

Joint Pub 2-03



**Joint Tactics,
Techniques, and Procedures for
Geospatial Information and
Services Support to
Joint Operations**



31 March 1999



PREFACE

1. Scope

This publication focuses on the responsibilities and procedures for geospatial information and services (GI&S) support to joint operations. This publication discusses GI&S planning, coordination, control, production, and dissemination responsibilities. The focus will be joint GI&S support to combatant commanders for both deliberate and crisis planning and execution. Communications architecture required for the dissemination of digital geospatial data will also be addressed.

2. Purpose

This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth doctrine and selected joint tactics, techniques, and procedures (JTTP) to govern the joint activities and performance of the Armed Forces of the United States in joint operations and provides the doctrinal basis for US military involvement in multinational and interagency operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders and prescribes doctrine and selected tactics, techniques, and procedures for joint operations and training. It provides military guidance for use by the Armed Forces in preparing their appropriate plans. It is not the intent of this publication to restrict the authority of the joint force commander (JFC) from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of

effort in the accomplishment of the overall mission.

3. Application

a. Doctrine and selected tactics, techniques, and procedures and guidance established in this publication apply to the commanders of combatant commands, subunified commands, joint task forces, and subordinate components of these commands. These principles and guidance also may apply when significant forces of one Service are attached to forces of another Service or when significant forces of one Service support forces of another Service.

b. The guidance in this publication is authoritative; as such, this doctrine (or JTTP) will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence for the activities of joint forces unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members of the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the United States. For doctrine and procedures not ratified by the United States, commanders should evaluate and follow the multinational command's doctrine and procedures, where applicable.

For the Chairman of the Joint Chiefs of Staff:



V. E. CLARK
Vice Admiral, US Navy
Director, Joint Staff

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EXECUTIVE SUMMARY

COMMANDER'S OVERVIEW

- **Discusses the Role of Geospatial Information and Services (GI&S) in Military Operations**
 - **Describes Deliberate Planning for GI&S Support**
 - **Describes Crisis Action Planning for GI&S Support**
 - **Discusses Command, Control, Communications, and Computer Systems Support for Geospatial Information Operations**
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The Role of Geospatial Information and Services in Military Operations

The objective of geospatial information and services support is to provide the commander with timely, complete, and accurate information about the battlespace.

Geospatial information and services (GI&S) is the collection, information extraction, storage, dissemination, and exploitation of geodetic, geomagnetic, imagery, gravimetric, aeronautical, topographic, hydrographic, littoral, cultural, and toponymic data accurately referenced to a precise location on the earth's surface. Joint GI&S doctrine defines the roles and relationships of GI&S providers at the national level, in the Services, unified commands, and subordinate joint forces. Geospatial information plays a significant role in military operations. Geospatial information provides the foundation upon which all other battlespace information is layered to form the common operating picture. GI&S aids the commander in visualizing the battlespace, to effectively plan and execute military operations, to navigate, and to accurately target the adversary. GI&S support plays an important role in the full range of military operations from peace to war. Joint force commanders cannot afford to conduct military operations without up-to-date geospatial information.

Deliberate Planning for GI&S Support

The planning effort must be focused to ensure that geospatial data is available to meet the commander's requirements and the requirements of subordinate units.

The essence of effective planning is the full definition of the mission, expression of the commander's intent, completion of the commander's estimate (including the GI&S estimate), and development of a concept of operations, with a GI&S annex. GI&S deliberate planning identifies the area of interest, determines GI&S area requirements for forces and weapons systems, determines current availability of resources to meet those requirements, determines risk, and then develops a production strategy to address shortfalls. The entire GI&S community becomes involved to support the deliberate planning process through five phases: initiation, concept development, plan development, plan review, and supporting plans.

Crisis Action Planning for GI&S Support

Crisis action planning usually involves rapid decisions to produce geospatial information for an area where little or no information exists.

Scarce geospatial data production resources are usually focused on high priority regions which are supported by deliberately prepared operation plans. When military forces are called upon to conduct missions outside their deliberate plan areas, they are often faced with little or no geospatial information to support their operations. The GI&S officer must coordinate the rapid production of geospatial information, some of which may not meet all established specifications. The GI&S officer conducts crisis action planning in coordination with the combatant command or joint forces staff to provide the required support for GI&S.

Command, Control, Communications, and Computer Systems Support for Geospatial Information Operations

Communications and automated data processing technology are undergoing continuous evolution, affecting geospatial information production, dissemination, and exploitation applications.

Communications and automated data processing systems provide for the timely production, transfer, and access to geospatial data around the world. Geospatial data transfer requires large communications bandwidths, and the commander must ensure that the most tactically relevant data are prioritized for transmission. Combatant commanders' communications planning consists of architecture planning, systems planning, and other planning considerations to establish an effective and robust communications system in theater.

CONCLUSION

This publication identifies approved doctrine for GI&S support to joint operations and outlines the responsibilities of the Services, agencies, and combatant commands to ensure effective GI&S support to commanders. It addresses how GI&S supports commanders of joint forces in the conduct of operations including, in general terms, how GI&S are requested and disseminated to support joint operations.

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CHAPTER I

THE ROLE OF GEOSPATIAL INFORMATION IN MILITARY OPERATIONS

“The want of accurate maps has been a grave disadvantage to me. I have in vain endeavored to procure them, and I have been obliged to make shift with such sketches as I could trace out of my own observations and that of gentlemen around me.”

General George Washington

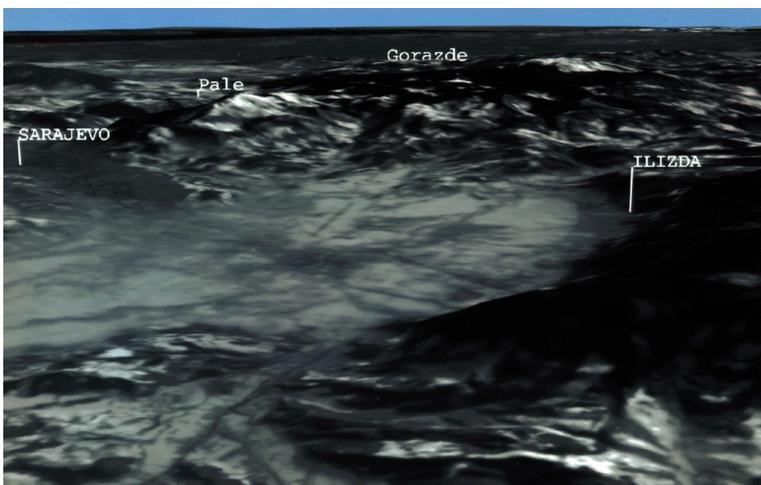
1. Introduction

The phrase “geospatial information and services” (GI&S), has recently replaced the term “mapping, charting, and geodesy.” This change was necessitated by an increasing use of digital geospatial information on sophisticated computer workstations to perform many military functions such as navigation, mission planning, mission rehearsal, targeting, and analysis of the battlespace. Digital geospatial information forms the foundation for battlespace visualization. When geospatial information is coupled with threat analysis, meteorological and oceanographic environmental intelligence, the friendly situation, and the logistics situation, the commander can more quickly grasp the view of the battlespace. This

dominant view of the area in which joint forces conduct operations allows commanders at all levels to react quickly to evolving situations, and allows for friendly forces to operate inside the decision cycle of adversaries. **All military operations require geospatial information.** Geospatial information provides the necessary framework upon which all other relevant strategic and tactical information is layered.

2. Geospatial Information and Services

GI&S is neither a product nor a system but rather a concept for the collection, production, archiving, dissemination, and exploitation of information about the earth. Geospatial information exists in both digital (softcopy)



Digital terrain elevation data, when coupled with high resolution imagery, provides a three dimensional view of the battlespace.

and printed (hardcopy) form and includes the concepts depicted in Figure I-1.

a. **The foundation of the geospatial information infrastructure** is composed of three major data elements, which are produced and maintained on a near-global basis. Foundation data are produced and maintained to support strategic planning. These data sets provide the base upon which higher resolution information can be layered.

- **Elevation and bathymetric data.** Digital terrain elevation data (DTED) and the corresponding digital bathymetric data base (DBDB) for ocean floor depths are important data sets. Elevation and

bathymetric data provide a three-dimensional view of the battlespace. DTED are critical for the orthorectification (removal of distortion due to relief) of imagery.

- **Foundation feature data** are those key natural or manmade features which are represented in a vector file as a point, line, polygon, or text. Features are positioned accurately, based on source. Within this data set, features include transportation and surface drainage networks, vegetation, built-up areas, international boundaries, and selected spot elevation data. Many of these features contain attributes which further

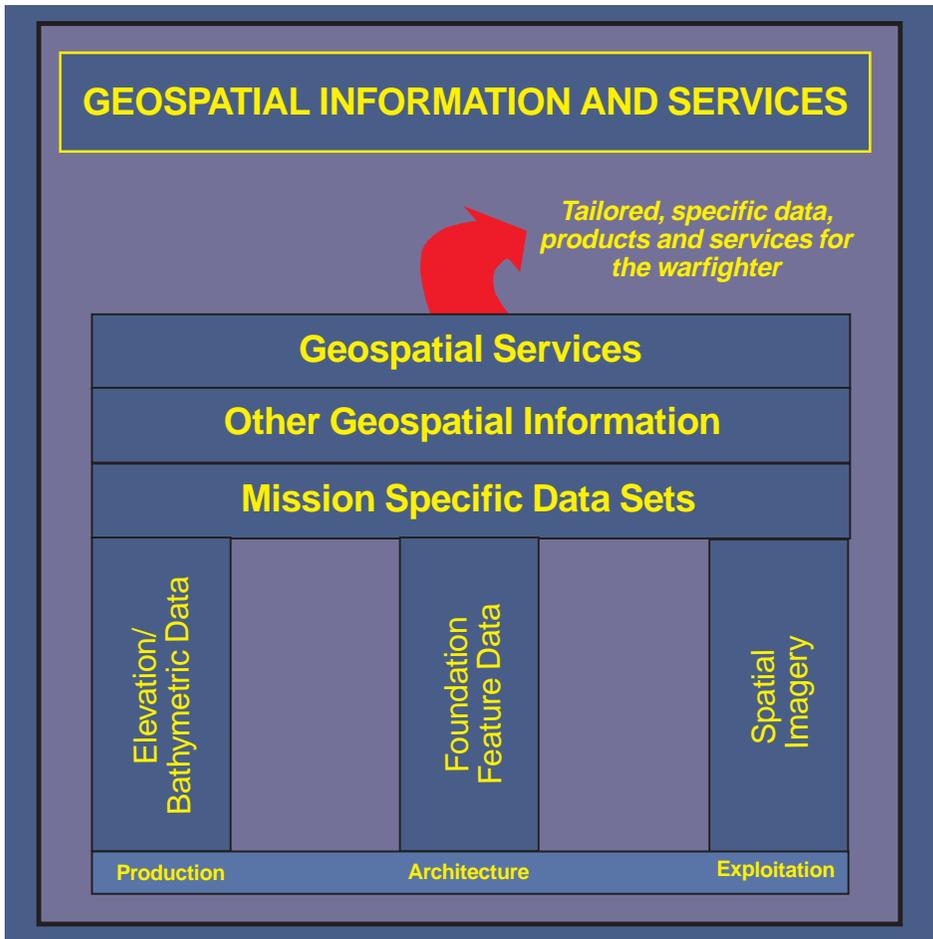


Figure I-1. Geospatial Information and Services

characterize information associated with the feature. For example, a built-up port area polygon will carry an attribute that is linked to information found in the World Port Index. A road would be depicted as a line and would carry attributes which describe its location, surface material, and operational status.

- **Spatial imagery, or imagery that has been geopositioned**, serves as the cornerstone of the geospatial data warehouse. The global spatial imagery layer will be composed of a seamless mosaic of ortho-rectified, black and white, high resolution (5 meter ground sample distance or better) satellite imagery.

b. Foundation data will be available on a near-global basis to support strategic planning. Further densification will be performed to support current operations, existing operation plans (OPLANS), training, and system development. This further densification of foundation data is called **mission specific data sets (MSDS)**. MSDS is information that can be used by the National Imagery and Mapping Agency (NIMA), the intelligence agencies, other government activities, and the warfighter to create specific data products for computer applications or to create hardcopy maps and charts. MSDS information can be

processed into specific products that meet established Department of Defense (DOD) specifications. Examples are:

- **Digital data (softcopy) stored on compact disk-read only memory (CD-ROM), digital tape or other electronic media, or on computer servers.** Examples are compressed equal arc second raster chart and/or map digitized raster graphics, vector maps, DTED, DBDB, digital nautical charts, and digital point positioning data bases.
- **Hardcopy (paper) maps and charts.** Examples are topographic line maps, joint operations graphics, tactical pilotage charts, and coastal charts.
- **Textual data** in the form of publications and bulletins. Examples are gazetteers, notice to mariners, country studies, and flight information publications.

c. In some cases, MSDS will not be available for immediate use. If warfighter requirements cannot be met by standard production of MSDS, NIMA or other geospatial producers may create **other information or products** to satisfy immediate or crisis requirements. This information may not conform to established data specifications for content or accuracy, but may still provide

MAPPING A PEACE AGREEMENT

In Dayton, Ohio in November 1995, the United States brokered a peace agreement between the warring factions in the former Yugoslavia. Using state-of-the-art computer workstations, elements of the Defense Mapping Agency, the Topographic Engineering Center, the US Army's 30th Engineer Battalion (Topographic), and contractor personnel worked around the clock for over a month to create instant maps which reflected the day's negotiations. Using terrain visualization workstations, the peace negotiators were able to virtually "fly" the proposed boundaries. Digital maps were then printed using on-site high quality ink-jet printers. After over seventy border changes, the final map was accepted and the peace treaty for Bosnia-Herzegovina was signed.

SOURCE: Various Sources

the warfighter with essential data requirements. The use of this information or products may involve some risk, and the production criteria must be firmly agreed upon by both the producer and the end user.

d. **Geospatial Services.** These services include, but are not limited to, functions such as geodetic survey, software development, providing tailored geodetic and geophysical products and services to support weapons systems, the calculation of precise locations for targeting of precision-guided munitions, training, and on-site technical support.

e. **Geospatial Data Warehouse.** The purpose of the geospatial data warehouse is to allow the warfighter to have instant access to the most current and accurate geospatial information available. If data contained in the data warehouse do not meet the warfighter needs, then NIMA and other activities, to include the user, will work together to develop updates and collect new information. There are three key components to the digital geospatial data warehouse as shown in Figure I-1: elevation and bathymetric data, foundation feature data, and spatial imagery. These near-global data sets will provide the

basic framework or grid to which all other information can be linked.

f. The **geospatial information production process** collects, extracts, and formats data to specific DOD specifications and places the data into the data warehouse. The data warehouse is supported by a **communications architecture** that allows the user to browse and download relevant data, and allows designated users to provide more current information to update the data set. Software tools provide the means to **exploit** the data for specific uses.

