event. The <<EOC/DOC/MOC UNIT/BRANCH/ETC>> is responsible for collecting, analyzing, and disseminating information across all Emergency Support Functions. The focus of the team will be to develop an integrated common operational picture of an emergency event. It will review information coming from the field, departmental control centers and EOC personnel to quality control the data, identify gaps, and develop intelligence products for staff. Most of the <<BRANCH/UNIT/ETC>> products will be built around geospatial information.

The structure is modular. In a small incident, one person could fill more than one role and in a large-scale incident several people could staff the same role. Be sure to consider that the guidance on staffing is for Multi-Agency Coordination Centers (where a “GIS Unit” or a “GIS Branch” is likely to exist) and does not specifically support the Incident Command Structure (ICS). Specifically, one point of differentiation to note is that in ICS there is no ‘Unit’ for GIS. However, a Geospatial Task Group may be constructed under the Situation Unit Leader to support the GIS needs for ICS.

Not all Multi-Agency Coordination Centers are alike. Please be sure to modify the sections and examples below to fit your Multi-Agency Coordination Center needs. For example some Multi-Agency Coordination Centers may have a GIS Unit within the Planning Section, while some may have a GIS Branch within the Intel/Info Section of the NIMS structure. When using this document as a template, be sure to modify it to meet the structure of your Multi-Agency Coordination Center.

Example Geospatial Roles and Responsibilities–

Provided below, in Figure 5, is an example list of key geospatial position titles and associated responsibilities per the DHS GeoConops. This list provides a good example of the types of roles you may want to have in your Multi-Agency Coordination Center; however the roles and position titles will need to be modified to fit Multi-Agency Coordination Center. The GIS role tables in the appendix contain position titles more relevant to a Multi-Agency Coordination Center.



Position Title	Roles &/or Responsibilities
Team Leader	<ul style="list-style-type: none"> • Responsible for the coordination of geospatial information system (GIS) production, RS, and geospatial database efforts. • Conducts briefings, attends meetings, and directs overall geospatial support operations. • Interfaces with federal, state, and local authorities establishing MOUs, partnerships, and data sharing agreements. • Proactively seeks opportunities to integrate geospatial products into executive decision making.
Deputy Team Leader	<ul style="list-style-type: none"> • Reports to the Geospatial Team Leader. • Responsible for maintaining the coordinated efforts of the geospatial team. • During times of absence of the Team Leader, becomes the representative of the Team.
Administrative Assistant	<ul style="list-style-type: none"> • Reports to the Team Leader. • Provides administrative support to the Team Leader and the Team in general. • Manages reception area. • Greets customers and assists them in filling out request forms.
Geospatial Production Manager	<ul style="list-style-type: none"> • Reports to the Team Leader. • Coordinates GIS requirements and supervises assigned Geospatial Analysts. • Prioritizes GIS production and activities. • Works with product requesters to properly define requirements and ensures the timely preparation and delivery of recurring and ad hoc GIS products.
Geospatial Analyst	<ul style="list-style-type: none"> • Reports to the Geospatial Production Manager. • Prepares recurring and ad hoc GIS products. • Compiles various types of geospatial information into map and data products. • Analyzes geospatial data from various sources to answer diverse questions and populate geospatial products.
Geospatial Imagery Manager	<ul style="list-style-type: none"> • Reports to the Team Leader. • Responsible for the coordination of RS requirements, resources, and requests for the team. • Operates as task originator & collection manager for assets related to the operation. • Works with Geospatial Production Manager to ensure imagery-derived products are delivered in a timely manner. • Supervises Imagery Analysts.
Imagery Analyst	<ul style="list-style-type: none"> • Reports to the Geospatial Imagery Manager. • Processes and interprets acquired imagery. • Processes imagery in native and/or other formats. • Prepares image data files for use by the Geospatial Analyst Staff. • Creates imagery-derived datasets and products.

Position Title	Responsibilities
Geospatial Database Manager	<ul style="list-style-type: none"> • Reports to Team Leader. • Responsible for creating and managing the file-based data storage system, updating and distributing associated documentation, answering all queries for use, and briefing teams on use of data. • Initiates data sharing agreements or purchases for data as required and arranges for data updates as necessary.
Geospatial Database Administrator	<ul style="list-style-type: none"> • Reports to the Geospatial Database Manager. • Develops, maintains, and coordinates the geospatial data used. • Sets database access rights and privileges. • Responsible for data backups as required.
Geospatial Data Analyst	<ul style="list-style-type: none"> • Reports to the Geospatial Database Manager. • Designs and builds custom database queries as requested by task force members. • Performs quality control and corrects anomalies in the data. • Loads data sets under direction of Database Manager.

Figure 5 – GEOSPATIAL ROLES AND RESPONSIBILITIES– per the DHS GeoConops. Examples are for reference purposes only and are not intended to set a standard.

GIS Role Tables

In the GIS Role tables, each GIS Role is thoroughly defined as are the skills required in order for an individual to qualify to fill each GIS Role in the manner required to adequately support the <<STATE/REGIONAL/LOCAL SYSTEM NAME>> in an emergency event. An individual’s ability to assume each GIS role is determined by the frequency with which that individual conducts certain GIS or GIS-related activities within their daily work routine. These values are idealized and do not need to be exactly duplicated or represented in the person filling the role. Refer to Appendix 1 for an example of a full description of GIS emergency roles and responsibilities.

Example GIS Role Chart –

Provided below, in Figure 6, is an example of one GIS Role and its associated skill set requirements and responsibilities. Additional example GIS Role charts are provided in the appendix. The specific duties and tasks where specific GIS software is referenced should be updated to reflect the software used by your individual agency. The role charts provided here serve only as examples and do not set standards for the use of any particular software.

ROLE: GEOSPATIAL ANALYST - This position can perform research, database queries and statistical analysis for the GIS specialist. Frequently during emergencies, data come into the INCIDENT/EMERGENCY OPERATION CENTER in less than pristine condition. The analyst will massage the data into a usable format. Having a GIS Analyst on site will free up the GIS specialist to concentrate on simple GIS analysis and map production.

Key Requirements Include:

- Prepares recurring and ad hoc GIS products.
- Compiles various types of geospatial information into map and data products.
- Analyzes geospatial data from various sources to answer diverse questions and populate geospatial products.

	DUTY/TASK	FREQUENCY
Administering and Operating GIS Application	Use geospatial software (i.e. ArcINFO 10) to identify, evaluate, and input spatial data.	Often (weekly)
	Use geospatial software to query data.	Often (weekly)
	Convert or import digital data using digitizers, scanners or GPS.	Often (weekly)
	Analyze raster data sets with Spatial Analyst/Grid or Imagine	Often (weekly)
	Analyze vector data sets with Geoprocessing	Often (weekly)
	Project spatial data	Often (weekly)
GIS Product Development	Create FDGC-compliant Metadata	Often (weekly)
	Collect field location data via GPS	Often (weekly)
	Edit GIS data	Often (weekly)
	Convert data (i.e., geodatabase, shapefile, coverage, DWG, etc.)	Often (weekly)
	Generate statistics	Often (weekly)
	Geocode data	Often (weekly)
	Perform image analysis	Often (weekly)
	Map and Create new GIS data	Often (weekly)
Maintain existing GIS data (QA/QC)	Often (weekly)	
GIS Services to End Users	Create maps	Often (weekly)
	Create reports based upon GIS Analysis	Often (weekly)
	Create charts	Often (weekly)
	Create tables	Often (weekly)
	Interpret analysis for client	Often (weekly)
	Determining design format of GIS data layers or database used with GIS layers	Often (weekly)
	Directly work with clients to meet their GIS need or further their understanding of GIS	Occasionally (every month)

Figure 6- EXAMPLE GIS ROLE CHART – The role charts provided here serve only as examples and do not set standards for the use of any particular software.

STAFFING AND TEAM TRANSITION

Background: It is recommended that GIS staff expectations & team structures are identified prior to an incident. Potential GIS responders should be made aware of these expectations before agreeing to be a GIS Responder. The environment during an incident in a Multi-Agency Coordination Center can be very frantic with request for information and maps coming from a variety of people and disciplines. Responders are also expected to work long hours while keeping a high performance level and intensity. Some people do not function well in this type of environment and may not be an ideal candidate as a GIS Responder.

It is also very important that public safety personnel are educated on the value and use of geospatial information and how it can & should be integrated into their workflows. Conducting exercises & cross-training for both public safety & GIS personnel is an important part of implementing your agency's SOPs.