3. The GI&S Operations Cycle

Generally speaking, GI&S support operations follow the cycle shown in Figure I-2, which applies to geospatial information producers as well as users of those data. GI&S operations are planned and controlled by the command GI&S officer or staff. This staff element may be subordinate to either the operations or intelligence staff element at various echelons from the combatant commander level down to various operational unit levels. Given the increasing importance of geospatial information, and due to the



Geospatial information can be used by computer workstations to support a variety of military applications.

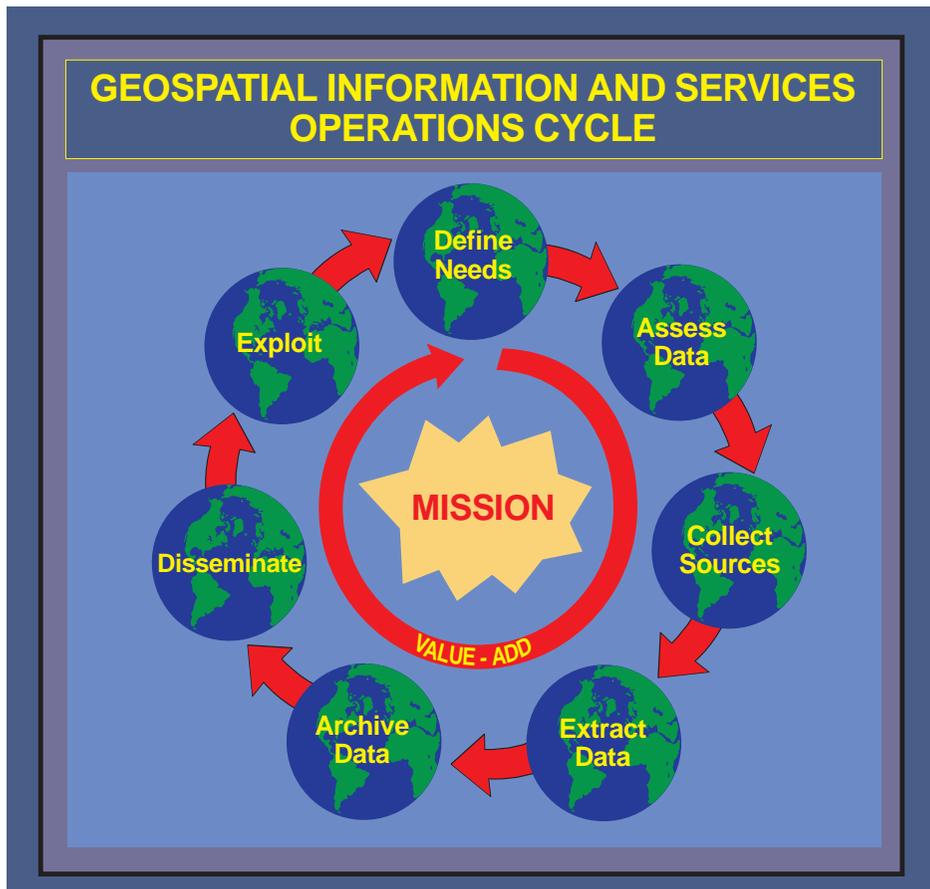


Figure I-2. Geospatial Information and Services Operations Cycle

complexity of production, dissemination, and exploitation, it is recommended that all echelons which employ operations and intelligence sections designate a command or unit GI&S officer.

a. **Define Needs.** The combatant commands, military Services, DOD intelligence agencies, and other federal activities such as the Drug Enforcement Agency submit their specific GI&S needs for standard DOD products and data to NIMA in accordance with Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3901.01, “Requirements for Global Geospatial Information and Services (GGI&S).” NIMA

allocates production resources against these GI&S requirements with prioritization guidance provided by the Joint Strategic Capabilities Plan (JSCP) and other national military strategy documents.

- The military Services submit requirements for GI&S to support Service training. Services also submit their needs to validate Service requirements for new DOD data or product standards to support research, development, test, and evaluation. The Services may also submit worldwide area requirements to support a global system such as a command and control (C2) system.

- When required, the military Services, US Special Operations Command, and the DOD intelligence agencies have the responsibility as defined in DOD Instruction 5000.56, “Programming Unique Mapping, Charting, and Geodesy (MC&G) Requirements for Developing Systems,” to submit requirements for new geospatial data to support emerging systems.
 - The combatant commands submit area requirements to support OPLANs, operation plans in concept format (CONPLANs) with or without time-phased force and deployment data (TPFDD), functional plans, and campaign plans or operation orders (OPORDs). Combatant commands also submit requirements for geospatial data for areas outside the continental United States and for continental United States (CONUS) areas to support joint training exercises.
 - The Services assist the combatant commands in determining GI&S requirements by maintaining a current GI&S planning factors data base (PFDB). The PFDB provides the operational planner with information as to what particular geospatial data is required for weapons and C2 systems. The PFDB also provides the GI&S officer with an estimate of quantities needed to support the forces available. The Services also have a responsibility to keep combatant commands informed on Service GI&S programs and capabilities.
- In addition to reviewing data requirements for OPLANs, it is also important to identify geospatial data requirements to support rehearsal of those plans. In preparation for the planned amphibious invasion for Operation DESERT STORM, a suitable beach was required in the theater of operations which best emulated the actual landing beach. Once the rehearsal area was selected, the command engaged crisis support procedures to obtain the necessary hydrographic survey data to support the rehearsal phase.
- a. **Assess Requirements.** Once the total requirement for GI&S is known, the GI&S officer, in coordination with NIMA, makes a detailed assessment of what products and data are available. This assessment must also include
 - b. **Assess Data.** Once the total requirement for GI&S is known, the GI&S officer, in coordination with NIMA, makes a detailed assessment of what products and data are available. This assessment must also include



US Naval Service Ships are used to collect oceanographic and bathymetric data in support of combatant command requirements.

an assessment of substitute products and consideration for the production and use of data that may not fully meet established DOD specifications. Detailed and accurate geospatial data require long lead times for production. Long production lead times, coupled with the large quantities of products and data sets needing initial production or revision, complicate availability of geospatial information. For this reason, the GI&S officer must carefully plan for GI&S support and ensure that the most critical requirements are available or are scheduled for production.

c. **Collect Sources.** Once specific area requirements are identified and prioritized, the task of source collection begins. Currently, the major source for geospatial data is visible-

spectrum imagery provided by national intelligence systems (See Figure I-3). Imagery provides a detailed overhead view of the area that is analyzed to identify natural and manmade features. Stereo imagery provides elevation data and improved identification of features. Ephemeris and attitude data which accompanies the imagery allows for the precise geodetic positioning of the image and mensuration of features. During a time of crisis, it is important to note that geospatial information producers are in direct competition with intelligence activities for these collection systems. The combatant command GI&S officer must be aware of this fact and assist NIMA in receiving the proper priority for imagery by coordinating with the intelligence officer (J-2) collection manager

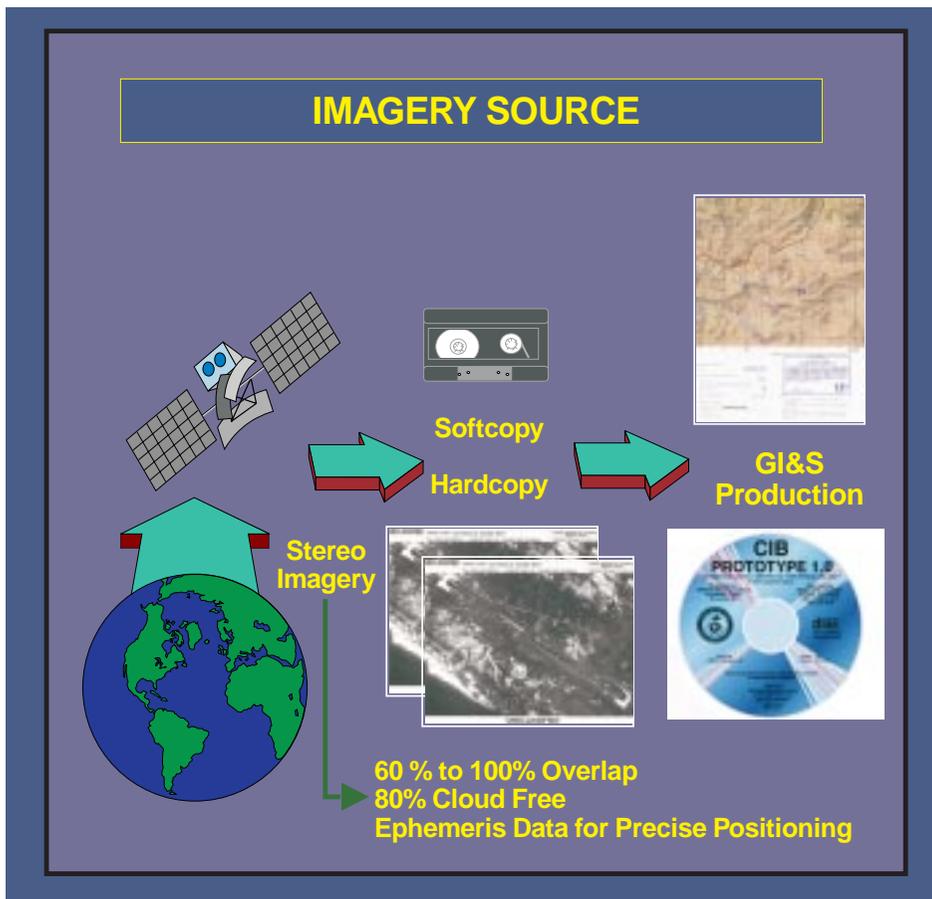


Figure I-3. Imagery Source

for tasking priority. Other source material plays a key role in data analysis. These ancillary sources include native edition maps and charts, geographic names data, commercial imagery, and other textual data to assist the analyst in identifying features.

- Ocean floor mapping is a critical data collection requirement for accurate ocean navigation charts, combat charts, and other hydrographic data sets. The Commander, Naval Meteorology and Oceanography Command, maintains a fleet of eight survey ships for deployment worldwide and coordinates with hydrographic fleets of the United States and other nations to obtain data. Current processes routinely use the sonar and other sounding devices. These ships are capable of collecting oceanographic data throughout the water column to include currents, physical parameters of the water (e.g., conductivity, temperature, pressure, salinity) bathymetry, and other related data. These data are processed into products which support amphibious warfare, special warfare, and mine warfare operations for supporting commanders. The collection of survey data can be lengthy; therefore, all requirements for this type of data should be stated well in advance. An evolving bathymetric survey method is the laser airborne bathymetry system (LABS). Mounted on airborne platforms, LABS uses laser technology to rapidly map ocean depths in relatively clear coastal and ocean waters up to 50 meters deep.
- Other sources of geospatial data are rapidly evolving. Interferometric synthetic aperture radar (IFSAR) can rapidly provide accurate and closely spaced elevation posts, and can provide a data source for images of the terrain. IFSAR technology allows for the day or night collection of data through clouds, smoke, fog, and haze, and therefore has

a distinct advantage over optical systems. IFSAR systems are currently employed on aircraft.

- Commercial multispectral and hyperspectral imagery provides an important source of radiometric and spatial data. New commercial sensors with high spectral (ten nanometer, hundreds of bands) and spatial (1-5 meter ground sample distance) commercial space imagery will be available as a supplement to national imaging systems.

d. **Extract Data.** While NIMA fulfills the bulk of DOD standard geospatial information extraction requirements, the Services and joint forces also possess limited data extraction capabilities. Service assets are best suited for the production of system or theater-specific data and the update of standard data sets.

e. **Archive Data.** Once digital geospatial data are processed, they are archived to a “data warehouse,” ready to be used for the creation of specific products or to be used in military applications. The data warehouse provides the foundation for a DOD-wide distributed network of geospatial information that includes topographic, aerospace, and hydrographic information, as well as imagery and geographic names and boundary data.

f. **Disseminate**

- Digital geospatial data will be available on global or regional servers which are accessible by users through several methods. These electronic communications pathways are discussed further in Chapter IV, “GI&S Command, Control, Communications, and Computer Support.” Geospatial data may also be distributed on electronic media (such as CD-ROM) and shipped to users worldwide to be pre-positioned on local servers that are regionally specific in content.

- High resolution geospatial data such as raster imagery, maps, and dense elevation and feature data very often comprise large digital files, even after compression. Electronic transmission of these files can clog even the largest current communications paths. It is therefore critical that the user strive to acquire the most current data via CD-ROM or digital tape for storage on local servers or media. During a crisis or contingency, there will be intense competition for electronic bandwidth.

While NIMA retains the responsibility for the bulk of DOD map and chart printing requirements, advances in printing technology have provided the means for deployed forces to produce low volume, full color hardcopy maps, charts, and other graphics. Local printing capabilities enable commanders to tailor standard data sets for specific missions and provide hardcopy output for the warfighter's use. This capability can also serve to print small numbers of standard or updated products to support planning or special operations.

- Hardcopy products may be stocked in theater and regional map depots operated by the Services, combatant commands, or by NIMA. **NOTE: Effective 1 April 1998, the responsibility for map, chart, and electronic media distribution shifts from NIMA to the Defense Logistics Agency.**

g. **Exploit.** Geospatial data can be manipulated by the user to produce tailored data sets or products that serve specific mission purposes. Data might be modified to support a specific mission rehearsal or several data sets might be fused to create a three-dimensional view of the battlespace. Hardcopy products can also be tailored to specific uses; however, the process is usually more time consuming.

h. **Value-add.** Detailed, high resolution data are subject to rapid change. For example, new roads are constructed, new obstacles to sea navigation are discovered, aerial obstructions are built, and beaches shift constantly. Commanders require accurate and up-to-date geospatial data in order to make the best tactical decisions. Value-adding is the process by which both the producer and the user of geospatial data constantly update geospatial data with current information. While digital systems enable the commander to capture and analyze tremendous amounts of data, the management of these enhanced data sets can become difficult. Multiple data sets of differing content and currency can confuse operations. The commander must determine what data are tactically significant vice data that become computational and management burdens.

4. Geospatial Information Operations in War

Geospatial information plays a key role in the full range of military operations from peace to war. Commanders use geospatial data to help determine friendly and enemy courses of action (COAs) and to plan for the deployment of forces and key weapons systems. When coupled with intelligence data, the disposition of friendly forces, weather, and the logistics situation, geospatial information assists the commander to visualize and develop the battlespace in order to exploit enemy weaknesses or take advantage of friendly strengths.

5. Geospatial Information in Military Operations Other Than War

a. Operations associated with military operations other than war (MOOTW) focus on deterring war, promoting peace, conducting counterdrug operations, and providing foreign humanitarian assistance or

disaster relief. Geospatial information requirements for these operations are similar to operations in wartime, although intended uses may be different. The commander must be able to visualize the battlespace in order to place forces where needed.

b. Conditions of MOOTW may change rapidly and therefore the GI&S officer must remain flexible and poised to transition into a higher state of conflict. Direct combat operations usually require more accurate and detailed geospatial information.

GI&S OPERATIONS DURING HURRICANE ANDREW

In August, 1992, Hurricane Andrew, the mightiest hurricane to strike the United States in modern times, crossed southern Florida and tracked into Louisiana, causing billions of dollars in damage while killing 88 people. The town of Homestead, Florida and nearby Homestead Air Force Base were devastated. Federal Emergency Management Agency personnel sprang into action and coordinated disaster relief efforts with state and local authorities. Ordinary road maps became useless as street signs and many landmark features were destroyed by the force of the hurricane. Coincidentally, the Department of Agriculture had already planned a low-altitude aerial photo mission for the area, and once the hurricane had passed, this mission was conducted. Using the available photographs, the US Army's 30th Engineer Battalion (Topographic) at Fort Bragg, NC created a photo mosaic map with overprinted street and landmark information. This rapidly-produced image map served the local authorities and deployed military units until standard products from the US Geological Survey became widely available.

**SOURCE: XVIII Airborne Corps After Action Report
October, 1992**

CHAPTER II

DELIBERATE PLANNING FOR GI&S SUPPORT

“The commander must acquaint himself beforehand with the maps so that he knows dangerous places for chariots and carts, where the water is too deep for wagons; passes in famous mountains, the principle rivers, the locations of highlands and hills; where rushes, forest, and reeds are luxuriant; the road distances; the size of cities and towns; well-known cities and abandoned ones; and where there are flourishing orchards. All this must be known as well as the way boundaries run in and out.”

Tu Mu, 803-852, Wei Liao Tzu

1. Introduction

a. **Deliberate planning requires the full definition of the mission, the expression of the commander’s intent, completion of the commander’s estimate (including the GI&S estimate), and the development of a concept of operations with Annex M (GI&S).** The planning effort must be responsive to the commander’s requirements and to the requirements of subordinate units. The GI&S officer must coordinate and share information with the J-2, the operations officer (J-3), the logistics officer (J-4), the plans officer (J-5), and the command, control, communications, and computer systems officer (J-6).

b. The Joint Pub 5-0 series provides detailed information on planning joint operations. The Joint Operation Planning and Execution System (JOPES) provides the foundation for conventional C2 by national- and theater-level commanders and their staffs. It is designed to satisfy their information needs in the conduct of joint planning and operations. JOPES translates policy decisions into OPLANs, CONPLANs, functional plans, and OPORDs. JOPES formats can be found in Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3122.03 “Joint Operation Planning and Execution System, Vol II: (Planning Formats and Guidance),” and

CJCSM 3122.04, “Joint Operation Planning and Execution System, Vol II: (Supplemental Planning and Execution Formats and Guidance).”

2. Deliberate Planning

a. The GI&S officer supports the deliberate planning process by preparing for a possible contingency based on the best information available and using forces and resources apportioned by the JSCP. Deliberate planning relies heavily on assumptions regarding the political and military circumstances that will exist when the plan is implemented. Conducted primarily in peacetime, the deliberate planning process engages the entire joint community in the methodical development of plans for contingencies identified in strategic planning documents, and for the transition to and from war.

b. During deliberate planning, the GI&S officer works closely with subordinate command GI&S officers and with NIMA to develop a strategy to provide GI&S support for future operations. Plans developed during deliberate planning provide a foundation for, and ease the transition to, crisis resolution. Figure II-1 shows the five phases of deliberate planning. Appendix A, “GI&S Deliberate Planning Checklist,” provides broad guidance to the GI&S officer as the deliberate plan is prepared.

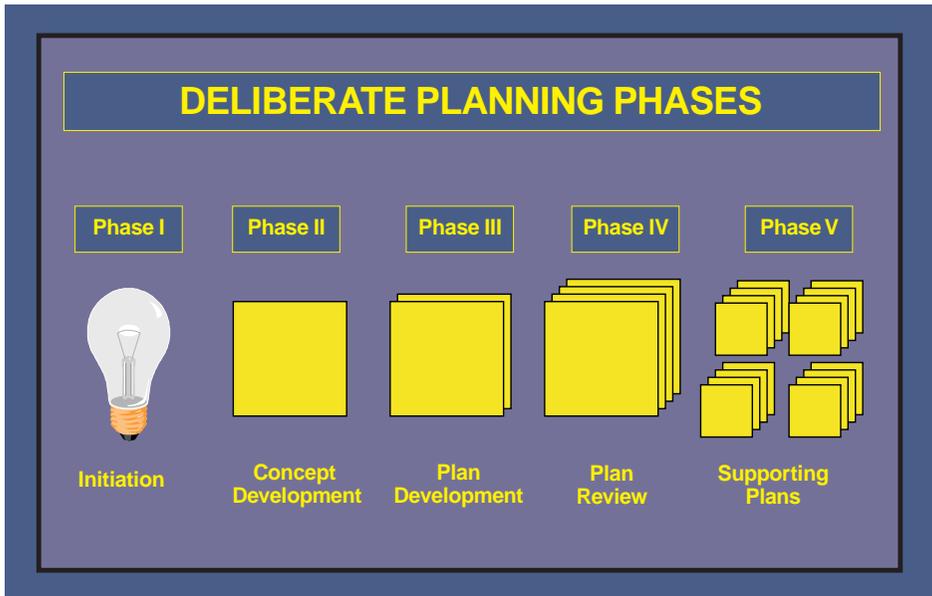


Figure II-1. Deliberate Planning Phases

c. During the deliberate planning process, the GI&S officer works closely with the appropriate customer support team at NIMA to determine specific GI&S requirements to support the plan. This process normally follows the sequence of events shown in Figure II-2.

3. Phase I, Initiation

a. The Service components provide information to the supported combatant commands on available GI&S-capable forces and GI&S requirements needed to support the plan. Service component GI&S officers use PFDB to accomplish this task. Service components also describe specific GI&S capabilities organic to assigned forces. GI&S capabilities include such functions as surveying, bathymetric data collection, data extraction, data processing, data management, and hard copy printing.

b. During Phase I, the GI&S officer should carefully review the PFDB to ensure that all units and weapons systems are included. It is also important to maintain a constant

dialog with the appropriate customer support team at NIMA to inform them of any new emerging plans or modifications to existing plans.

4. Phase II, Concept Development

a. During Phase II, the supported combatant commander’s concept of the operation is developed and is documented as the combatant commander’s strategic concept. The staff prepares alternative COAs.

b. During this phase, the GI&S officer:

- Submits planning information to the primary staff to be included in the COA development.
- Coordinates the development of a preliminary “geographic footprint” for the area of interest (AOI) with the J-2 and the J-3 for the plan. This early determination of the AOI is necessary information for NIMA to begin an assessment of GI&S source materials and

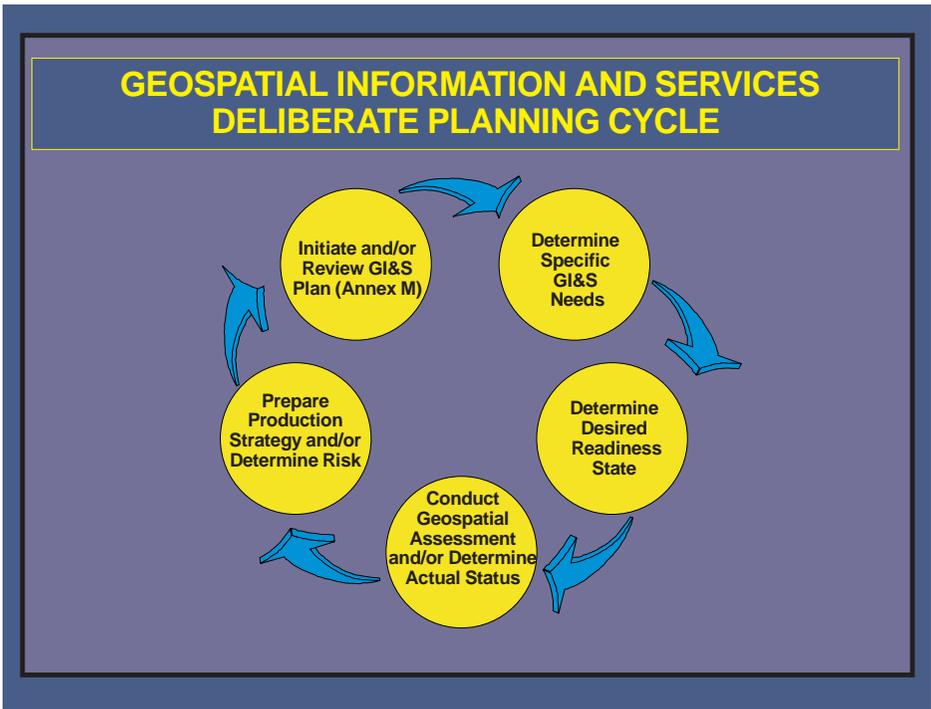


Figure II-2. Geospatial Information and Services Deliberate Planning Cycle

data availability. Ensure that the geographic footprint includes areas outside of the primary AOI which may be used for rehearsal or staging areas.

- Works closely with the J-2 during the joint intelligence preparation of the battlespace (JIPB) process to provide input on available and required geospatial data.
- Assists other staff elements as required to apprise them of geospatial data requirements and availability.
- Prepares a GI&S estimate (Appendix B, “GI&S Estimate”) and a preliminary GI&S concept of operations.
- Identifies and receives combatant commander guidance on any datum issue that may arise. Although CJCSI 3900.01, “Position Reference Procedures,” establishes World Geodetic System 84

(WGS-84) as the joint operations standard, this standard may not be achievable in the short-term to support the plan. Many large scale standard NIMA products still exist using local datums, and the effort to change all hardcopy products to WGS-84 is an enormous undertaking. Multinational operations may dictate that the command use a local datum to ensure interoperability. The GI&S officer must explain datum issues in detail to the combatant commander and the staff and work closely with NIMA to provide a recommended COA.

- Identifies possible issues that may arise with the disclosure (confirmed to exist) and release (physical transfer) of limited distribution and classified GI&S products and data to multinational forces. The GI&S officer must coordinate these issues with NIMA.

DATUM ISSUES DURING OPERATION ABLE SENTRY

As US ground forces deployed to Macedonia in late 1993 for peacekeeping operations, they faced a situation in which three different maps were in use. Older, 1:50,000 scale topographic line maps (TLMs) made by the Defense Mapping Agency (DMA) were on the European datum (ED-50), in compliance with North Atlantic Treaty Organization agreements. United Kingdom (UK) 1:100,000 scale maps were made using the WGS-84 datum. Yugoslavian-produced 1:25,000 scale maps were produced using the local Hermannskogel datum. The Yugo maps provided great detail of the terrain, and portrayed the Serbia-Macedonia border more accurately than the DMA and UK sheets. Faced with a potentially serious interoperability problem, the combatant commander requested that DMA update all the standard 1:50,000 TLMs to the WGS-84 standard, and that the Serb-Macedonian border be shown as on the Yugo 1:25,000 scale maps. The newly revised maps also included many details provided by the ground forces to depict trails and outposts encountered during routine patrols. During the early stages of Operation ABLE SENTRY, the datum differences on maps did not hamper operations. Subordinate commanders ensured troops were properly trained on the datum differences and coordinates were routinely transformed until full coverage of WGS-84 products became available.

SOURCE: Various Sources

- With the assistance of the appropriate command customer support team from NIMA, conducts a detailed analysis of the supportability of the operational concept.
- The first step in this process is to determine an appropriate level of readiness required for the plan, based on likelihood of execution and calculation of preparation times based on indications and warnings. Priorities for availability of GI&S products are shown in Figure II-3. The appropriate level of readiness is a combatant commander's assessment of the adequate level of GI&S preparedness at a given point in time before an operation is executed. The geospatial assessment is a planning tool which both the combatant commander and NIMA use to determine how much effort should be allocated to a particular OPLAN to produce standard geospatial data and products.

GI&S PRIORITIES	
Priority 1:	If data and/or product is unavailable, will PREVENT performance of mission.
Priority 2:	If data and/or product is unavailable, will SIGNIFICANTLY impact performance of mission.
Priority 3:	If data and/or product is unavailable, will have MINOR impact on performance of mission.

Figure II-3. GI&S Priorities

- As shown in Figure II-4, this assessment is articulated using the GI&S readiness levels: (1) **C-1**: All required products and information must exist as standard or substitute products and

GI&S RISK ASSESSMENT	
In determining an acceptable C-rating for any plan, the GI&S officer is recommending a level of risk that the command accepts for pre-existing geospatial products and information:	
C-1:	Minor deficiencies may exist for geospatial support: NEGLIGIBLE impact on mission.
C-2:	Minor deficiencies exist for geospatial support: MINOR impact on mission.
C-3:	Significant deficiencies exist for geospatial support: reduced capacity to support mission.
C-4:	Major deficiencies exist for geospatial support: may prevent mission accomplishment.

Figure II-4. GI&S Risk Assessment

information. All products can be made adequate and delivered within the time required for the plan. (2) **C-2:** All Priority 1 and 2 products and information must exist as either standard or substitute products and information, or interim products and information can be generated and delivered within the command’s required time. Deficiencies exist in the coverage of Priority 3 products and information. Priority 1 and 2 products and information can be made adequate within the required time based on each plan. Existing Priority 3 products and information cannot be made adequate within the required time for each plan. (3) **C-3:** All Priority 1 products and

information must exist as either standard or substitute products and information, acceptable interim products and information, or can be generated and delivered within the command’s required time. Significant deficiencies exist in the coverage of Priority 2 and 3 products and information. Existing products and information cannot be made adequate within the required time for each plan. (4) **C-4:** Major deficiencies may exist for Priority 1, 2, or 3 products.

c. With the recommendations of the staff, the combatant commander chooses one COA and that COA is developed into the strategic concept, which is forwarded to the Chairman of the Joint Chiefs of Staff (CJCS) for review and approval.