Not all MACCs are alike, please be sure to modify the examples below to fit your Multi-Agency Coordination Center needs. Examples are for reference purposes only and are not intended to set a standard.

- ✓ **Purpose:** In order to facilitate a smooth transition between shifts, it is important that GIS staff accurately maintain record of all requests and their priority level as well as what has been delivered and what is pending. It is also important that GIS staff are named, teams identified, and back-up staff arranged in the planning process. The purpose of this chapter is to identify GIS Staffing periods and team transition requirement.

GIS RESPONDER EXPECTATIONS

Example GIS Responder Expectations:

GIS is considered an essential emergency function and GIS Staff are consequently considered essential personnel during an emergency event. Staff that is directly affected by the event is not expected to report to work. It is the responsibility of GIS staff to communicate their availability status to the GIS Branch Coordinator. The GIS Branch Coordinator will keep track of which staff is available to report and which staff has been affected by the event and unable to report.

EOC/DOC/MOC GIS STAFFING

EOCs, DOCs and MOCs employ <<enter shift length, ex: 12 hour>> shifts. During most emergency events the EOC, DOCs and MOC are staffed 24 hrs/day.

<<Outline how EOC, DOC, and MOC are staffed. Detail the process for obtaining additional GIS support and identify reserve staff resources>>

TEAM TRANSITION

Start of Shift

At the beginning of a shift, GIS staff should complete the following tasks: <<Enter local protocols.>>

Example Beginning of Shift Tasks:

- Sign in on your operations center's Staffing Log.
- Communicate your role and availability via <<Identify appropriate communication systems and channels>>
- Assess GIS needs of Incident Command and your operations center and the needs of fellow GIS staff at other operations centers.
- As necessary or requested, provide data, map products and progress reports through relevant communication channels

End of Shift

At the end of a work shift, GIS staff will debrief their replacement with the following information: <<Enter local protocols.>>

Example Beginning of Shift Tasks:

- Wrap up the project/map/data that you are working on to the best of your ability.
- Communicate the end of your shift via <<Identify appropriate communication systems and channels>>. Include the name of your replacement.
- Debrief your replacement in the following:
 - What deliverables have been requested.
 - What has been created, what is left to be created?
 - Where are the necessary scratch files?
 - What base data have been modified?
 - Where are your notes?
 - Provide the last Media Report?
 - What next steps have been identified?
 - Provide your replacement with your contact information.
 - Provide your replacement with contact information for other GIS Staff that are currently staffing the event or that are due to report.

FILE NAMING AND DIRECTORY STRUCTURE

Background: This chapter is intended to provide GIS staff with a common, standardized file naming convention and directory structure. The examples provided are for reference purposes only and are not intended to set a standard.

The example directory structure was borrowed from the National Wildfire Coordinating Groups GIS SOP used by GIS Specialists to fulfill the GIS needs of the Planning Section of the Incident Management Teams. Standard naming conventions and directory structures foster easier collaboration between varying shifts of GIS Responders. The directory structure is set up with the date and time at the beginning of each folder and file to facilitate easy chronologic sorting ensuring that the most recent map information is at the top or bottom of a file list depending on sort order.

Not all Multi-Agency Coordination Centers are alike. Please be sure to modify the sections and examples below to fit your Multi-Agency Coordination Center needs. Examples are for reference purposes only and are not intended to set a standard.

- ✓ **Purpose:** This chapter provides GIS staff with a common, standardized file naming convention and directory structure. The structure and naming conventions set herein are intended to support an efficient work flow process by providing self-evident naming protocols that are specific not only to each individual incident but also to each incident's time(s) and date(s).

GIS File Directory Structure

During an emergency event, incident related data and maps can be retrieved from: **1. <<FOLDER LOCATION>> AND/OR 2. <<WEB APPLICATION>>** per the file structure outline and guidelines defined below. *Figure 6 on the following page serves as an example of how this directory structure and naming convention would be used in an actual event.*

Example Directory Structure:

The example directory structure convention provided here was borrowed from the National Wildfire Coordinating Group (NWCG) SOPs. This structure will be accessible on the <<FOLDER LOCATION>> however; it is also suggested to maintain a copy on your desktop/laptop C:\ drive in the event that a network connection is not possible. The directory structure is set up with the data and time at the beginning of each folder and file to facilitate easy chronologic sorting.

Example Directory Structure

- <<Folder (for example, P:\EOCGIS)>>\BaseData - This folder contains base map data; data specific or derived from the event are NOT stored here.
 - DEMs - Digital Elevation Models
 - Logos – logos and data disclaimers
 - Raster – Hillshade, Eagle Aerial Imagery, Air Photo Imagery
 - Vector – Transportation, Admin Boundaries, Points of Interest, etc
- <<Folder>>\Tools This folder contains extensions, scripts, models, DMS-DD conversion macro/script, other software used during the incident
- <<Folder>>\Incidents\ - This is the top tier GIS Emergency Response directory:
 - YYYY_IncidentName – This is the top tier Folder for a unique event. 4-digit year and the name of the Unique Incident (e.g. 2003_CedarFire)
 - Date (YYYYMMDD) date/time stamped incident spatial data layers; one folder for each day of the incident
 - Incident Data – All data stored in this folder are data that are specific to the incident and include a date/time stamp – DATA SHOULD NOT BE PUBLISHED TO THE WEB UNTIL THE PRODUCT IS READY FOR USE/DISSEMINATION AND APPROVED BY THE INCIDENT COMMANDER. Consideration should be given to breaking ‘incident data’ into sub-groups 1) DEM, 2) Raster, and 3) Vector – as incident data could be collected in these forms.
 - Products – GIS analysis and map products produced for the event on that day
 - Workspace – Workspace for that day
 - External Maps – Daily maps produced outside the organization

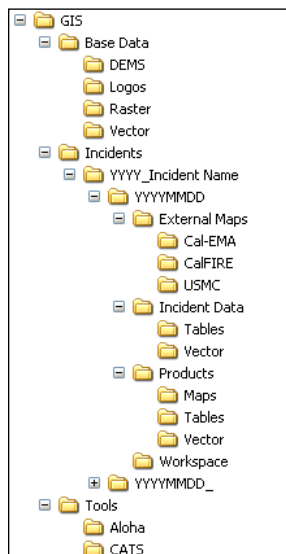


Figure 7- Example Directory Structure

NOTE: In addition to incident related maps and data, resources such as basemap data, GIS Map templates, layer files, scripts and other tools will be accessible on <<**FOLDER LOCATION**>>.

GIS FILE NAMING CONVENTION

All data files (*.shp, *.xls, *.dbf, etc.) must contain <<ENTER LOCAL REGULATIONS>>. Similarly, map document names (*.pdf, *.jpg, etc) must contain <<ENTER LOCAL REGULATIONS>>.

Example GIS File Naming Convention:

Provided below is a recommended GIS file naming convention that can be applied. Be sure to consider your local regulations when defining this component of your SOP or SOG.

Example GIS File Naming Convention

All data files (*.shp, *.xls, *.dbf, etc.) must contain date/time, incident agency responsible for creating a map and subject matter qualifiers. Similarly, map document names (*.pdf, *.jpg, etc.) must contain date/time, incident name, subject matter information as well as size (e.g. 11X17, ANSI B, Custom32X66, etc.) and orientation (i.e. portrait vs. landscape) of the map.

- Data file – `yyyymmdd_hhmm_IncidentName_Subjectmatter_Agency`.
- Map document - `yyyymmdd_hhmm_IncidentName_Subjectmatter_Agency_Size_Orientation.***`

For field collected data, also include a Source Code tag when naming the data file:

- GPS_Name = Global Positioning System_Collector's Name
- FOBS = Field Observer
- SITL = Situation Unit Leader

For data/maps that were provided by Local, State or Federal Agency tag with Agency's Acronym:

- CalFire (or relevant state agency)
- CDC
- Etc

NOTE: When adding non-standard tags ALWAYS notify GIS staff of their presence and meaning.

NOTE: It is the responsibility of each GIS responder to ALWAYS communicate the file naming convention that they are using to those with whom they are sharing the data.

Figure 8- Example GIS File Naming Convention

MAPPING PROTOCOLS

Background: It is recommended that map templates populated with base data and symbolized similar to local map products be compiled prior to an incident. Templates speed up the process of getting the maps out to the Emergency Management Team especially during the first response period. You may find that map templates and elements need to be changed based on the type of incident or as the incident expands and contracts.