5. Phase III, Plan Development

a. A CJCS-approved concept of operations is expanded into a complete OPLAN during the plan development phase of deliberate planning.

“Those who do not know the conditions of mountains and forests, hazardous defiles, marshes, and swamps cannot conduct the march of an army.”

Sun Tzu
The Art of War

b. During this phase, the GI&S officer should:

- Determine what shortfalls exist in GI&S coverage and, in conjunction with NIMA, develop a production strategy to eliminate or reduce the risk of those shortfalls. Determine the appropriate priority for the production or update of required geospatial data and products in accordance with CJCSI 3901.01, “Requirements for Global Geospatial Information and Services (GGI&S).”

- Determine what GI&S support shortfalls exist with the forces apportioned by the JSCP.
 - Develop Annex M (GI&S) to the basic plan. A sample Annex M is shown in CJCSM 3122.03, “Joint Operation Planning and Execution System, Vol II: (Planning Formats and Guidance).” Guidelines for the review of OPLANs are contained in CJCSM 3141.01, “Procedures for the Review of Operations Plans.”
 - Ensure that GI&S assets and products are included in the TPFDD to ensure proper movement of critical personnel, equipment, and GI&S data and products into theater. Responsibility for building the TPFDD records rests with the Service components; therefore, constant coordination with the Service components and supporting combatant command GI&S officers is required.
- critical issues that arise during the review of supporting plans, and NIMA and the Joint Staff may coordinate the review of any supporting plans on behalf of the Chairman and other members of the Joint Chiefs of Staff (JCS) should circumstances warrant.
- b. Support planning identifies the quantity of supplies, equipment, and replacement personnel required to sustain the force, and to phase their movement into the theater. Support planning determines the quantities of supply by broad category and converts them into weights and volumes that can be compared to available strategic and intratheater lift capacity.
- The combatant command GI&S officer must coordinate with the J-4 to ensure adequately prioritized lift and distribution support are provided for the shipment of paper maps and charts as well as data in digital format such as tapes and CD-ROMs (See Figure II-5).

6. Phase IV, Plan Review

The Chairman of the Joint Chiefs of Staff conducts a final review of the OPLAN submitted by the supported commander during Phase IV. This review evaluates the plan to determine whether taskings have been met and whether resources have been used effectively with the constraints of the JSCP apportionment guidance. NIMA conducts a formal review of the plan’s Annex M (GI&S).

7. Phase V, Supporting Plans

a. This phase deals with mobilization, deployment, employment, sustainment, and redeployment of forces and resources in support of the concept described in the supported commander’s approved plan. The review and approval of supporting plans is the responsibility of the commander they support. However, the Chairman of the Joint Chiefs of Staff may be requested to resolve

In coordination with the J-6, the GI&S officer will plan communications support so that adequate communications bandwidth exists to transmit digital geospatial information from CONUS to deployed units and data management centers.

c. During this phase, the combatant command GI&S officer works closely with the appropriate NIMA customer support team and will:

- Coordinate with Service components and supporting combatant commands to determine their GI&S basic load and war reserve stock (WRS).
- Task Service components and supporting combatant commands to provide NIMA with automatic distribution (AD) requirements to support unit basic load and planning stock requirements.

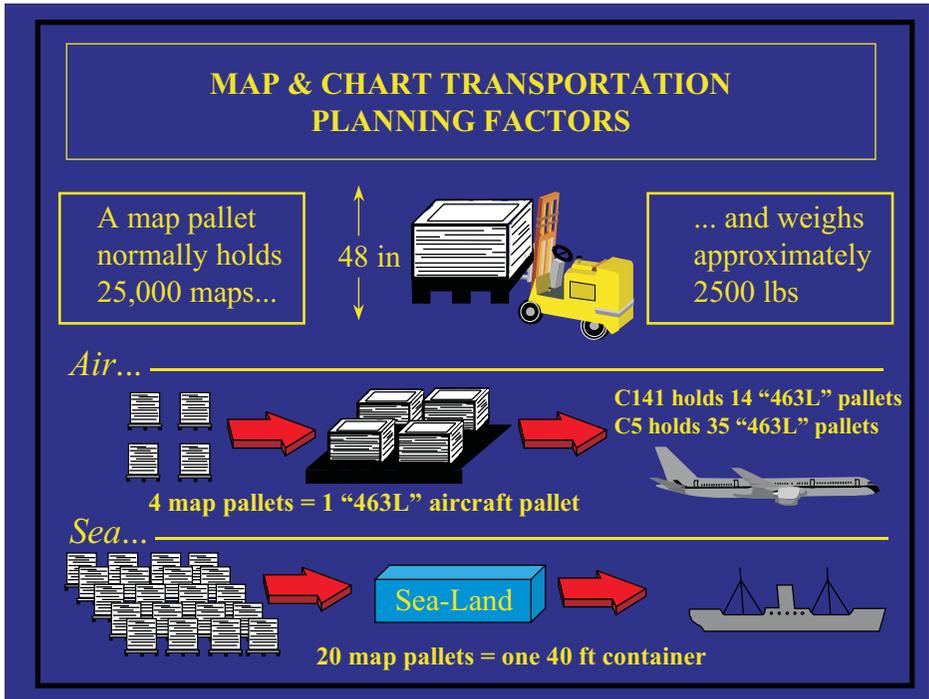


Figure II-5. Map & Chart Transportation Planning Factors

Activities responsible for the WRS maintenance must be directed to ensure that their AD accounts and listings are up-to-date.

- Ensure Service components and supporting combatant commands include GI&S requirements in their TPFDD records.
- Determine locations for storage of WRS, to include coordination for facilities and a maintenance plan. Maintenance of the WRS will be accomplished by either NIMA or a Service component. A memorandum of understanding (MOU) will be prepared to assign maintenance responsibilities.
- Plan to implement augmentation from components and NIMA for distribution operations, if necessary. If NIMA augmentation is to be used, the requirement should be stated in both the

plan's Annex M and in a formal MOU between the command and NIMA.

- Coordinate formal agreements or MOUs, if required, to support other aspects of the GI&S logistics. Examples include provisions for support from host nations and the role of allied units in GI&S operations.
- Develop procedures to process the disclosure and release of geospatial data so that any assigned multinational forces have access to required geospatial information.
- Develop a plan for residual GI&S stocks that may remain in-theater after operations cease. This plan may call for the destruction of GI&S stocks, turnover to host-nation forces (once proper disclosure and release has been granted), or shipment back to theater or CONUS depots. Classified GI&S data and products

must be disposed of in accordance with DOD Manual 5200.1. “DoD Information Security Program.” Unclassified limited distribution products may be disposed of in accordance with DOD Manual 4160.21-M, “Defense Utilization and Disposal Manual.”

- Identify and task a geospatial data base manager and unit to maintain the theater geospatial information data warehouse.
- Define procedures for reporting and requesting geospatial information to and from the theater geospatial data warehouse.
- Establish co-production procedures and requirements for intratheater support.

8. Conclusion

During deliberate planning, the GI&S officer coordinates with the combatant command staff to determine requirements for GI&S support and ensures that GI&S assets, products, and digital data are included in transportation and communications planning. The GI&S officer works closely with NIMA to determine what geospatial information already exists, what risks can be accepted, and the priority for production to satisfy shortfalls.

CHAPTER III

CRISIS ACTION PLANNING FOR GI&S SUPPORT

“Just as our soldiers must carry their weapons and ammunition as they deploy, they must also carry the maps which make maneuver and fire effective on the battlefield.”

Major General Barry R. McCaffrey
Commanding General, 24th Infantry Division
Operation DESERT STORM

1. Introduction

a. The basic planning process is adapted to execute joint operations in crisis situations. Crisis action planning (CAP) procedures provide the GI&S planner with an abbreviated process for determining GI&S support to a rapidly developing military operation.

b. Deliberate and CAP for any particular joint operation are interrelated by the degree to which deliberate planning has been able to anticipate and prepare for the crisis. Every crisis situation cannot be anticipated, but detailed analysis and coordination accomplished during the deliberate planning period may greatly expedite CAP. GI&S support planning for CAP should always begin with a thorough examination of relevant deliberate plans.

c. CAP and execution are accomplished within a framework of six phases as described in Joint Pub 5-0, “Doctrine for Planning Joint Operations.” Discussed below are the processes and procedures pertinent to GI&S planning during CAP. Appendix C, “GI&S Crisis Action Checklist,” serves as a starter checklist for the GI&S officer to consider when conducting CAP.

2. Phase I, Situation Development

Situation development is a dynamic process that evolves simultaneously with

policy (See Figure III-1). Proper situation development demands that staffs be able to provide immediate advice to commanders, based on deliberate planning. The combatant command GI&S staff must be able to provide to the staff those products and data necessary for planning their assessments. During this phase, a principle task of the GI&S officer is to develop a commander’s situation assessment for geospatial information support. The report must provide current and accurate assessments of the preparedness of the command to execute military operations in the AOI from a GI&S perspective. The GI&S officer should make this assessment in conjunction with the appropriate customer support team from NIMA. The GI&S officer’s assessment must consider the following factors.

a. The geographic “footprint” of the AOI.

b. The operational requirements for GI&S based on the mission and the force structure. The PFDB can be used to determine what geospatial information is needed by specific weapons and C2 systems.

c. The availability and currency of geospatial information — that is what products and data currently reside “on the shelf” at depots and servers.

d. A preliminary recommendation for what GI&S forces should be included on the joint task force (JTF) composition.



Figure III-1. Crisis Action Planning - Phase I

e. In conjunction with the J-6, an initial estimate of the communications requirements needed to transmit digital geospatial data between forward-deployed units, CONUS production centers and digital data warehouses, theater-level computer data servers, and to multinational forces.

f. The use of interim products such as satellite image maps instead of topographic line maps, and meteorological data systems instead of more standard and more detailed digital data. What geospatial information can be developed or updated is a function of requirements and time available. NIMA can assist in determining what data can be made available in the time required.

3. Phase II, Crisis Assessment

During Phase II, the National Command Authorities (NCA) and the JCS analyze the situation assessment and determine whether a military option should be

prepared. The combatant command GI&S officer continues to refine the GI&S assessment completed in Phase I and now begins to consider the strategic lift requirements for transporting required geospatial data of the operational area and the AOI. The crisis assessment phase ends with a decision by the NCA to return to the pre-crisis state or to have military options developed for consideration and possible use. The NCA decision provides strategic guidance for joint operation planning and may include specific guidance on the COAs to be developed (See Figure III-2). The responsibilities of the GI&S officer during Phase II are as follows:

a. Coordinate with NIMA to ensure that they are informed of the NCA decision and the CJCS planning guidance directive.

b. Provide a recommendation and receive combatant commander guidance on the datum to be used for the operation.

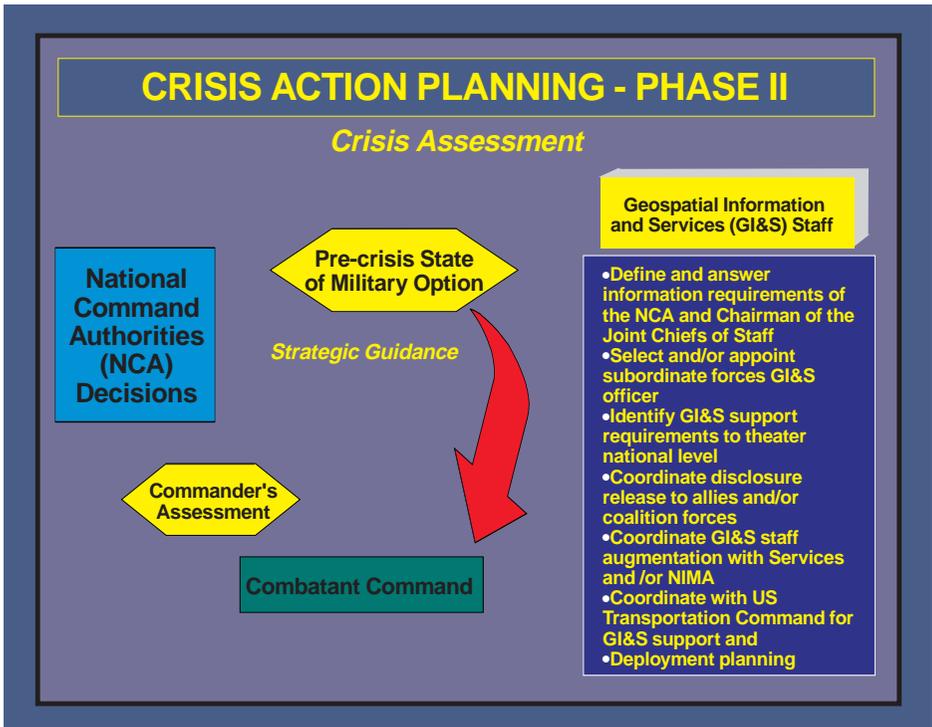


Figure III-2. Crisis Action Planning - Phase II

c. Coordinate with NIMA to place a hold on distribution of any hardcopy products and digital media covering the AOI. This will allow the GI&S officer to prioritize the distribution of the required data and products to the units involved in the immediate operation. This hold should not, however, restrict activities from obtaining small numbers of products for planning purposes.

d. Develop and provide guidance to NIMA, subordinate and supporting GI&S staffs, and appropriate forces regarding special procedures to be used when requisitioning products over the AOI. Information about distribution limits and unit priorities must be established early to prevent depletion of stocks.

e. Coordinate with the J-4 to determine the effect the transportation infrastructure status has on deployment planning for GI&S products, data, and GI&S production-capable units as early as possible in the planning effort.

f. Coordinate with NIMA and the Services for GI&S staff augmentation, if required. NIMA has crisis response teams specially trained in requirements planning, GI&S production, distribution, and map depot warehousing operations that can be deployed in theater upon request by the combatant commander. These assets may be assigned to work directly for the combatant commander or the designated JTF GI&S officer to help develop and execute the GI&S support plan. The National Imagery and Mapping College may provide technical assistance to joint forces. The US Army Topographic Engineering Center, the Naval Oceanographic Office, and other Service assets may also provide assistance to joint forces as part of their Service components assigned to the operation. Information required by these DOD and Service activities includes justification for request, what expertise is needed, where support will be located, and approximately when the support will need to be in place.

g. Coordinate the early geospatial information production and collection efforts of national and theater assets. The combatant command GI&S officer must coordinate with all GI&S producers, including subordinate GI&S units, units from multinational forces, Service assets, and NIMA, to eliminate duplication of effort.

h. Identify, in coordination with the joint force staff, GI&S requirements and/or requests from multinational forces. If required, begin coordinating requests for foreign disclosure and/or release with NIMA.

i. Establish points of contact with multinational forces for supply and receipt of GI&S products and data.