The use of the US National Grid (USNG) should also be incorporated into your agency's SOGs and policies. Resources to support the implementation of USNG are available from the USNG Implementation Center (<http://mississippi.deltastate.edu/>) and from the FGDC (<http://www.fgdc.gov/usng>).

It is important to establish QA/QC procedures. Before a map is released from the GIS unit all map elements must be updated including scale bar, file location information, title, legend, and symbology. Special attention should be paid to time and date information. This information is critical when asked to reproduce a map or for after action reporting or for litigation purposes.

There is not a nationally adopted incident-level symbology set. This is a gap that DHS, FEMA, and NAPSG are currently working to address. There are however, standard symbol sets put forth by the Homeland Security Working Group (<http://www.fgdc.gov/HSWG/index.html>), National Fire Protection Association (<http://www.nfpa.org>), and the National Wildfire Coordinating Group (<http://www.nwcg.gov/>).

Agencies may want to establish standard and optional map products based on types of incidents that reoccur on a frequent basis in their region such as floods, hurricanes, or wildfires.

Not all Multi-Agency Coordination Centers are alike. Please be sure to modify the examples below to fit your Multi-Agency Coordination Center needs. Examples are for reference purposes only and are not intended to set a standard.

- ✓ **Purpose:** In order to maintain a uniform look and feel, to facilitate interpretability and ease of use, all GIS Staff will follow the guidelines listed below when creating map products in support of an emergency event.

MAP TEMPLATES

- Map Templates are available at: <<**FOLDER LOCATION OR HYPERLINK**>>
- Use the Templates available at this location to create all map products

Note: In a future version of this document, example map templates may be provided. Additional research is required to create the map templates for the most broadly relevant needs for Multi-Agency Coordination Centers. Additionally through the development of this guidance, NAPSG Foundation has identified a need for map templates for incident command, NIMS, and other key applications.

MAP ELEMENTS

Example Required Map Elements

- Title – Includes Incident Name, Map theme, Geographic Extent, time/date stamp of data
- Legend
- Scale Bar
- Logos and Data Disclaimers
 - Logo and data disclaimer to recognize data sources
 - Logo and data disclaimer to recognize County Group/Dept/Division
- File Location– provide the full path name for the network location of the map document; ex:
C:\GIS\Incidents\yyyy_IncidentName\YYYYMMDD\Products\yyyyymmdd_hhmm_IncidentName_Subjectmatter_Agency_Size_Orientation.mxd
- North Arrow
- Projection – Name of the projection, datum, and units
- Data Sources – who, what, where, when, why and how (source codes - refer to page 21 of <http://www.nwcg.gov/pms/pubs/GSTOP7.pdf> NWCG SOP)
- “Time Sensitive Data” Disclaimer Stamp – for all maps that are time sensitive
- “DRAFT” stamp – if map is a draft

PRODUCT FORMAT CONVENTIONS

- Share completed map products with <<enter agency/section>> in <<enter format>> format.
- Export maps with 100 dpi resolution to keep file size down, unless higher resolution is necessary to see detail (300 dpi is recommended for hard copy print maps). This eases data sharing and load on networks.

MAP DISTRIBUTION REGULATIONS

Example map distribution guidelines:

- GIS Staff is not at liberty to distribute maps or GIS incident data to media or public. This is the decision of incident command.
- Incident maps may be distributed to the Public if requested/instructed by <<enter position>>.

MAP SYMBOLOGY GUIDELINES

- Reference the most widely used symbol set by your jurisdiction.
- A symbol set specifically for Multi-Agency Coordination Centers has not yet been developed or socialized. NAPSG is currently working with DHS & FEMA to fill this gap.
- The FGDC offers some suggested symbology that may or may not support the needs of your agency. For these resources visit - <http://www.fgdc.gov/HSWG/index.html>.
- If you are an ArcGIS user, additional resources on how to use the FGDC symbology are available at - <http://resources.arcgis.com/content/kbase?fa=articleShow&d=29213>

QA/QC

- Strive for excellence on the first go. If a bad map or bad data are discovered, update the <<enter GIS position>> immediately. The GIS group (and all individuals referring to map/data) will be notified via <<Identify channels for communicating QC related issues>>, identify what exactly the flaw is, work to correct the map and redistribute immediately.
- Remove incorrect data or maps from locations such as published web applications as soon as possible, but do not delete the bad information from the disk drive. Instead, add a tag to the file name indicating that it is bad data and should not be used. A record of any bad data that was released may need to be accessed at some point during or after the event.

STANDARD MAP PRODUCT DEFINITIONS

The standard map product definitions section outlines the product objectives, target audience, data content and cartographic requirements for those map products. These map products communicate incident specific details as well as general environment and infrastructure information to support emergency management operations.

<<Enter standard map product definitions.>>

OPTIONAL MAP PRODUCT DEFINITIONS

The optional map product definitions section outlines the product objectives, target audience, data content and cartographic requirements for those map products that are *optional* for all State or Regional Multi-Agency Incidents. These map products provide supplementary and specialized information for use during the response and recovery phases of the incident. Other ad-hoc map products may also be requested to meet incident specific needs.

<<Enter optional map product definitions.>>

Note: *In a future version of this document, example map product definitions will be provided. Additional research is required to create a list of the most broadly relevant list of map product definitions. Additionally through the development of this guidance, NAPSG Foundation has identified a need for map product definitions for incident command, NIMS, and other key applications.*

DATA PROTOCOLS

Background: It is recommended that data formats, data and map transfer protocols, and back up policies be standardized prior to an incident. Things to consider are native data and file formats that emergency responders and other GIS responders will be accessing. For example, if a .dbf table is distributed out to the Emergency Management Team and they use Microsoft Excel to open the file they will receive a warning message, most responders will not go beyond the warning message to access the file. Another example is if a .pdf or .kml file is distributed to field personnel and they do not have Adobe Acrobat Reader or Google Earth on their mobile device the field personnel will not be able to open the file.

It is recommended that the all data be stored locally in the Multi-Agency Coordination Center or on a computer/ hard drive designated for EOC use. This is to accommodate loss of network/ internet connectivity. Storing data on a back-up DVD or thumb-drive may also be beneficial. The briefing cycles section is intended to give GIS responders direction for responsibilities and a timeframe for which products may need to be ready.

The damage assessment section is intended to give direction on how damage assessment data can be collected.

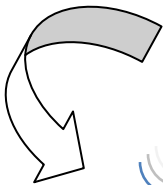
Not all Multi-Agency Coordination Centers are alike. Please be sure to modify the examples below to fit your Multi-Agency Coordination Center needs. Examples are for reference purposes only and are not intended to set a standard.

- ✓ **Purpose:** This chapter discusses data format conventions, data backup and data sharing policies.

DATA FORMAT CONVENTIONS

Example Data Format Conventions:

GIS staff should adhere to the following Data Format Conventions. Examples provided here serve only as examples and do not set standards for the use of any particular software.



Example Data Format Conventions

- *Acceptable Data Formats include - <<Example: .xls, .dbf, .shp, File Geodatabase, KML*
- *Post tables for GIS staff as .dbf for quick import into ArcGIS*
- *When working with Excel spreadsheets remember that cell values linked to calculations will not be translated between .xls and .dbf. If there are values of consequence that are linked to a calculation, create a new field for the data values and perform a paste special (Values only) before converting to .dbf. Make sure that there are no spaces in the header row and worksheet tabs.*
 - *Also note Microsoft 2007 does not support saving as a .dbf; however, ArcMap now intakes .xls and has always accepted .CSV files.*
- *Tables posted for consumption of use outside of GIS should be in an MS Excel (.xls) or (.xlsx) format to avoid software compatibility warnings when opening the file.*
- *Acceptable Map [Output] Formats include - <<Example: .jpg, .pdf, .mxd*
- *When exporting to .jpg or .pdf use a resolution of 100 dpi (for printing hard copies 300 dpi is the recommended resolution) unless higher resolution is necessary to see detail. This reduces file sizes to accommodate file sharing and network limitations.*
 - *Use Relative Paths Option when sharing .mxds with others - Select the Document Properties option from the File Menu, followed by the Data Sources button in the "Map Title" Properties dialog. Then select "Store relative path names to data sources" and "Make relative paths the default for new map documents I create."*

NOTE: When posting zip files, use same naming convention as associated data file (refer to above naming conventions).

Figure 9 – EXAMPLE DATA FORMAT CONVENTIONS

DATA BACKUP POLICY

To avoid duplication of effort and loss of work products GIS staff are to adhere to the following practices
<<ENTER DATA BACKUP POLICY>>

Example Data Backup Policy:

GIS staff should adhere to the following Data Format Conventions to avoid loss of data.

Figure 10-EXAMPLE DATA BACKUP POLICY

Example Data Backup Policy

- Perform and save all work in the Workspace directory under the incident (or on your C: Drive if the network is unavailable or sluggish)
- Create backup copies of the files you are working on, on a regular basis
 - At a specific time interval, it is recommended this be done every 2-4 hours
- Save/Backup work to USB memory stick or to portable, external hard drive
 - Tip: Purchase a portable, external hard drive with backup software.
 - IMPORTANT – *Legal action* is often associated with post disaster mitigation, relief, and funding. Saving all your work and keeping a time log or journal of events, people, and requests made is highly suggested.

Example - Direction for GIS Staff:

Between scheduled briefings Incident Management Teams - IMT (and field responders only if an IMT is not set-up) send data, in various formats, to EOC staff. GIS staff is responsible for compiling these data, conducting analyses and providing maps to help staff make decisions regarding susceptible vulnerable populations, facility closures, potential environmental health hazards, etc. GIS staff is also responsible for providing maps for the briefings. Example briefings maps illustrate the extent of damage or the evacuation areas.

BRIEFING CYCLES

During an emergency event, the <<EMERGENCY OPERATION CENTER (OR DOC/MOC/ETC)>> operates on a <<ENTER BRIEFING CYCLE TIMES, EX: 12 HOUR>> briefing cycle. Often <ENTER BRIEFING TIMES>>, EOC Officials and/or Elected Officials and/or staff brief the media/public. These briefings provide information as to the extent of the area and population affected as well as actions enlisted by the <<JURISDICTION OR ENTITY>> and other agencies to show the incident progression (if applicable) and reconcile the damage.

US NATIONAL GRID

The use of a standardized grid, such as the US National Grid (USNG) should also be incorporated into your agency's SOGs and policies. The USNG is a point reference system of grid references commonly used in United States. It provides a nationally consistent language of location in a user-friendly format. Utilization of the USNG will aid in interoperability between local, state, and federal agencies. Resources

to support the implementation of USNG are available from the USNG Implementation Center (<http://mississippi.deltastate.edu/>) and from the FGDC (<http://www.fgdc.gov/usng>).

DAMAGE ASSESSMENT

As outlined in Section 3.1 of the DHS GeoCONOPS,

Damage assessments are conducted by multiple entities in support of their mission specific information requirements. These efforts are time and labor intensive and often focus on long-term recovery missions as opposed to critical response operations. The immediate needs of the post-event response are assessed using reports from field observations, localized damage reports, imagery sources, models, and subject matter expertise.

One helpful resource when conducting damage assessments is the use of a common grid to divide up responders. Utilization of a common grid reference system, such as the USNG is recommended for damage assessments and should be included in your agency’s SOP.

Below is a table of the FEMA damage classifications listed in the DHS GeoCONOPS. These classifications are recommended for use by all agencies. This will streamline the collection and consolidation of local damage assessment efforts. It will also streamline the transfer of data to state and federal agencies.

FEMA Damage Classification

Damage Level		Observed Damages
General Damage Classifications		
LD	Limited Damage	Generally superficial damage to solid structures (e.g., loss of tiles or roof shingles); some mobile homes and light structures are damaged or displaced.
MD	Moderate Damage	Solid structures sustain exterior damage (e.g., missing roofs or roof segments); some mobile homes and light structures are destroyed, many are damaged or displaced.
ED	Extensive Damage	Some solid structures are destroyed; most sustain exterior and interior damage (roofs missing, interior walls exposed); most mobile homes and light structures are destroyed.
CD	Catastrophic Damage	Most solid and all light or mobile home structures destroyed.

Wildfire Damage Classifications

B	Burned	Areas observed that have already burned.
LD	Limited Damage	Few structures are burned/destroyed.
ED	Extensive Damage	Some structures are completely burned/destroyed and sustained observable exterior damage.
CD	Catastrophic Damage	Most structures are completely burned/destroyed.

Figure 11 – EXAMPLE FEMA DAMAGE CLASSIFICATION, per the DHS GeoCONOPS.

DATA ACQUISITION AND DISSEMINATION

Background: This section is intended to familiarize GIS Responders with the types of data that may be requested of them, data they may need to acquire, data they may need to create, and how that data is transferred. This section also provides GIS responders with federal geospatial products and programs available to them. GIS Responders may want to refer to and become familiar with the DHS GeoCONOPS. The DHS GeoCONOPS lists various datasets and essential elements of information required to support federal geospatial activities.

The Public Data Sharing/ Exchange Policy section establishes the rules for the sharing of data and policy for release to the news media and for public release. It is important to note that GIS responders are not allowed to release incident information to anyone outside the incident without following the policies identified within the jurisdiction.

The Minimum Essential Datasets section provides an example of datasets that GIS responders may want to have at their disposal prior to an incident. GIS responders may also want to refer to and become familiar with the DHS GeoCONOPS and its Appendices. The DHS GeoCONOPS lists essential elements of information and relevant datasets used to support federal geospatial activities. It may not be necessary to include the list in the local document, but it is recommended that a list is available in case GIS assistance is provided by individuals or entities that are not familiar with the local data. It is also a good idea to have this data available on an Emergency DVD/CD or hard drive that can be shared with other responding agencies or to easily reload data in case of hardware failure.

Data connection information is important to include in case automatic data connections fail. Data connection protocols are not easily remembered when hurried or tired.

Not all Multi-Agency Coordination Centers are alike. Please be sure to modify the examples below to fit your Multi-Agency Coordination Center needs. Examples are for reference purposes only and are not intended to set a standard.

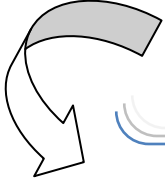
- ✓ **Purpose:** This chapter provides GIS staff with an understanding of the media briefing cycles, incident data, and damage assessment protocols.

MINIMUM ESSENTIAL DATASETS

The recommended datasets list details GIS datasets that are optional in support of the mapping functions outlined in these standards. The DHS GeoCONOPS provides additional detail on essential elements of information supporting federal emergency management operations. The relevant datasets are listed in Appendix B of the DHS GeoCONOPS.

There are many ways for local jurisdictions to obtain geospatial data. It is recommended that Multi-Agency Coordination Centers leverage existing data warehouse, from local jurisdictions and state agencies, to locate needed data. Contact your states' geographic information council to find out what

state or regional data warehouses or portals are available or contact your State GIS Coordinator. For a listing of State GIS Coordinators visit, http://gisinventory.net/summaries/state_reps/State-Reps-05.05.2011.pdf?PHPSESSID=dce35f9a7bc71ce1e890e6830548afd.



Example Minimum Essential Datasets: The recommended datasets list details GIS datasets that are optional in support of the mapping functions outlined in these standards. The DHS GeoCONOPS provides additional detail on essential elements of information supporting federal emergency management operations. The relevant datasets are listed in Appendix B of the DHS GeoCONOPS.