4. Phase III, COA Development

At the beginning of Phase III, an NCA decision or CJCS planning directive to develop military options is issued. This directive (and required actions) are described

in Joint Pub 5-0, “Doctrine for Planning Joint Operations,” and Joint Pub 5-00.2, “Joint Task Force Planning Guidance and Procedures.” The supported commander analyzes each COA and provides recommendations to the NCA and Chairman of the Joint Chiefs of Staff (See Figure III-3). This phase ends with submission of the commander’s estimate, which includes the GI&S estimate (Appendix B, “GI&S Estimate”).

a. In this phase, the GI&S officer coordinates with NIMA for analysis of all COAs, and determines the supportability of each.

b. The GI&S officer supports other staff elements with their planning effort by providing geospatial information or guidance.

5. Phase IV, COA Selection

In Phase IV, the Chairman of the Joint Chiefs of Staff reviews and evaluates the combatant commander’s estimate and prepares

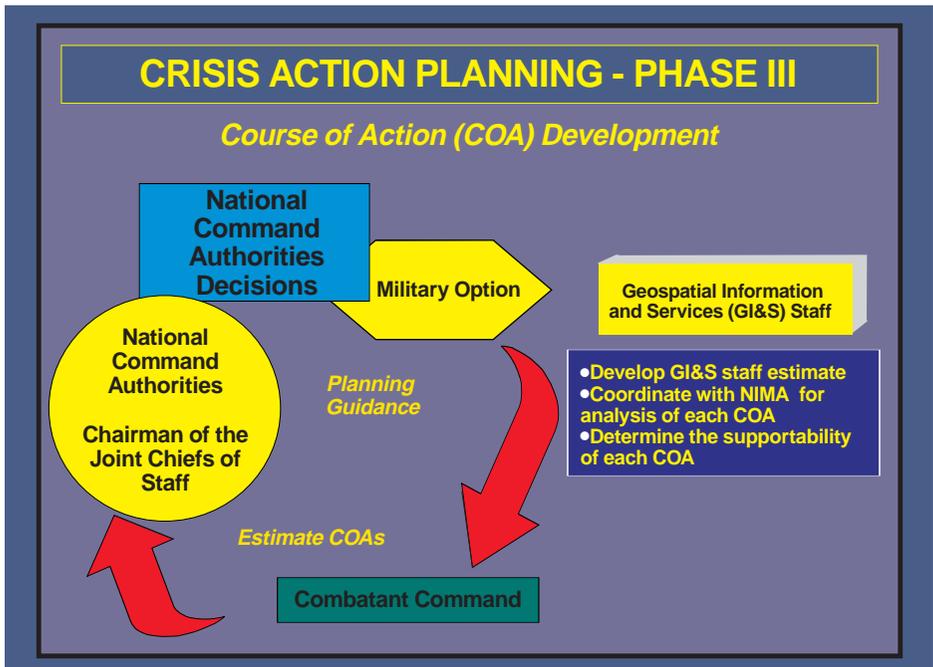


Figure III-3. Crisis Action Planning - Phase III

recommendations and advice for the NCA (See Figure III-4). The NCA selects a COA and directs that execution planning be accomplished. An alert order implements the NCA decision and contains sufficient detail to allow the joint force commander (JFC) to conduct detailed planning. A CJCS planning order could be issued to initiate execution planning before the NCA selects a COA. The focus of the GI&S staff element shifts to the COA selected by the NCA. In addition, the GI&S officer will complete the following tasks.

a. Review the checklist found in Appendix C, “GI&S Crisis Action Checklist,” for issues to consider.

b. Ensure that all subordinate joint force GI&S personnel understand the organizational structures, command, and multinational relationships established for the mission. Subordinate forces and supporting command GI&S personnel should be briefed on key C2 relationships affecting their specific responsibilities.

c. Coordinate with the J-3 and J-4 to ensure adequate lift and priority is provided for the shipment of paper maps and charts as well as electronic media.

d. In coordination with the J-6, finalize communications support for the subordinate force GI&S element so that adequate communications bandwidth exists to transmit digital geospatial information from CONUS to deployed units and data management centers. Develop backup procedures for maintaining support to units if primary communications are lost.

e. Ensure that requests for theater and national augmentation (both personnel and equipment, to include NIMA resources) are formally submitted and responses are tracked. Coordinate with the manpower and personnel officer to ensure that logistic preparations for locating and housing augmentees are underway.

f. Coordinate final personnel, systems, supply, and equipment requirements with the



Figure III-4. Crisis Action Planning - Phase IV

subordinate GI&S officer and ensure that these requirements are submitted to JOPES and the TPFDD.

g. Resolve foreign disclosure and/or release policies with respect to geospatial information and inform subordinate GI&S personnel of these procedures. Requirements to share geospatial data must be finalized and specific products or data to be shared must be identified in Annex M in the OPORD. Coordinate with NIMA for support being provided to multinational forces through the United Nations (UN), North Atlantic Treaty Organization (NATO), or other international organizations.

h. Obtain a status from NIMA on their crisis production plan to cover GI&S shortfalls.

i. Begin coordination with NIMA on in-theater map depot establishment and manning requirements.

6. Phase V, Execution Planning

This phase begins with receipt of the alert order or planning order from the Chairman of the Joint Chiefs of Staff. The approved COA is transformed into an OPORD. Detailed planning occurs throughout the joint planning community. If required, the supported commander will initiate campaign planning or refine a campaign plan already developed. The supported commander develops the OPORD and supporting TPFDD by modifying an existing OPLAN, expanding an existing CONPLAN, or developing a new plan (See Figure III-5). This phase ends with an NCA decision to implement the OPORD. In those instances where the crisis does not progress to implementation, the Chairman of the Joint Chiefs of Staff provides guidance on continued planning using either deliberate or CAP procedures.

a. The planning emphasis during this phase shifts to transportation requirements and the building of movement schedules. The movement status of GI&S forces, equipment, and geospatial data should be included in every status report and briefing prepared during the planning of joint operations.

b. GI&S officer actions during this phase including the following:

- Brief subordinate GI&S officers, NIMA, and Service geospatial information support activities on the alert or planning order;
- Finalize any remaining Phase IV or previous actions that were compressed due to the rapid development of the crisis situation;
- Refine Annex M (GI&S) to the OPORD according to CJCSM 3122.03, “Joint Operation Planning and Execution System, Vol II: (Planning Formats and Guidance)”;
- Ensure that all subordinate GI&S personnel understand the GI&S support operations concept;
- Ensure that command, control, communications, and computers (C4) relationships have been defined for GI&S support to major component forces of the subordinate joint force;
- Apprise the supported commander of the current status of GI&S capabilities and limitations as well as the status of crisis production of geospatial information; and
- Brief personnel on the complete OPORD.

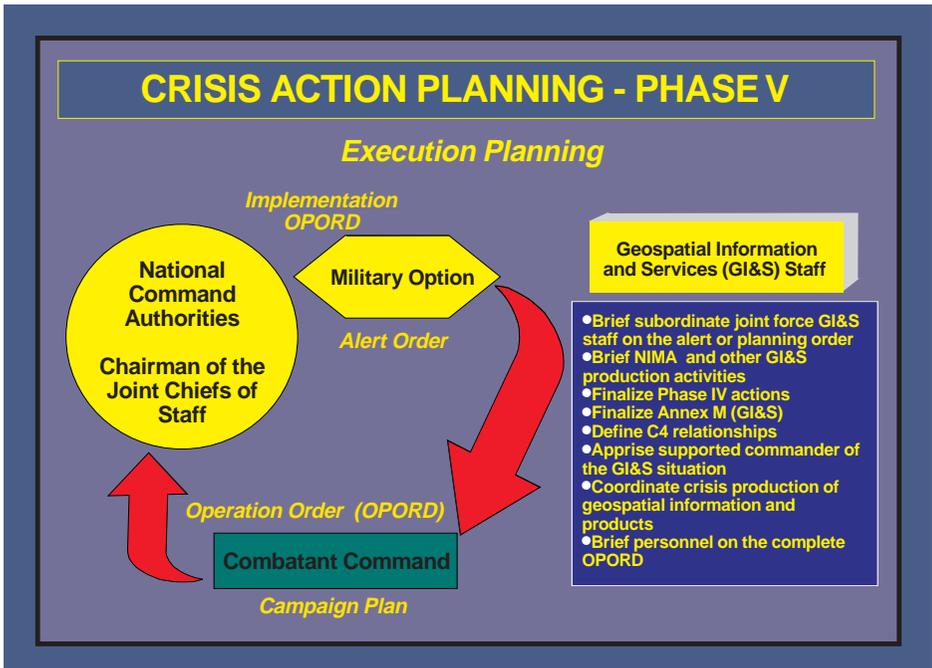


Figure III-5. Crisis Action Planning - Phase V

7. Phase VI, Execution

If the NCA decides to execute the selected COA, the Chairman of the Joint Chiefs of Staff issues an execute order to begin Phase VI, Execution. The execute order directs the deployment and employment of forces, defines the timing for initiation of operations, and conveys guidance not provided in earlier CAP orders and instructions. This phase continues until the crisis or mission ends and force redeployment has been completed. If the crisis is prolonged, the process may be repeated continuously as circumstances change and missions are revised. If the crisis expands to major conflict or war, CAP will evolve into and be absorbed within the larger context of implementation planning for the conduct of the war. As soon as the deployment begins, the supported command GI&S officer coordinates the deployment of requested GI&S augmentation of personnel and/or

equipment to the theater. The supported command GI&S officer continues to provide production guidance to NIMA and other CONUS-based geospatial data production activities, and provides taskings for in-theater assets until the subordinate joint force GI&S staff has reached operational status at the deployed location (See Figure III-6).

8. Conclusion

The requirement to plan GI&S support for crisis operations depends greatly upon the scope of the mission, how much can be adapted from existing deliberate plans, and the total time available for the CAP process. In some cases, phases may be skipped. To better prepare for this eventuality, combatant command GI&S officers should create their own crisis planning checklists and exercise them. Appendix C, "GI&S Crisis Action Checklist," provides a starting point for checklist development.



Figure III-6. Crisis Action Planning - Phase VI

CHAPTER IV

GI&S COMMAND, CONTROL, COMMUNICATIONS, AND COMPUTER SUPPORT

“During the Civil War, Grant received information by telegraph and messenger...The 21st-century commander will have real time information from all dimensions of the battlefield and must be capable of decisive action within hours if not minutes. As we insert digital technology into our battlefield systems, we are building an Army of unprecedented capability.”

General Gordon R. Sullivan
Army Chief of Staff
March 1994

1. Introduction

a. Communications and automated data processing (ADP) systems provide the basic framework for the timely dissemination of current digital geospatial information during the planning and execution phases of military operations. Communications and ADP technology are undergoing continuous evolution affecting GI&S architecture, systems, and applications. These rapid technology advances, while allowing for more data to be visualized and analyzed in better and faster ways, present tremendous challenges to operator training, integration, interoperability, and the efficient use of available resources. These challenges can be overcome by professional training, hands-on experience, realistic exercises, and careful coordination and planning throughout the GI&S community.

b. Geospatial information producers, weapons and C2 systems developers, and other ADP professionals must continuously raise the threshold of dynamic support to commanders by successfully creating and refining digital dissemination and exploitation of geospatial data. However, all development must be supported by a warfighter need — technology is not an end in itself, but rather the means to transmit and exploit geospatial information in support of the commander and

the mission. Technological development must be realistically tempered by the limitations of fielded and deployed systems and of the consumers themselves.

“The challenge for the young leaders of tomorrow is to find the proper balance between those infantrymen and the technology needed to give them the improved mobility, lethality, and survivability required to win on the battlefields of the future.”

LtGen Charles E. Wilhelm
Commander
Marine Forces Atlantic
View from the Foxhole,
Marine Corps Gazette, Aug 95

2. GI&S Communications Capabilities

a. The DOD GI&S architecture implements common procedures, standards, data formats, and interoperable software, while continuing to evolve with the “Command, Control, Communication, Computers, and Intelligence (C4I) for the Warrior” concept. This broadly connected joint system provides total battlespace information to the warrior, and establishes a global C4I capability for the warfighter to “plug in” anytime, anywhere, for any mission (See Figure IV-1).

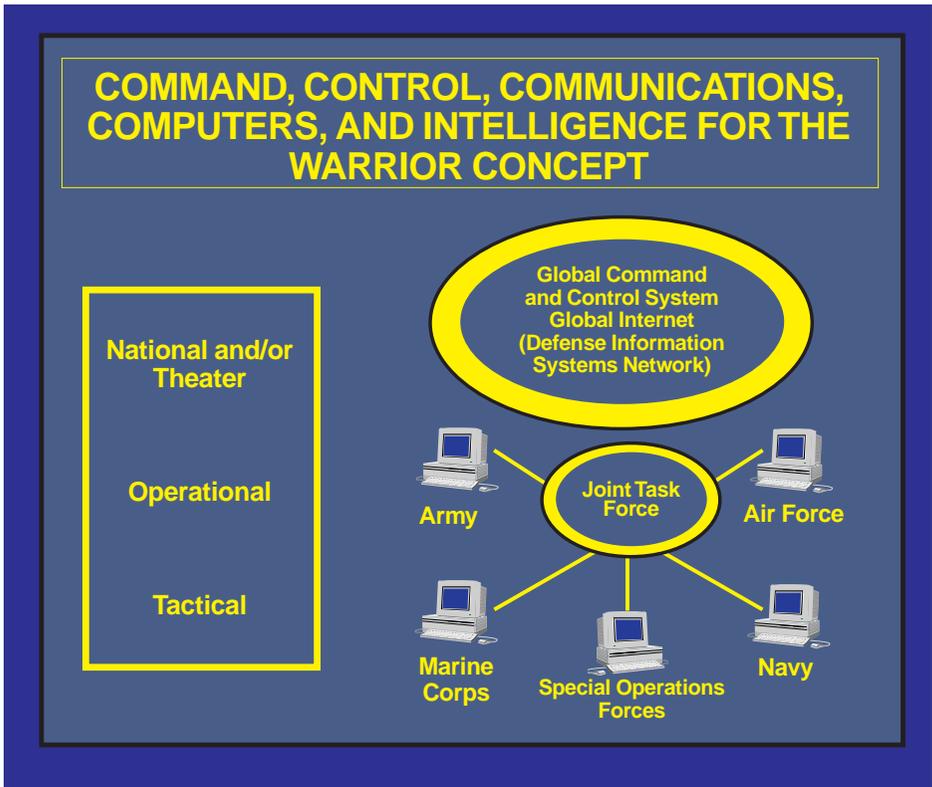


Figure IV-1. Command, Control, Communications, Computers, and Intelligence for the Warrior Concept

b. **National Imagery and Mapping Agency Support.** The Director, NIMA, as the DOD program manager for GI&S, establishes interoperability standards and data formats for joint and Service GI&S support. NIMA coordinates the national communications and ADP structure for GI&S support to the combatant commands and intelligence agencies. The combatant commands and intelligence agencies use these same standards and data formats for transmitting geospatial data to subordinate commands and joint forces.