Example Minimum Essential Datasets

Transportation

- ✓ Purpose: Identify access routes to the incident, evacuation routes, and other related transportation reference points. Support routing of public vehicles (evacuation/avoidance).
 - Streets (name, hierarchy – primary vs. interstate)
 - Private roads
 - Traffic control points
 - Access control points
 - Road construction
 - Transportation resources - buses, school buses (with wheelchair access), ambulances
 - Navigable waterways
 - Mass transit
 - Railways
 - Airports
 - Helicopter landing zones

Population

- ✓ Purpose: Identify impacted and at-risk populations.
 - Daytime population
 - At need populations (schools, daycares, public meeting places, seniors homes, universities etc)

Buildings

- ✓ Purpose: Identify affected facilities or facilities in use for the incident.
 - Potential shelter sites (large buildings – schools, convention centers etc)
 - Primary and secondary mass care centers from existing EOC plan
 - Critical Infrastructure
 - Building footprints
 - Ice arenas (temporary morgues)

Example Datasets Continued:

Utilities

- ✓ Purpose: Identify infrastructure that could be damaged. Identify infrastructure that could be hazardous. Provide guidance for access by first responders.
 - Utility pipelines
 - Power lines (underground and overhead)
 - Propane farms
 - Sanitary Sewers
 - Water Treatment Plants
 - Storm water facilities - catch basins, storm sewers, outfalls
 - Wet Hydrants
 - Dry/draft hydrants
 - Potable water mains
 - Extremely Hazardous Sites and Hazardous Sites (SARAH Title 3 sites)
 - Public Service facilities (public works, water treatment, waste water treatment, electric plants)

Communications

- ✓ Purpose: Identify potential communication outages due to the incident.
 - Cell towers
 - Radio communication
 - Siren locations, sound buffers
 - Main internet hubs/lines

Land Ownership/Administrative

- ✓ Purpose: Identify land ownership. This data may be managed by the tax assessors office.
 - Address points
 - Parcel boundaries with CAMA data
 - Jurisdictions

Environment

- ✓ Purpose: Identify physical environment conditions that may influence hazard behavior or response.
 - Topography
 - Water courses
 - Lakes
 - Rivers
 - DEM
 - Fuel models
 - Historical fire incidents
 - FEMA flood zones

<i>Example datasets continued</i>	
Imagery	<ul style="list-style-type: none"> • Aerial imagery with Date • Oblique aerial imagery (i.e., Pictometry)
Grid Reference System	<ul style="list-style-type: none"> • United States National Grid (USNG)
Dynamic Datasets	<ul style="list-style-type: none"> ✓ <u>Purpose:</u> Gain perspective on incident within context of current conditions <ul style="list-style-type: none"> • Atmospheric conditions (wind direction, etc) • Traffic counts/traffic flow • Incident Datasets
Incident Specific	<ul style="list-style-type: none"> ✓ <u>Purpose:</u> Visualize location and extent of incident <ul style="list-style-type: none"> • Location and extent of tactical area or incident boundaries (point, line, or polygon) • Plume (fire, chemical, etc) • Shake Map (USGS)
Incident Command	<ul style="list-style-type: none"> ✓ <u>Purpose:</u> Identify incident operations sites and zones <ul style="list-style-type: none"> • Incident command post • Staging areas • Hot/warm/cold zones • Shelter sites • Decontamination site • Evacuation zone • Police/fire stations • Hospitals/emergent care • Heliports

Figure 12 – EXAMPLE MINIMUM ESSENTIAL DATASETS

National & Federal Geospatial Products and Programs

There are many Federal geospatial data and tools resources available to local agencies. This list is not inclusive of all programs, but will provide a broad overview of products available to local agencies.

HIFLD

The Homeland Infrastructure Foundation-Level Data (HIFLD) working group was established to address desired improvements in collection, processing, sharing, and protection of homeland infrastructure geospatial information across multiple levels of government and to develop a common foundation of homeland infrastructure data to be used for visualization and analysis on all classification domains. For more information on federal geospatial products and programs please visit HIFLD Working Group website at <http://www.hifldwg.org/>.

HSIN

Public Safety Responders may also want to obtain a Homeland Security Information Network (HSIN) GIS Portal credential. HSIN is a national secure and trusted web-based portal for information sharing and collaboration between federal, states, local, tribal, territorial, private sector, and international partners engaged in the homeland security mission. More information on HSIN can be found on the DHS website, http://www.dhs.gov/files/programs/gc_1156888108137.shtm. HSIN credentials can be requested by emailing hsin.helpdesk@dhs.gov or calling (866) 430-0162.

The HSIN GIS portal is located at <https://government.hsin.gov/sites/gis> and also contains a link to download HSIP Freedom data. Your HSIN GIS credential can also be used to view HSIP Gold data in OneView and DHS Earth.

Within HSIN, the main Geospatial Information Infrastructure (GII) website is located at <https://gii.dhs.gov> where you can access GII web services, the OneView map, and download the DHS Earth kml file for use in Google Earth. More information on the DHS OneView can be found in Appendix E of the DHS GeoCONOPS.

According to the DHS GeoCONOPS, the formal location for federal posting and accessing geospatial data is through the Homeland Security Information Network (HSIN) and DHS Geospatial Information Infrastructure tools (GII) such as OneView.

HSIP Freedom and Gold

HSIP Freedom data is a subset of the HSIP Gold datasets developed and compiled by NGA over the past few years. Approximately 190 datasets were identified from HSIP Gold as license free and distributable to state and local Homeland Security/Homeland Defense mission areas. HSIP Freedom can be shared and distributed among state and local government agencies and is being made available through the HSIN GIS Community of Interest (COI). HSIP Gold can be requested after a federal disaster declaration through HIFLD.

HSIP-NAVTEQ State Release

The commercial street & transportation data from HSIP Gold is also available separately upon special request by eligible state agencies. This data set is the only commercial dataset found in HSIP Gold that is available to States without a presidentially declared disaster. This data release includes street data, points of interest data, and route analysis information as generated by NAVTEQ. It includes the navigation features for routing and route analysis that are particularly valuable in public safety GIS. At this time this data product is only available on special request via HIFLD and only to eligible state agencies. For more information about the HSIP-NAVTEQ State Release visit HIFLD Working Group website at <http://www.hifldwg.org/>.

NSGIC GIS Inventory

The GIS Inventory is managed by the National States Geographic Information Council (NSGIC) as a tool for states and their partners. Its primary purpose is to track data availability and the status of geographic information system (GIS) implementation in state and local governments to aid the planning and building of Spatial Data Infrastructures. It can be used by public safety agencies, mutual aid groups,

EOCs, and MACCs as a “yellow pages” directory for GIS information and also as a tool to share links to data & web mapping services to support public safety at the local and state levels. More information can be found at <http://gisinventory.net/>.

US National Grid (USNG)

The USNG is a point reference system of grid references commonly used in United States. It provides a nationally consistent language of location in a user-friendly format. Utilization of the USNG will aid in interoperability between local, state, and federal agencies. Resources to support the implementation of USNG are available from the USNG Implementation Center (<http://mississippi.deltastate.edu/>) and from the FGDC (<http://www.fgdc.gov/usng>).

Geospatial Platform

The Geospatial Platform is envisioned as a managed portfolio of common geospatial data, services and applications contributed and administered by authoritative sources and hosted on a shared infrastructure. More information can be found at <http://www.geoplatform.gov>

INCIDENT DATA

Typical types of incident data include: Road Closures, Detours, Shelters, Evacuation Areas, or Incident Perimeters. Incident data comes from a number of sources: GPS data, field ICP, remotely sensed imagery, emergency or mass notification system, word of mouth, scratch paper, etc. There is an element of latency inherent in the distribution of GIS data, for a number of reasons:

- Data need to be transferred from the field.
- Data are often converted into or created from scratch in a GIS friendly format before validation.
- Data must be approved for release by the data owner and/or the Emergency Management Team.
- Ability to commission reconnaissance flights/aerial surveys.
- Data analysis and computation time.
- Quality control of the data inputs and outputs

All incident data should be quality controlled. If a multi-agency coordination center makes changes and updates to data that originated in the field, the field teams should be given the opportunity to quality control as well. One efficient way of doing this is through the use of visualization tools. Visualization tools can easily allow GIS Responders in one location to view the GIS products of other responders in a separate location, and quickly accept or reject any data changes.

COMMUNICATION

Communication with other local Multi-Agency Coordination Centers, State Operations Centers, and Federal Operations Centers can also be an invaluable resource during emergency activations. These connections can lead to data being more easily transferred. It is recommended that Multi-Agency Coordination Centers identify contacts within their emergency management network. One example of where to look for these contacts is through state GIS User Groups or the HIFLD working group.

DATA DISSEMINATION

According to the DHS GeoCONOPS, the formal location for federal posting and accessing geospatial data is through the Homeland Security Information Network (HSIN) and DHS Geospatial Information Infrastructure tools (GII) such as OneView. However each local agency will have different data dissemination protocols. Section 2.2.3 of the DHS GeoCONOPS gives an overview of recommended ways to share data:

Vector data products are fairly compact in individual file size, facilitating data sharing through web services, e-mail, and web postings. With agile delivery options, emergency managers have access to these data products in a timely manner to assist in their decision making. Larger data files such as imagery or national datasets are more difficult to manage. Frequently these data types are shared through the physical transfer of external hard drives and other portable media.

For dynamic data exchanges, DHS supports the National Information Exchange Model (NIEM) and Open Geospatial Consortium (OGC) standards to facilitate data dissemination and information exchange. NIEM represents a collaborative partnership of agencies and organizations across all levels of government (federal, state, tribal, and local) and with private industry. The purpose of NIEM is to effectively and efficiently share critical information at key decision points throughout the whole of the [justice](#), [public safety](#), [emergency and disaster management](#), [intelligence](#), and [homeland security](#) enterprise. NIEM is designed to develop, disseminate, and support enterprise-wide information exchange standards and processes that will enable [jurisdictions](#) to automate information sharing. NIEM includes twelve domains. NIEM emergency management domain data elements and attributes were derived from existing messaging standards promulgated by the Emergency Data Exchange Language (EDXL) initiative, including the Common Alert Protocol (CAP v1.1), Distribution Element (DE), and Hospital Availability Exchange (HAVE), EDXL functions as a stand-alone suite of messaging standards. NIEM leverages EDXL concepts and methods. Open Geospatial Consortium (OGC) is an international industry consortium of government agencies and organizations, universities, and the private sector that develops publicly available interface standards that are geo-enabled and interoperable.

Data Dissemination Protocols

Data dissemination is a vital part of incident response. A detailed work plan of designated paths by which data can be transferred from ICT in the field to Multi-Agency Coordination Centers to State Operations Centers to Federal Operations Centers should be outlined if possible.

Note: Additional research is required to outline data dissemination protocols. Through the development of this guidance, NAPSG Foundation has identified a need for geospatial data dissemination protocols for incident command, NIMS, and other key applications – which still need to be researched & developed.

Information Dissemination Protocols

Local agencies should research visualization platforms as well as data transfer protocols as a way of sharing information. Location information can be easily shared via visualization tools and provide decision makers with needed information to effectively manage disasters.

DATA CONNECTIONS

Example Data Connections

Example: <<Server name>>

Personal/File GDB, Shapefiles, Coverages: <<Folder location>>

CD/DVD: <<CD/DVD name>>

ENTERPRISE DATABASE

Example Enterprise Database

<<Provide process and connection properties for SDE databases.>>

Open GIS File Management Program

- *Double Click Database Connections*
- *Select Add Spatial Database Connection*
- *Enter connection information:*
 - *Server: <server>*
 - *Service: <service>*
 - *Database: <database>*
 - *Username: <username>*

Password: <password>

GIS EMERGENCY DVD

<<IF APPLICABLE, DESCRIBE THE DATASETS AND OTHER CONTENT PROVIDED ON CD/DVD. INCLUDE INFORMATION ON HOW THE CD/DVD IS PRODUCED AND DISTRIBUTED AND IDENTIFY ANY USAGE RESTRICTIONS. IDENTIFY THE PHYSICAL LOCATION OF THE MEDIA>>

PUBLIC DATA SHARING/EXCHANGE POLICY

Web Applications

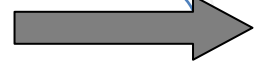
<<DESCRIBE WEB APPLICATIONS AND SYSTEMS. PROVIDE GUIDANCE AND OUTLINE THE PROCESSES FOR SHARING DATA AND MAP PRODUCTS. ATTACHMENTS MAY BE INCLUDED TO PROVIDE STEP BY STEP INSTRUCTIONS FOR WORKING WITH THESE SYSTEMS.>>

GIS Press Package (optional)

<<IF DATA WILL ALSO BE SHARED WITH THE PUBLIC OUTLINE POLICIES AND PROCEDURES FOR DATA RELEASE OR REFERENCE EXISTING POLICIES. >>

Example GIS Press Package Policy:

GIS Staff is not at liberty to distribute maps or GIS incident data to media or public. This is the decision of <<insert title>>. Data must be vetted by <<insert title>>. If there is any concern over the release of the data, <<insert title>> will contact the Data Owner to ensure the release is appropriate. Final sign-off then comes from <<insert title>>, bringing the info first to the Info/Intel Section Chief (See Figure 3 – OES/NIMS Org chart) for sign-off and then finally the EOC director. No release may be made before this final sign-off is made. GIS staff should adhere to the following GIS Press Package Policy when sharing data with the media.



Example GIS Press Package Policy

To further ensure the security and/or confidentiality of all incident related data:

- Do not share files through web applications unless the data are complete, ready-for-use, and where applicable you have been given the proper authority.
- When sharing GIS files, ALWAYS attach a projection file. Projection files are REQUIRED to be posted with all GIS data file formats. Projection to be used should be determined before emergency situation.
- When using web applications to share files, use the meta_tag to alert GIS users as to status of the data/map/etc (i.e. FACT, DRAFT, etc.)
- Clear data and map transfer with your Operation Center Manager or Director, as needed, when sharing data and map products between EOC, DOC and/or MOC GIS Staff and/or through web applications.
- The Public Information Officer is responsible for sharing ALL data and/or maps with the media.
- Public Access to <<jurisdiction>> GIS Data During a Disaster
- When the need to distribute certain types of GIS information is first apparent, certain assurances must be made. In order for a data layer to be made available publicly in a GIS press package, it must meet the following eight criteria. The questions must be applied individually to each data set that is to be included in the GIS press package. A “No” answer on any of the following questions should prohibit the release of the specific data layer in the press package.
 1. Is the Incident the source of the information (the data is not base data)?
 2. Data is essential in the press package; otherwise the press package will not make sense?
 3. Has the data has been cleared to be in the press package by its authors?
 4. Has the data been cleared to be released by the incident PIO in this briefing cycle (if any doubt see question 3)?
 5. Has the data been checked for quality and consistency?
 6. Is the data or subject matter releasable and not described on the Release Constrained Data layer list?
 7. Is the data still current with recent events?
 8. Does the data have metadata (see standard in definition)?

Additionally, if the data passes the above questions with a “Yes” answer to all of them, the data must be summarily vetted.

Figure 13 – EXAMPLE GIS PRESS PACKAGE

DOCUMENTATION AND METADATA

Background: It is recommended that metadata be provided on all GIS data leaving the Multi-Agency Coordination Center, especially any data to be released to the public. Due to the proliferation of geospatial data during an incident from other agencies, news organizations, and social network crowd sourced information it is very important to attach a minimum set of metadata on data released to the public to distinguish the data as authoritative. Due to the time needed to complete FGDC (Federal Geographic Data Committee) compliant metadata, the file naming convention may serve as a good fit for data maintaining residency in the Multi-Agency Coordination Center during extremely busy periods of time.

Not all Multi-Agency Coordination Centers are alike. Please be sure to modify the examples below to fit your Multi-Agency Coordination Center needs. Examples are for reference purposes only and are not intended to set a standard.

- ✓ **Purpose:** This chapter provides guidance for the creation of metadata for all incident data and modified base data.

DISSEMINATION OF METADATA

Metadata should be created/updated in GIS File Management System in compliance with the FGDC (Federal Geographic Data Committee). <<**REFERENCE ANY MATERIALS/POLICIES THAT OUTLINE METADATA GUIDELINES**>>.

The metadata file can be exported in HTML, SGML or .txt format and should be named in the same convention as the data to which it refers (date/time stamp, incident name, etc

APPENDIX 1: EXAMPLE GIS ROLES AND RESPONSIBILITIES

The example roles for standard operation are based upon a white paper written by a Seattle Emergency Management Unit describing how to “Get the Most Out of GIS in an Emergency Operations Center”ⁱⁱ and the DHS GeoCONOPS. There are 8 roles and they are designed to work in conjunction with or in direct support of the EOC or Operation center. The role titles have been merged with the roles laid out in the DHS GeoCONOPS. Please update the role titles and number of roles to match what fits best in your jurisdiction. Provided in parenthesis are the titles from the DHS GeoCONOPS.

The Unit/Branch is responsible for collecting, analyzing, and disseminating information across all Emergency Support Functions. The focus of the team will be to develop an integrated common operational picture of an emergency event. It will review information coming from the field, departmental control centers and EOC personnel to quality control the data, identify gaps, and develop intelligence products for staff.

The structure is modular. In a small event, one person could fill more than one role and in a big event several people could staff the same role. Staffing is accomplished by tapping staff who are not currently assigned emergency roles under current response plans.

Most of the branch/unit’s products will be built around geospatial information. These include situation maps, an incident action plan, and briefing maps. However, being a team approach, the GIS Specialist will be called upon to support other team members as needed.