3. Multinational Force GI&S Support and Interoperability

a. Combined operations and coalition warfare are now common for military operations, which makes the sharing of

geospatial information with allies increasingly important. There is no existing multilevel security system to facilitate dissemination of disclosable and releasable information to US, allied, and/or coalition operational commanders. Combatant commands and subordinate JTFs can request through NIMA that geospatial data be either disclosed or released to coalition and/or allied nations as necessary.

b. A subordinate joint force should be interoperable with, and have access to, theater-ADP systems and geospatial data bases, as well as allied and/or coalition force data bases and GI&S dissemination systems. For example, geospatial data may be stored on systems such as the Linked Operational Intelligence Centers Europe (LOCE). LOCE is the primary automated system for

exchanging information with NATO allies. A similar capability exists in Korea with the Pacific ADP Server Site-Korea.

4. Establishing GI&S Communications Support Requirements

a. A wide range of national, theater, and component C4 systems are available to a JFC. The continuing evolution of the primary Department of Defense Intelligence Information System (DODIIS), including the Joint Worldwide Intelligence Communications System (JWICS) and the Joint Deployable Intelligence Support System (JDISS) or client-server environment compliant workstation, provides a robust and flexible capability for a subordinate joint force. While these systems are designed and used primarily for the transfer of intelligence data, they can also be used for the dissemination of updated geospatial data. The existence of this capability does not, however, ensure that geospatial data can be disseminated without significant planning and coordination.

- When planning communications requirements, the GI&S officer identifies the type of mission, formulates the concept of operations, considers joint and Service doctrine, and determines the specific mission requirements. The GI&S officer must work closely with the J-2 and the J-6 to determine GI&S data bandwidth requirements, recommend priorities of data transmission, and develop backup plans. Supporting communications paths will require procurement or extension to link the JFC with the Defense Information Systems Network (DISN) to allow for the transmission of large geospatial data files.
- Specific mission objectives of the JFC and each of the subordinate commanders

are developed. The GI&S officer provides a list of the subordinate joint force GI&S assets assigned from national, theater, and Service levels, a specific activity timeline for operations planned for the JFC and each subordinate commander, and an estimate of the data bandwidth requirements to fill shortfalls in geospatial data transmissions.

- The J-6 determines the specific communications plan to deliver geospatial data to the JFC and to the subordinate commanders. Products include a node-to-node layout of existing and planned data transmission routes and the identification of all organizations or units that will be included on the communications architecture (See Figure IV-2).

b. Key concepts to successful GI&S support are joint interoperability, streamlined flow of information, and the provision for pull-down geospatial information tailored to the needs of the operational forces. The ability to provide the tactical commander with near real time geospatial data continues to be a critical factor that is becoming more important as supporting technology matures.

5. Combatant Commander's Communications Planning

a. Architecture Planning

- The transmission and dissemination of digital geospatial data is an evolving concept. The DOD GI&S community is involved in ongoing research to develop new and faster ways to transfer the large data files associated with geospatial information. The GI&S officer must carefully plan and coordinate this aspect of the mission with NIMA and other CONUS GI&S support activities, the J-2, the J-6, and subordinate units.

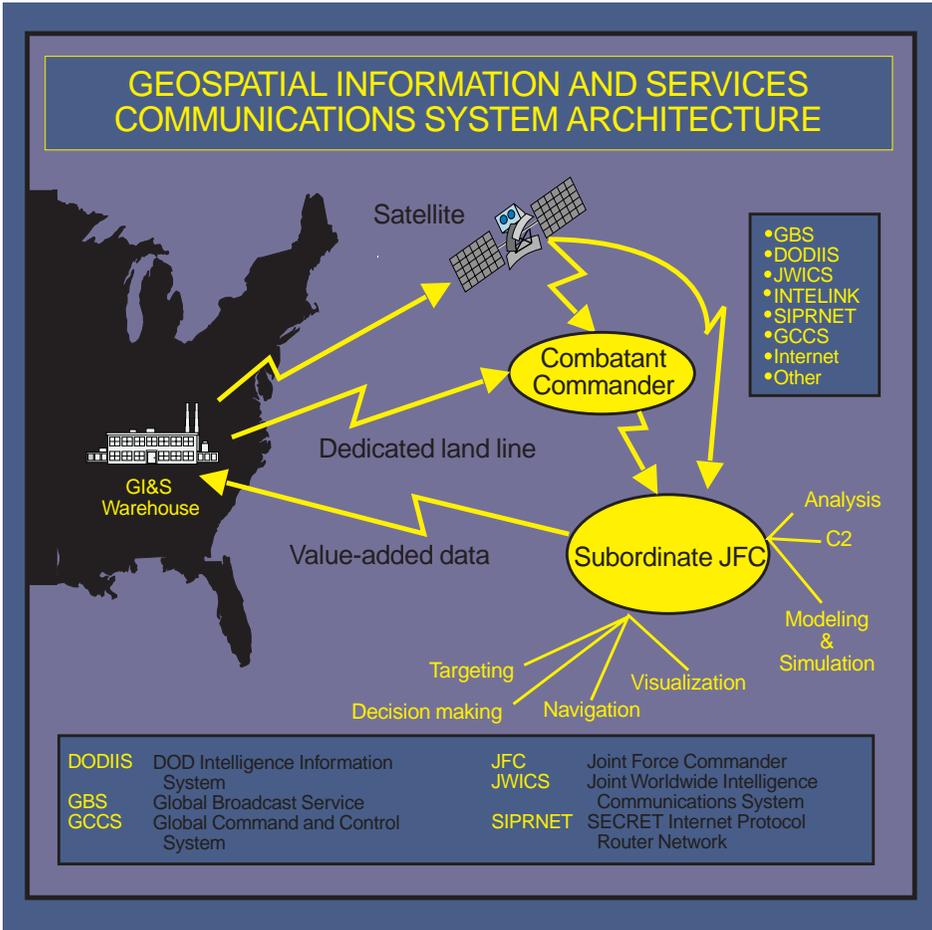


Figure IV-2. Geospatial Information and Services Communications System Architecture

- Every effort should be made for units to deploy with the most current geospatial data on electronic media such as digital tape, CD-ROMs, or removable disks. Pre-positioned geospatial data will limit the load on communications bandwidths to data updates.
- In coordination with the J-2 and the GI&S officer, the combatant command J-6 should establish an adequate GI&S communications path for the subordinate JFC and/or subordinate command prior to operational deployment (See Figure IV-3). The joint force should use established wide-area networks (WANs) as the basis for planning its

communications, ADP support, and dissemination to the joint force component commanders for both classified and unclassified geospatial data. In coordination with the J-2 and the GI&S officer, the combatant command J-6 builds a tailored, integrated communications architecture which links the JTF and subordinate forces with NIMA and other national, Service, and theater-level GI&S data bases and production capabilities. Once the architecture is defined, the GI&S officer works with the J-3 and the J-4 to update the TPFDD and the time-phased force and deployment list. The J-6 and the GI&S officer should solve any

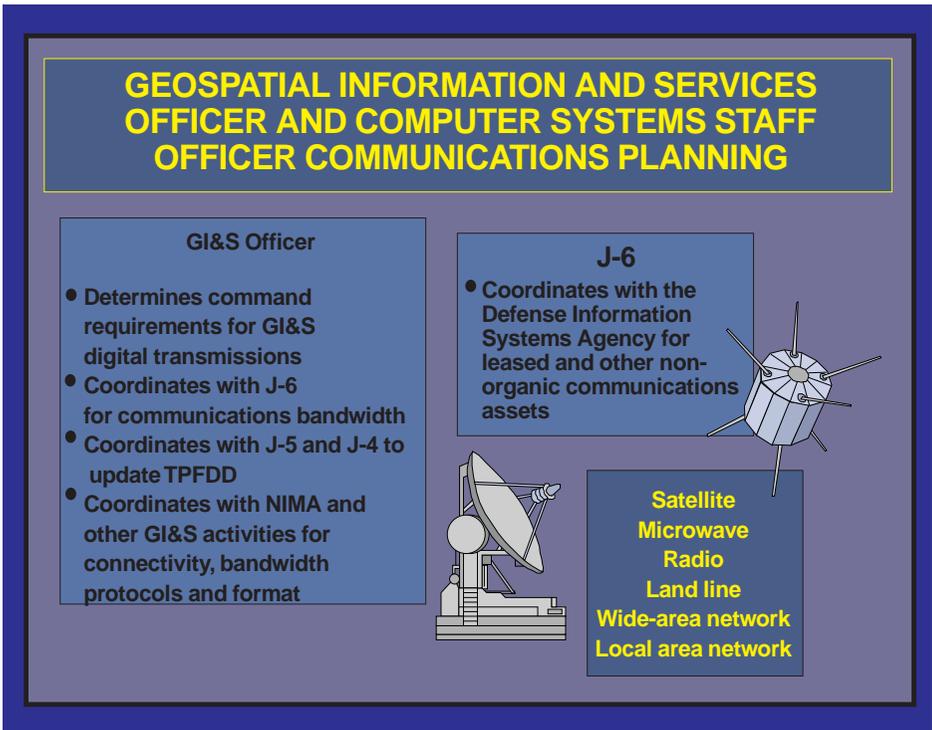


Figure IV-3. Geospatial Information and Services Officer and Computer Systems Staff Officer Communications Planning

interoperability problems prior to system deployment.

b. System Planning

- Subordinate joint force communications links include satellite, microwave, radio, landline, WANs, and local area networks (LANs). The subordinate joint force GI&S officer and J-6 identify the proper frequencies, communications protocols (bit rate, parity, and other communications protocols), network security management requirements, and other procedures required to make the architecture function properly. The resulting communications capability interfaces with NIMA’s data warehouse and other national assets, with Service data holdings, with theater data bases and with multinational forces’ geospatial data bases.

- Requests from the combatant command J-6 for Defense Information Systems Agency leased or non-organic theater communications resources may become complex. The J-6 requires detailed information for formal request documentation. Information required includes the type of telecommunications support required, proposed location(s), time required to be operational, duration, funding, capability justifications, terminal types at all locations, estimated geospatial traffic volumes, precedence and security levels, usage duration and recommended restoration priorities. The combatant command GI&S officer must coordinate with NIMA and Service assets for communications methods and hardware protocols.
- Required communications capabilities considered by the J-6 planner and the

JOINT BROADCAST SYSTEM SUPPORT TO OPERATION ASSURED RESPONSE

In early April 1996, US Navy and Marine forces were dispatched to a location off the coast of Monrovia, Liberia for the evacuation of US personnel in danger from an escalating civil war. The seaborne forces had no maps of Liberia on-board. Elements of the Naval Space Command (NAVSPACECOM) in Dalgren, Virginia, in coordination with the National Reconnaissance Office, worked to merge SPOT satellite imagery with vector feature data to create an imagery file that could be sent to the forces for operations planning. Once thumbnail views of the images were approved by command personnel aboard the *USS LaSalle*, NAVSPACECOM used the Joint Broadcast System (JBS), an early test bed for the Global Broadcast Service, to transmit the large digital image files to the command. This event marked the first use of the JBS to send geospatial information to a ship at sea during an actual operation.

SOURCE: Various Sources

GI&S officer includes channel capacity, defined as the maximum rate at which information can be sent over a communication channel without error. Imagery and other raster file transmissions are of particular concern because of their high bandwidth requirements. The J-6 and the GI&S officer must ensure that high bandwidth transmissions, such as imagery, do not preclude or delay the receipt of other transmissions (e.g., messages), thereby affecting the overall mission. The wideband circuits required to resolve this problem are costly and are not always available in tactical locations. While satellite transmissions systems offer high volume and broad coverage (compared to land line and line of sight radio systems) overall transmission capacity is limited by the available radio frequency bandwidth. Land line system capacity is limited by the amount of wire or fiber in place throughout the system.

c. Planning Considerations

- GI&S operations are rapidly evolving and testing both “push” and “pull” concepts. The “pull” concept allows

joint forces to browse through geospatial data files and acquire relevant information based upon their specific needs. These data may reside on a distributed network that remains virtually invisible to the warfighter, but is linked to many servers on a global basis. The “push” concept requires that national- or theater-level producers of geospatial data automatically send updated data (or data required for safety of navigation) to all nodes in the joint force or to a special distribution list of known users.

- The combatant command GI&S officer must identify the requirements for data base management for the operation. It is anticipated that many users will have the capability to value-add, or update the geospatial data base with more current or more detailed information. It is critical that this updated data be disseminated to all pertinent users in the theater and back to NIMA for inclusion in the DOD geospatial data warehouse. The combatant command GI&S officer, in coordination with the subordinate command GI&S officer, should identify a single point of contact for all in-theater

data base management actions. This data base manager reviews and validates any value-added data before its dissemination to other components in theater and before sending it back to NIMA.

- The requirement to exchange large quantities of data among dispersed forces places considerable demands on communications networks. The GI&S planner must understand the possible adverse effect large volumes of geospatial data may have on a limited bandwidth transmission system. **Communications systems do not have an infinite capacity.** Joint Pub 6-0, “Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations,” states, “Combatant commanders determine priorities of C4 systems and allocate communications circuits and channels (bandwidth) within the geographic or functional area of responsibility of their commands, including those required by component and other subordinate commands.”