These roles are:

- 1. GIS Branch Coordinator (Team Leader)**
- 2. GIS Unit Leader (Deputy Team Leader)**
- 3. GIS Specialist**
- 4. Field Analyst/Observer**
- 5. Communications Specialist**
- 6. Geospatial Analyst (GIS Analyst)**
- 7. Policy Analyst**
- 8. Technical Liaisons**

GIS ROLE TABLES

In the GIS Role tables to follow, each GIS Role is thoroughly defined as are the skills required in order for an individual to qualify to fill each GIS Role in the manner required to adequately support the county in an emergency event. An individual’s ability to assume each GIS role is determined by the frequency with which that individual conducts certain GIS or GIS-related activities within their daily work routine. These

values are idealized and do not need to be exactly duplicated or represented in the person filling the role. The specific duties and tasks where specific GIS software is referenced should be updated to reflect the software used by your individual agency. The role charts provided here serve only as examples and do not set standards for the use of any particular software.

ROLE: GIS BRANCH COORDINATOR (Team Leader)

Because an incident will often involve multiple jurisdictions, agencies, and departments that require communication of GIS coordination activities and staff levels and resources, a Team Leader will be required as an umbrella communicator/coordinator. This role is designed to insure that the required GIS staff are available and informed of their duties to the Operation Centers. This role is often a member of the jurisdiction's upper management with direct contact with the jurisdiction's leadership. The role may serve as a liaison to other jurisdictions and can coordinate the GIS assistance of staff and GIS resources to other jurisdictions if requested by the respective emergency management or emergency services department. The defining characteristic of this role is providing the staff, training, resources, GIS logistical support (software, servers, field equipment, etc.) to the other roles.

One of the most important duties performed by this position is preparing the jurisdiction for emergency response by developing staffing, ensuring personnel are adequately trained and equipped and by developing standard operational plans in coordination with the Operation Center GIS Coordinators. This role may also work in conjunction with the surrounding jurisdictions GIS emergency response units.

Main responsibilities include:

- Responsible for the coordination of geospatial information system (GIS) production, RS, and geospatial database efforts.
- Conducts briefings, attends meetings, and directs overall geospatial support operations.
- Interfaces with federal, state, and local authorities establishing MOUs, partnerships, and data sharing agreements.
- Proactively seeks opportunities to integrate geospatial products into executive decision making.

SKILL	DUTY/TASK	FREQUENCY
Administering and Operating GIS Applications	Use geospatial software (i.e. ArcINFO 10 or other) to identify, evaluate, and input spatial data	Rarely (every 6 mos.)
	Use geospatial software to query data	Rarely (every 6 mos.)
	Convert or import digital data using digitizers, scanners or GPS.	Rarely (every 6 mos.)
	Analyze vector data sets with Geoprocessing	Rarely (every 6 mos.)
	Project spatial data	Rarely (every 6 mos.)
GIS Product Development	Create FDGC Metadata	Rarely (every 6 mos.)
	Collect field location data via GPS	Rarely (every 6 mos.)
	Edit GIS data	Rarely (every 6 mos.)
	Convert data (i.e., geodatabase, shapefiles, coverage, DWG,...etc)	Rarely (every 6 mos.)
	Generate statistics	Rarely (every 6 mos.)

	Geocode data	Rarely (every 6 mos.)
	Perform image analysis	Rarely (every 6 mos.)
	Map and Create new GIS data	Rarely (every 6 mos.)
	Maintain existing GIS data (QA/QC)	Rarely (every 6 mos.)
GIS Services to End Users	Creating maps	Occasionally (every month)
	Create reports based upon GIS Analysis	Often (weekly)
	Create charts	Rarely (every 6 mos.)
	Create tables	Rarely (every 6 mos.)
	Interpret analysis for client	Often (weekly)
	Determining design format of GIS data layers or database used with GIS layers	Often (weekly)
	Directly working with clients to meet their GIS need or further their understanding of GIS	Often (weekly)

<p>ROLE: GIS UNIT LEADER (Deputy Team Leader)</p> <p>This role is designed to manage and maintain the GIS operations during the incident. This role assigns GIS work at the Operation Center and receives the requests for their Operation Center. Additionally, they perform QA/QC on the products that are produced in their Operation Center and ensure the work is finished by given deadlines. This role is required to post their information/data findings to web applications and to coordinate and communicate with the Incident GIS Coordination/Logistics Support Role.</p> <p>Main responsibilities include:</p> <ul style="list-style-type: none"> • Reports to the Geospatial Team Leader. • Responsible for maintaining the coordinated efforts of the geospatial team. • During times of absence of the Team Leader, becomes the representative of the Team. 		
SKILL	DUTY/TASK	FREQUENCY
Administering and Operating GIS Applications	Use geospatial software (i.e. ArcINFO 10 or other) to identify, evaluate, and input spatial data	Occasionally (every month)
	Use of geospatial software to query data	Occasionally (every month)
	Convert or import digital data using digitizers, scanners or GPS.	Rarely (every 6 mos.)
	Analyze raster data sets with Spatial Analyst/Grid or Imagine	Occasionally (every month)
	Analyze vector data sets with Geoprocessing	Occasionally (every month)
	Project spatial data	Occasionally (every month)
GIS Product Development	Create FDGC Metadata	Occasionally (every month)
	Collect field location data via GPS	Rarely (every 6 mos.)
	Edit GIS data	Occasionally (every month)

	Convert data (i.e., geodatabase, shapefiles, coverage, DWG,...etc)	Rarely (every 6 mos.)
	Generate statistics	Occasionally (every month)
	Geocode data	Rarely (every 6 mos.)
	Perform image analysis	Rarely (every 6 mos.)
	Map and Create new GIS data	Occasionally (every month)
	Maintain existing GIS data (QA/QC)	Occasionally (every month)
GIS Services to End Users	Creating maps	Often (weekly)
	Create reports based upon GIS Analysis	Often (weekly)
	Create charts	Often (weekly)
	Create tables	Often (weekly)
	Interpret analysis for client	Often (weekly)
	Determining design format of GIS data layers or database used with GIS layers	Often (weekly)
	Directly working with clients to meet their GIS need or further their understanding of GIS	Often (weekly)

ROLE: GIS SPECIALIST

The most important function of the Geospatial Production Manager will be integrating the vast amount of data that a large event will generate. While most of the roles here do not directly address GIS coordination with agencies outside the Operation Centers (with the exception of the EOC GIS Coordinator and Incident GIS Coordinator), they are organized to facilitate the integration of data into an operation center in the context that it will be disseminated to others (one of the primary purposes of an EOC). The Geospatial Production Manager role will supervise the creation of map products that neatly summarizes the most important points of an emergency response on a small sheet of paper. The position will also perform ad hoc analysis at the request of the Team Leader. Part of the analytical function will be to perform analysis that verifies data. This specialist will also assist Emergency Public Information Officers produce spatial information for public consumption. The defining characteristic of this role is the ability to *quickly make maps and perform simple analyses* for the operation center coordinator.

Main responsibilities include:

- Reports to the Team Leader.
- Coordinates GIS requirements and supervises assigned Geospatial Analysts.
- Prioritizes GIS production and activities.
- Works with product requesters to properly define requirements and ensures the timely preparation and delivery of recurring and ad hoc GIS products.

SKILL	DUTY/TASK	FREQUENCY
Administering and Operating GIS	Use geospatial software (i.e. ArcINFO 10 or other) to identify, evaluate, and input spatial data	Often (weekly)
	Use of geospatial software to query data	Occasionally (every month)

Applications	Convert or import digital data using digitizers, scanners or GPS.	Occasionally (every month)
	Analyze raster data sets with Spatial Analyst/Grid or Imagine	Occasionally (every month)
	Analyze vector data sets with Geoprocessing	Occasionally (every month)
	Project spatial data	Occasionally (every month)
GIS Product Development	Create FDGC Metadata	Occasionally (every month)
	Collect field location data via GPS	Occasionally (every month)
	Edit GIS data	Occasionally (every month)
	Convert data (i.e., geodatabase, shapefiles, coverage, DWG,...etc)	Often (weekly)
	Generate statistics	Often (weekly)
	Geocode data	Rarely (every 6 mos.)
	Perform image analysis	Rarely (every 6 mos.)
	Map and Create new GIS data	Often (weekly)
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GIS Services to End Users	Creating maps	Often (weekly)
	Create reports based upon GIS Analysis	Occasionally (every month)
	Create charts	Often (weekly)
	Create tables	Often (weekly)
	Interpret analysis for client	Often (weekly)
	Determining design format of GIS data layers or database used with GIS layers	Rarely (every 6 mos.)
	Directly working with clients to meet their GIS need or further their understanding of GIS	Rarely (every 6 mos.)

ROLE: FIELD ANALYST / OBSERVER

This role acts as the eyes of the operation centers and GIS specialist in the field. It provides a way for operation centers to directly access an incident site. One of its most important duties is collecting GPS data and relay it back to the GIS specialist. This position verifies information for the GIS specialist. Specifically, this individual is required to collect and report spatial information from the field in the forms of maps, data, or positions relay via phone or radio. Their primary task or job often is not related to emergency response, but they are required to perform this task during a disaster. They are skilled in GPS collection and are familiar with the difficulties of working in remote locations in rapidly changing environment. This role must be able to be detached to a state or federal agency if called to this duty. This role is the primary forward observer for spatial information for command centers.

SKILL	DUTY/TASK	FREQUENCY
Administering and Operating GIS	Use geospatial software (i.e. ArcINFO 10 or other) to identify, evaluate, and input spatial data	Occasionally (every month)
	Use geospatial software to query data	Occasionally (every month)

Applications	Convert or import digital data using digitizers, scanners or GPS.	Often (weekly)
	Analyze raster data sets with Spatial Analyst/Grid or Imagine	Rarely (every 6 mos.)
	Analyze vector data sets with Geoprocessing	Occasionally (every month)
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	Convert data (i.e., geodatabase, shapefiles, coverage, DWG,...etc)	Often (weekly)
	Generate statistics	Rarely (every 6 mos.)
	Geocode data	Often (weekly)
	Perform image analysis	Never (never)
	Map and Create new GIS data	Often (weekly)
Maintain existing GIS data (QA/QC)	Rarely (every 6 mos.)	
GIS Services to End Users	Creating maps	Often (weekly)
	Create reports based upon GIS Analysis	Occasionally (every month)
	Create charts	Occasionally (every month)
	Create tables	Occasionally (every month)
	Interpret analysis for client	Occasionally (every month)
	Determining design format of GIS data layers or database used with GIS layers	Never (never)
	Directly working with clients to meet their GIS need or further their understanding of GIS	Never (never)

ROLE: COMMUNICATIONS SPECIALIST

This role acts as the ears of the Unit by monitoring radio and TV communications. For the GIS analyst, it is an information source. It will often be the first to pick up new, raw information. The person filling this role will be able to provide frequent updates to the Geospatial Production Manager and assist with vetting information. This role will also be cross-trained to perform the simple tasks outlined in the GIS Specialist role. In a fast moving event, the Communications Specialist would directly update a map document set up by the Geospatial Production Manager.

SKILL	DUTY/TASK	FREQUENCY
Administering and Operating GIS	Use geospatial software (i.e. ArcINFO 10 or other) to identify, evaluate, and input spatial data	Occasionally (every month)
	Use geospatial software to query data	Occasionally (every month)

Applications	Convert or import digital data using digitizers, scanners or GPS.	Rarely (every 6 mos.)
	Analyze raster data sets with Spatial Analyst/Grid or Imagine	Never (never)
	Analyze vector data sets with Geoprocessing	Rarely (every 6 mos.)
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	Perform image analysis	Never (never)
	Map and Create new GIS data	Occasionally (every month)
	Maintain existing GIS data (QA/QC)	Rarely (every 6 mos.)
GIS Services to End Users	Creating maps	Occasionally (every month)
	Create reports based upon GIS Analysis	Rarely (every 6 mos.)
	Create charts	Occasionally (every month)
	Create tables	Occasionally (every month)
	Interpret analysis for client	Rarely (every 6 mos.)
	Determining design format of GIS data layers or database used with GIS layers	Never (never)
	Directly working with clients to meet their GIS need or further their understanding of GIS	Rarely (every 6 mos.)

ROLE: GEOSPATIAL ANALYST		
<p>This position can perform research, database queries and statistical analysis for the Geospatial Production Manager. Frequently during emergencies, data comes into the EOC in less than pristine condition. The analyst will massage the data into a usable format. Having a database expert on site will free up the GIS specialist to concentrate on simple GIS analysis and map production.</p> <p>Main responsibilities include:</p> <ul style="list-style-type: none"> • Reports to the Geospatial Production Manager. • Prepares recurring and ad hoc GIS products. • Compiles various types of geospatial information into map and data products. • Analyzes geospatial data from various sources to answer diverse questions and • populate geospatial products. 		
SKILL	DUTY/TASK	FREQUENCY
Administering and Operating	Use geospatial software (i.e. ArcINFO 10 or other) to identify, evaluate, and input spatial data.	Often (weekly)

GIS Application	Use geospatial software to query data.	Often (weekly)
	Convert or import digital data using digitizers, scanners or GPS.	Often (weekly)
	Analyze raster data sets with Spatial Analyst/Grid or Imagine	Often (weekly)
	Analyze vector data sets with Geoprocessing	Often (weekly)
	Project spatial data	Often (weekly)
GIS Product Development	Create FDGC Metadata	Often (weekly)
	Collect field location data via GPS	Often (weekly)
	Edit GIS data	Often (weekly)
	Convert data (i.e., geodatabase, shapefiles, coverage, DWG,...etc)	Often (weekly)
	Generate statistics	Often (weekly)
	Geocode data	Often (weekly)
	Perform image analysis	Often (weekly)
	Map and Create new GIS data	Often (weekly)
	Maintain existing GIS data (QA/QC)	Often (weekly)
GIS Services to End Users	Creating maps	Often (weekly)
	Create reports based upon GIS Analysis	Often (weekly)
	Create charts	Often (weekly)
	Create tables	Often (weekly)
	Interpret analysis for client	Often (weekly)
	Determining design format of GIS data layers or database used with GIS layers	Often (weekly)
	Directly working with clients to meet their GIS need or further their understanding of GIS	Occasionally (every month)

ROLE: POLICY ANALYST

This position provides administrative support to the team and produces the text that accompanies maps and other analysis if they require special explanation or detail. They help ensure that GIS maps communicate with a lay audience and integrate with non-geographic material. Although they are not technically part of the unit's GIS structure they play an important role of minimizing miscommunication to the public and other non-technical agency representatives.

Main responsibilities include:

- Reports to the Team Leader.
- Provides administrative support to the Team Leader and the Team in general.
- Manages reception area.
- Greets customers and assists them in filling out request forms.

SKILL	DUTY/TASK	FREQUENCY
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This role requires no specialized GIS skills, only a general understanding of what the technology is and what it does, and how has conducted the work or sources of information. This role is very important in that it should act as a reality check QA/QC in asking about the quality or source of information or claims made in the GIS products. This role is required to respond to the operation center or duty station.

ROLE: TECHNICAL LIAISONS

While not officially, members of the Unit, as needed, the operation center Unit will be augmented with scientific liaisons to better inform GIS analysis. Often, decision makers look to GIS analysts to provide detailed technical analysis outside their areas of expertise. The operation center plan provides a mechanism to request scientific support when needed. From areas multi-disciplinary areas of expertise, a pool will be formed of individuals to fill this role.

SKILL	DUTY/TASK	FREQUENCY
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This role requires no specialized GIS Skills, only a general understanding of what the technology is and what it does. This role is very important role in that it should augment the expertise of GIS Analyst and GIS specialist so that they can make informed decision when working with spatial data that has a specific technical aspect, e.g., HAZMAT, sensitive biology, engineering, etc. This role does not require a response to the EOC or physical presence (unless requested), but should be available via phone and email when needed.

APPENDIX 2: LIST OF REFERENCED LINKS

ⁱ National Wildlife Coordinating Group. GIS Standard Operating Procedures (June 2006)
<<http://www.nwcg.gov/pms/pubs/GSTOP7.pdf>>

Federal Interagency Geospatial Concept of Operations (GeoCONOPS), Department of Homeland Security, Geospatial Management Office. For a digital copy visit,
http://www.napsgfoundation.org/attachments/article/113/DHS_Geospatial_CONOPS_v3.0_8.5x11.pdf

ⁱⁱ Arnone, Harvey and T.J. McDonald, “Getting the Most Out of GIS in an Emergency Operations Center: Support for GIS operations using a Situation Status Unit” (ESRI International User Conference Proceedings and Seattle Emergency Management Agency)
<<http://proceedings.esri.com/library/userconf/proc05/papers/pap1422.pdf>>