6. Communications Systems

a. **Joint Worldwide Intelligence Communications System.** A JWICS containerized and mobile capacity has been developed to support contingency requirements through the use of military or commercial satellite or terrestrial earth terminals. The containerized JWICS is designed with six containers of video and communications gateway equipment. The mobile JWICS system is **JWICS Mobile Integrated Communications System (JMICS)**. JMICS provides a scalable, deployable JWICS that is self-contained on heavy, high mobility multipurpose wheeled vehicles for rapid deployment. Key features include satellite connectivity, facsimile, collateral, and sensitive compartmented

information (SCI), LAN-capable workstations, and JDISS network servers. JWICS is a secure (Top Secret SCI), high speed multimedia communications network designed to support intelligence production and dissemination, as well as video teleconferencing and other video transfer.

b. **Joint Deployable Intelligence Support System.** JDISS bundles commercial off-the-shelf hardware and software applications in a standard desktop environment. JDISS provides a field-deployable office automation suite that allows electronic mail and chat sessions between intelligence echelons via the site’s existing communications architecture. JDISS provides access to theater, Service, and national GI&S resources, such as data bases, basic imagery, specific GI&S tools and software, and some support functions required to execute the GI&S support mission. JDISS is the preferred method of providing secondary imagery dissemination to the combatant commanders and subordinate JFCs.

c. **INTELINK** builds on ongoing architectural initiatives at the Top Secret/SCI, Secret, and Unclassified classification levels. INTELINK provides a comprehensive set of tools to query, access, and retrieve information. INTELINK is both an architectural framework and an integrated intelligence dissemination and collaboration service providing uniform methods for access and retrieval of intelligence data. The INTELINK framework conforms to the future direction of the national information infrastructure. Patterned after the internet and using web browser technology, INTELINK is part of an overall effort to reduce duplication among the various agencies and services, enhance interoperability, modernize systems, and leverage the impressive developments by the commercial sector in multimedia computing and communications fields.

7. Communications and ADP Systems and Networks

Joint Pub 6-0, “Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations,” provides more information on the systems briefly described below.

a. **DODIIS** is the intelligence component of DISN, the DOD telecommunications infrastructure that supports military operations. DODIIS defines the standards for intelligence system and application interoperability. DODIIS tools support movement of data between NIMA, the combatant commands, the Services, and other geospatial production activities and users worldwide. This program includes access to on-line data bases with digital geospatial data, and allows for the “pull” of information, CD-ROM storage, document imaging, electronic publishing, and networked (via internal LANs or JWICS) mass storage devices to contain large volumes of digital geospatial data.

b. **The SECRET Internet Protocol Router Network (SIPRNET)** is the secret-level WAN, with a worldwide backbone router system. Various DOD router services and systems are migrating onto the SIPRNET backbone router network to serve the needs of the users.

c. **Global Command and Control System (GCCS)**

- GCCS was implemented in accordance with the C4I for the Warrior concept. GCCS is a deployable C2 system that supports joint and multinational operations throughout the range of military operations anytime and anywhere in the world with compatible, interoperable, and integrated C4I systems. GCCS incorporates policies, procedures, reporting structures, trained

personnel, automated information processing systems, and connectivity to provide up to Secret information necessary to plan, deploy, employ, and sustain forces.

“The new technology that is already at hand has huge implications for the future, and we need to take a hard look at how we can adapt to it before someone else shows us how... across the battlefield.”

General Charles C. Krulak
Commandant of the Marine Corps
Embracing Innovation,
Marine Corps Gazette, Jan 96

- GCCS meets the C2 requirements of the NCA through the subordinate joint force by encompassing four main communities: national (NCA, the National Security Council, and CJCS and Service headquarters); theater (supported combatant commands and other component commanders); the subordinate JFCs and their component commanders; and supporting groups (supporting combatant commands and their component commanders, Service major commands, UN and allied commands, and other US Government agencies such as the Defense Intelligence Agency, NIMA, the Department of State, and the Department of Transportation (the US Coast Guard). GCCS provides analytical tools, information processing technologies and other GI&S tools through interoperable map software such as the Joint Mapping Tool Kit. At all user levels, the system is able to provide geospatial information on a pull basis so that the user can tailor information requirements. Push updates automatically distribute critical changes to ensure that the warfighter receives current information. The intent is to meet multiple users’ requirements by

providing concise information tailored to the users' needs on a single system that eliminates multiple platform displays.

d. **Global Broadcast Service** is an information service that uses commercially developed direct broadcast technology to provide a wide range of information, including geospatial data, to the warfighter. This simplex broadcast system is initially using leased commercial satellite capacity to provide high bandwidth capability for broadcast of information such as imagery and geospatial data bases.

systems necessary to provide timely and interoperable connectivity between national geospatial information providers, the combatant command, and the supported and supporting commands. This planning is crucial for the warfighter to take advantage of the growing digital information available in the geospatial data warehouse. Data management functions must be coordinated early in the planning to assign direct responsibilities for the control and dissemination of geospatial data. The GI&S officer is responsible for ensuring the command's subordinate units are all using the same data sets which form the common operating picture of the battlespace.

8. Conclusion

The J-6 must carefully coordinate with the GI&S officer for the C4 architecture and

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APPENDIX A

GI&S DELIBERATE PLANNING CHECKLIST

Phase/Step	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase I - Task Assignment	<ul style="list-style-type: none"> • Receive tasking document 	<ul style="list-style-type: none"> • None
Phase II - Concept Development		
Step 1: Mission Analysis	<ul style="list-style-type: none"> • Combatant commander and staff read tasking document • Staff obtains combatant commander's initial guidance • Determine specified, implied, subsidiary, and essential tasks (J-3/J-5) • Prepare draft mission statement (J-3/J-5) • Review apportioned force list (J-3/J-5) • Review enemy capabilities (J-2) • Define tentative AOI boundaries to include areas for mission rehearsal and staging (J-5) • Review AOI terrain (J-2) • Identify controlling factors levied by higher authority (constraints and limitations) • All staff elements make initial assumptions 	<ul style="list-style-type: none"> • Review tasking document • In coordination with J-5, determine area of interest (latitude/longitude coordinates) • Determine if datum issues exist; provide recommendation • Notify NIMA of area of interest limits • Request NIMA assessment of geospatial coverage for area of interest • Determine GI&S needs based on force structure and weapons systems, C2 and intel needs • Determine plan's geospatial information C-rating, based on available geospatial data versus needs • Determine acceptable C-rating • In conjunction with NIMA, determine production strategy to fill shortfalls • Determine specified, implied, subsidiary, and essential GI&S tasks • Develop draft GI&S mission statement • Assist the J-2 with the JIPB process

Phase/Step	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase II - Concept Development (cont'd)		
Step 5: CINC's Strategic Concept (cont'd)	<ul style="list-style-type: none"> ● Transmit strategic concept to Chairman of the Joint Chiefs of Staff for review (J-5) ● Staff obtains commander's initial guidance 	<ul style="list-style-type: none"> ● Verify all GI&S assumptions; ensure these are included in "Assumptions" paragraph of the strategic concept ● Refine GI&S mission statement to match commander's chosen COA ● Develop GI&S concept of operations ● Develop commander's intent for GI&S ● Determine and assign tasks to subordinates, supporting combatant commands, and agencies ● Develop GI&S coordinating instructions ● Develop concept for logistic support for GI&S operations and coordinate with J-4 ● Develop GI&S communications architecture in coordination with the J-6 ● Develop command relationships for GI&S operations
Step 6: CJCS Review	<ul style="list-style-type: none"> ● Chairman of the Joint Chiefs of Staff receives CINC's strategic concept ● Joint Staff disseminates strategic concept to Services and DOD agencies for review ● Joint Staff assembles and transmits review comments to combatant commander ● If necessary, combatant commander adjusts strategic concept per CJCS guidance 	<ul style="list-style-type: none"> ● Provide NIMA and supporting combatant command's GI&S officers with copies of GI&S estimate ● Develop draft Annex M (GI&S); provide to NIMA for comment

Phase/Step	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase III - Plan Development (cont'd)		
Step 2: Support Planning (cont'd)		<ul style="list-style-type: none"> • Task Service components and supporting combatant commands to determine basic loads and war reserve for geospatial data (both hardcopy maps and charts and digital data stored on media) • Task Service components and supporting combatant commands to TPFDD GI&S basic loads • Task Service components and supporting combatant commands to include war reserve in the TPFDD (if not already stored in-theater) • Develop GI&S sustainment flow and TPFDD in coordination with NIMA • Task Service components and supporting combatant commands to develop AD accounts with NIMA to support unit basic load and/or planning stock requirements • Develop AD listing to cover requirements of combatant command and/or JTF headquarters
Step 3: Nuclear Planning	<ul style="list-style-type: none"> • J-2, JTF Staff, and US Strategic Command conduct target planning and will request NIMA to produce precise points as required to support the mission 	<ul style="list-style-type: none"> • Assist staff target planning efforts by coordinating with NIMA • Assist NIMA efforts to acquire source imagery by obtaining command emphasis for high priority NIMA source taskings

Phase/Step	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase III - Plan Development (cont'd)		
<p>Step 4: Transportation Planning</p> <p>Step 5: Shortfall Identification</p> <p>Step 6: Transportation Feasibility Analysis</p> <p>Step 7: TPFDD Refinement</p> <p>Step 8: Documentation</p>	<ul style="list-style-type: none"> • Ensures Service components enter all force and non-unit records into the TPFDD • Coordinate with USTRANSCOM to run simulations of strategic deployments • Review transportation simulations to ensure forces and equipment flow into theater according to the concept of operations • Assess operational impact of late arrivals in-theater; examine alternatives • J-4 or J-5 may attend or conduct a transportation feasibility conference • J-5 and USTRANSCOM conduct a transportation refinement conference to resolve issues of strategic movement • J-5 ensures all written aspects of the plan are completed, to include the TPFDD • J-5 prepares the plan for commander signature and submission to the Chairman of the Joint Chiefs of Staff for review 	<ul style="list-style-type: none"> • Ensure that list of GI&S forces, non-unit cargo, personnel, and equipment is complete • Review transportation simulations to ensure GI&S forces arrive in-theater according to the GI&S concept of operations • Assess operational impact of late arrivals in-theater; examine alternatives • Assist J-4 or J-5 in transportation feasibility assessments. Provide input for the movement of GI&S assets and resources • Continue to provide input concerning the movement of GI&S assets and resources • Complete final version of Annex M and appendices; provide to J-5 • Provide Annex M to NIMA, subordinate components, and supporting combatant commands • Complete all MOUs and GI&S agreements; include in written plan
Phase IV - Plan Review	<ul style="list-style-type: none"> • Joint Staff Director for Operational Plans and Interoperability reviews the plan with the assistance of the Joint Staff, the Services, and Defense agencies. The review is normally completed within 60 days 	<ul style="list-style-type: none"> • Coordinate with NIMA for the formal review of Annex M

Phase/Step	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase V - Supporting Plans	<ul style="list-style-type: none"> ● Combatant command J-5 ensures supporting commanders, joint forces, and Service components prepare their supporting plans 	<ul style="list-style-type: none"> ● Resolve open issues with subordinate command and supporting command GI&S officers ● Resolve all open issues with NIMA ● Review subordinate commands' and supporting combatant commands' GI&S Annexes ● Track geospatial information requirements production

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APPENDIX B

GI&S ESTIMATE

The GI&S estimate is an appraisal of available GI&S for a specific situation in a certain region of the world. It is used to determine the supportability of a COA, depending upon the GI&S requirements for planning and execution. The format for the GI&S estimate is included below.

SAMPLE GI&S ESTIMATE FORMAT

GI&S ESTIMATE

SECURITY CLASSIFICATION

Originating Section Issuing Headquarters*
Place of Issue
Day, Month, Year

GI&S STAFF ESTIMATE NUMBER**

- () REFERENCES: a. Maps and Charts.
b. Other relevant documents.

1. () Mission. State the assigned task and its purpose. The mission of the command as a whole is taken from the commander's mission analysis, planning guidance, or other statement.

2. () Situation

a. Definition of the area of interest. Describe the limits of the area of interest both in terms of natural or cultural features and/or latitude and longitude coordinates. If the area of interest limits are difficult to describe, a map with the appropriate boundaries should be appended.

b. Assigned or apportioned GI&S assets. Identify those forces which can perform one or more of the following GI&S functions:

- map and chart distribution
- digital dissemination of data
- battlespace analysis
- paper map or chart production and reproduction
- digital data production
- geodetic surveying
- command and control of GI&S assets
- geospatial data base management
- value-add to GI&S data sets
- construction of modeling and/or simulation data bases
- mensurated point production
- hydrographic surveying

*When this estimate is distributed outside the issuing headquarters, the first line of the heading is the official designation of the issuing command, and the ending of the estimate is modified to include authentication by the authorizing section, division, or other official according to local policy.

**Normally, these are numbered sequentially during a calendar year.

SECURITY CLASSIFICATION

SECURITY CLASSIFICATION

c. Facts and assumptions. Facts and assumptions are usually generated during the mission analysis process, and may include items pertaining to release and disclosure of GI&S products to multinational forces, transportation availability, and digital communications availability.

d. GI&S considerations. Example items are:

- datum determination
- standard GI&S product and data availability
- data currency
- availability of national source imagery and commercial imagery
- GI&S support to and from multinational forces
- existing GI&S agreements between foreign countries
- war reserve stock and basic load considerations
- sustainment of geospatial data
- sustainment of GI&S assets and personnel
- creation and manning of forward map depots
- data requirements for mission rehearsal areas

3. () Analysis of Courses of Action. The following are examples of factors the GI&S officer can use to weigh courses of action:

- GI&S forces and functions: The COA employs forces to cover the greatest number of GI&S functions.
- Datums and interoperability: Assesses each COA by comparing forces and/or systems to the actual geographic footprint of the area of interest and its associated datum(s).
- Allied and/or coalition operations: Assessment of how each COA facilitates allied or coalition operations.
- Geospatial information coverage: Assessment of each COA for the geospatial data availability over the area of interest (if COAs have somewhat different geographic boundaries).
- NIMA supportability: An assessment by COA from a NIMA supportability perspective.
- Simplicity of GI&S distribution and digital dissemination: Assessment by COA of the probable scheme for distributing paper maps and charts and the digital dissemination of geospatial data.
- C2 of GI&S assets: Assessment of the COA from a C2 perspective.
- Unit basic loads and war reserve stock: Assessment of the COA for requirements for operational forces for both paper and digital geospatial data.

4. () Comparison of Courses of Action. Using the factors stated above and others, the GI&S officer compares the different courses of action to determine if GI&S supportability is a factor for execution.

SECURITY CLASSIFICATION

SECURITY CLASSIFICATION

5. () Conclusions. Once the analysis is complete, the GI&S officer should either make a recommendation for a single COA, or state that none of the COAs are adversely affected by the current GI&S situation.

(signed)

(The staff division chief [J-2 or J-3] signs the GI&S staff estimate. If the estimate is to be distributed outside the headquarters, the heading and signature block must be changed to reflect that fact.)

ANNEXES: (By letter and title) Annexes should be included where the information is in graphs (such as geospatial data coverage graphics) or is of such detail and volume that inclusion makes the body of the estimate cumbersome. They should be lettered sequentially as they occur throughout the estimate.

DISTRIBUTION: (According to procedures and policies of the issuing headquarters)

APPENDIX C

GI&S CRISIS ACTION CHECKLIST

Phase	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase I - Situation Development	<ul style="list-style-type: none"> ● Begin monitoring and reporting on the situation ● Establish a crisis action team to track the situation ● Begin the mission analysis process; defines the mission ● Identify available forces ● Identify major constraints ● Inform the Chairman of the Joint Chiefs of Staff of any actions or plans being taken (COA development) 	<ul style="list-style-type: none"> ● Provide planning maps, charts, and digital data to the staff ● Understand enemy and friendly situations ● Define the boundaries of the AOI and provide warning order to NIMA ● If required, request GI&S staff augmentation from NIMA or Service assets ● Review combatant commander guidance ● Assist the staff in the COA development ● Determine what forces and weapons systems are being considered for employment ● Assist the J-2 with the JIPB process ● In conjunction with NIMA, determine area requirements for GI&S support ● Request NIMA “freeze” issue of products that cover the AOI, except for small quantities for planning ● Coordinate with subordinate command and supporting combatant command GI&S officers ● Develop GI&S facts and assumptions ● Identify any datum issues in the AOI; make a preliminary recommendation to the J-5

Phase	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase I - Situation Development (cont'd)		<ul style="list-style-type: none"> • Direct all in-theater GI&S activities to provide an immediate report (units, map depots) • Assess the possibility of multinational operations; the potential for GI&S requirements and/or productions capabilities • Begin release and disclosure assessments
Phase II - Crisis Assessment	<ul style="list-style-type: none"> • Continue mission analysis and situation monitoring • Review existing OPLANs and CONPLANs for applicability to the situation • Evaluate disposition of assigned and available forces • Evaluate status of assigned theater transportation assets • Brief commander as necessary on the situation and ongoing planning actions 	<ul style="list-style-type: none"> • Continue actions begun in Phase I • Review Annex M of similar OPLANs and CONPLANs • Provide guidance to NIMA, subordinate and supporting GI&S officers for product requisitioning (project codes, quantity limits, priority units, and other related areas) • Evaluate most current status of GI&S units and activities • Receive NIMA's initial assessment of product and data availability and suitability • Determine geospatial data shortfalls • In conjunction with NIMA, determine priorities for crisis production • Consider substitute products or data production such as single color overprints, image maps, native edition maps, and charts
Phase III - Course of Action Development	<ul style="list-style-type: none"> • Receive and evaluate CJCS warning order 	<ul style="list-style-type: none"> • Determine what organic or other available Service GI&S assets can provide to the crisis production effort

Phase	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase III - Course of Action Development (cont'd)	<ul style="list-style-type: none"> • Develop and evaluate tentative COAs • Develop TPFDD • With USTRANSCOM, conduct transportation feasibility analyses • Prepare commander's estimate with analysis of all COAs • Provide a recommended COA 	<ul style="list-style-type: none"> • Keep NIMA informed • Review the CJCS warning order; ensure NIMA has a copy • Determine deadline for the submission of the commander's estimate; determine deadline for GI&S estimate • Assist the staff in the COA development and recommendation • Develop a GI&S concept of operations for each COA under consideration • Determine need for map depots to be established in-theater • Determine GI&S forces required for each COA • Prepare a GI&S estimate for each COA • Provide a copy of the completed commander's estimate to NIMA • Coordinate with NIMA to "push" essential GI&S products to assigned units • Begin preparation of Annex M • When (if) JTF GI&S officer is assigned, coordinate all actions to avoid duplication of effort
Phase IV - Course of Action Selection	<ul style="list-style-type: none"> • Continue monitoring the situation and evaluating the impacts on the recommended COA • Continue transportation planning 	<ul style="list-style-type: none"> • Discuss CJCS planning order or alert order with NIMA • Complete draft Annex M; submit to NIMA for comment

Phase	Actions of Combatant Command/JTF Staff	Actions of GI&S Staff
Phase IV - Course of Action Selection (cont'd)	<ul style="list-style-type: none"> ● Await receipt of the planning order or alert order from the Chairman of the Joint Chiefs of Staff ● Await NCA decision on the selection of a COA 	<ul style="list-style-type: none"> ● Work with J-4 and J-5 for transportation planning of GI&S products to deploying units and map depot(s) ● Work with J-6 to determine paths for distribution of digital geospatial information to units at both home station and forward-deployed sites ● Keep subordinate and supporting command GI&S officers informed
Phase V - Execution Planning	<ul style="list-style-type: none"> ● Make adjustments to COA based on NCA and/or CJCS guidance ● Prepare complete OPORD for the NCA's selected COA 	<ul style="list-style-type: none"> ● Monitor status of GI&S products and units ● Assist subordinate and supporting command GI&S officers to complete Annex M ● Maintain contact with NIMA on crisis production, distribution of products, and the availability of information in geospatial data servers; keep NIMA informed of ongoing planning activities and decisions ● Adjust GI&S support in accordance with changes to the published OPORD ● Coordinate with NIMA on the anticipated levels of GI&S sustainment
Phase VI - Execution	<ul style="list-style-type: none"> ● Receive CJCS execute order ● Issue execute order to the designated JTF 	

APPENDIX D

REFERENCES

The development of Joint Pub 2-03 is based upon the following primary references:

1. DOD Manual 4160.21-M, “Defense Utilization and Disposal Manual.”
2. DOD Instruction 5000.56, “Programming Unique Mapping, Charting, and Geodesy (MC&G) Requirements for Developing Systems.”
3. DOD Directive 5105.60, “National Imagery and Mapping Agency (NIMA).”
4. DOD Manual 5200.1, “DoD Information Security Program.”
5. Joint Pub 0-2, “Unified Action Armed Forces (UNAAF).”
6. Joint Pub 1-02, “DOD Dictionary of Military and Associated Terms.”
7. Joint Pub 2-0, “Doctrine for Intelligence Support to Joint Operations.”
8. Joint Pub 2-01, “Joint Intelligence Support to Military Operations.”
9. Joint Pub 2-02, “National Intelligence Support to Joint Operations.”
10. Joint Pub 3-0, “Doctrine for Joint Operations.”
11. Joint Pub 4-0, “Doctrine for Logistic Support of Joint Operations.”
12. Joint Pub 5-0, “Doctrine for Planning Joint Operations.”
13. Joint Pub 5-00.2, “Joint Task Force Planning Guidance and Procedures.”
14. Joint Pub 6-0, “Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations.”
15. CJCSI 3110.08A, “Geospatial Information and Services Supplemental Instruction to Joint Strategic Capabilities Plan.”
16. CJCSM 3122.03, “Joint Operation Planning and Execution System, Vol II: (Planning Formats and Guidance).”
17. CJCSM 3122.04, “Joint Operation Planning and Execution System, Vol II: (Supplemental Planning and Execution Formats and Guidance).”
18. CJCSM 3141.01, “Procedures for the Review of Operation Plans.”

19. CJCSI 3900.01, "Position Reference Procedures."
20. CJCSI 3901.01, "Requirements for Global Geospatial Information and Services (GGI&S)."
21. Military Handbook 850, "Glossary of Mapping, Charting, and Geodetic Terms."

APPENDIX E

ADMINISTRATIVE INSTRUCTIONS

1. User Comments

Users in the field are highly encouraged to submit comments on this publication to the Joint Warfighting Center, Attn: Doctrine Division, Fenwick Road, Bldg 96, Fort Monroe, VA 23651-5000. These comments should address content (accuracy, usefulness, consistency, and organization), writing, and appearance.

2. Authorship

The lead agent for this publication is the United States Atlantic Command. The Joint Staff doctrine sponsor for this publication is the Director for Intelligence (J-2).

3. Change Recommendations

a. Recommendations for urgent changes to this publication should be submitted:

TO: CINCUSACOM NORFOLK VA//J33//
INFO: JOINT STAFF WASHINGTON DC//J7-JDD//

Routine changes should be submitted to the Director for Operational Plans and Interoperability (J-7), JDD, 7000 Joint Staff Pentagon, Washington, DC 20318-7000.

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GLOSSARY

PART I — ABBREVIATIONS AND ACRONYMS

AD	automatic distribution
ADP	automated data processing
AOI	area of interest
C2	command and control
C4	command, control, communications, and computers
C4I	command, control, communications, computers, and intelligence
CAP	crisis action planning
CD-ROM	compact disk-read only memory
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CJCSM	Chairman of the Joint Chiefs of Staff Manual
COA	course of action
CONPLAN	operation plan in concept format
CONUS	continental United States
DBDB	digital bathymetric data base
DISN	Defense Information Systems Network
DOD	Department of Defense
DODIIS	Department of Defense Intelligence Information System
DTED	digital terrain elevation data
GCCS	Global Command and Control System
GI&S	geospatial information and services
IFSAR	interferometric synthetic aperture radar
J-2	Intelligence Directorate of a joint staff
J-3	Operations Directorate of a joint staff
J-4	Logistics Directorate of a joint staff
J-5	Plans Directorate of a joint staff
J-6	Command, Control, Communications, and Computer Systems Directorate of a joint staff
JCS	Joint Chiefs of Staff
JDISS	Joint Deployable Intelligence Support System
JFC	joint force commander
JIPB	joint intelligence preparation of the battlespace
JMICS	JWICS Mobile Integrated Communications System
JOPES	Joint Operation Planning and Execution System
JSCP	Joint Strategic Capabilities Plan
JTF	joint task force
JWICS	Joint Worldwide Intelligence Communications System

Glossary

LABS	laser airborne bathymetry system
LAN	local area network
LOCE	Linked Operational Intelligence Centers Europe
MOOTW	military operations other than war
MOU	memorandum of understanding
MSDS	mission specific data sets
NATO	North Atlantic Treaty Organization
NCA	National Command Authorities
NIMA	National Imagery and Mapping Agency
OPLAN	operation plan
OPORD	operation order
PFDB	planning factors data base
SCI	sensitive compartmented information
SIPRNET	SECRET Internet Protocol Router Network
TPFDD	time-phased force and deployment data
UN	United Nations
USTRANSCOM	United States Transportation Command
WAN	wide-area network
WGS-84	World Geodetic System 1984
WRS	war reserve stock

PART II — TERMS AND DEFINITIONS

area of interest. That area of concern to the commander, including the area of influence, areas adjacent thereto, and extending into enemy territory to the objectives of current or planned operations. This area also includes areas occupied by enemy forces who could jeopardize the accomplishment of the mission. Also called AOI. (This term and its definition modifies the existing term and definition and are approved for inclusion in the next edition of Joint Pub 1-02)

data base. Information that is normally structured and indexed for user access and review. Data bases may exist in the form of physical files (folders, documents, etc.) or formatted automated data processing system data files. (Joint Pub 1-02)

datum (geodetic). A reference surface consisting of five quantities: the latitude and longitude of an initial point, the azimuth of a line from that point, and the parameters of the reference ellipsoid. (Joint Pub 1-02)

Defense Information Systems Network. Integrated network, centrally managed and configured to provide long-haul information transfer services for all Department of Defense activities. It is an information transfer utility designed to provide dedicated point-to-point, switched voice and data, imagery, and video teleconferencing services. Also called DISN. (Joint Pub 1-02)

geospatial information and services. The concept for collection, information extraction, storage, dissemination, and exploitation of geodetic, geomagnetic, imagery (both commercial and national source), gravimetric, aeronautical, topographic, hydrographic, littoral, cultural, and toponymic data accurately referenced to a precise location on the earth's surface.

These data are used for military planning, training, and operations including navigation, mission planning, mission rehearsal, modeling, simulation and precise targeting. Geospatial information provides the basic framework for battlespace visualization. It is information produced by multiple sources to common interoperable data standards. It may be presented in the form of printed maps, charts and publications; in digital simulation and modeling data bases; in photographic form; or in the form of digitized maps and charts or attributed centerline data. Geospatial services include tools that enable users to access and manipulate data, and also includes instruction, training, laboratory support, and guidance for the use of geospatial data. Also called GI&S. (This term and its definition are approved for inclusion in the next edition of Joint Pub 1-02.)

Global Command and Control System.

Highly mobile, deployable command and control system supporting forces for joint and multinational operations across the range of military operations, any time and anywhere in the world with compatible, interoperable, and integrated command, control, communications, computers, and intelligence systems. Also called GCCS. (Joint Pub 1-02)

interoperability. 1. The ability of systems, units or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. 2. The condition achieved among communications-electronics systems or items of communications-electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The

degree of interoperability should be defined when referring to specific cases. (Joint Pub 1-02)

joint force. A general term applied to a force composed of significant elements, assigned or attached, of two or more Military Departments, operating under a single joint force commander. (Joint Pub 1-02)

joint force commander. A general term applied to a combatant commander, subunified commander, or joint task force commander authorized to exercise combatant command (command authority) or operational control over a joint force. Also called JFC. (Joint Pub 1-02)

joint intelligence preparation of the battlespace. The analytical process used by joint intelligence organizations to produce intelligence assessments, estimates, and other intelligence products in support of the joint force commander's decision making process. It is a continuous process that includes defining the total battlespace environment; describing battlespace characteristics; evaluating the adversary; and determining and describing adversary courses of action. The process is used to analyze the surface, sub-surface, endoatmospheric, exoatmospheric, electromagnetic, cyberspace, and human dimensions of the environment and to determine an opponent's capabilities to operate in each. Joint intelligence preparation of the battlespace products are used by other staff elements in preparing their estimates and are also applied during the analysis and selection of friendly courses of action. Also called JIPB. (This term and its definition are provided for information and are proposed for inclusion in the next edition of Joint Pub 1-02 by Joint Pub 2-0.)

Joint Operation Planning and Execution System. A continuously evolving system that is being developed through the

integration and enhancement of earlier planning and execution systems: Joint Operation Planning System and Joint Deployment System. It provides the foundation for conventional command and control by national- and theater-level commanders and their staffs. It is designed to satisfy their information needs in the conduct of joint planning and operations. Joint Operation Planning and Execution System (JOPES) includes joint operation planning policies, procedures, and reporting structures supported by communications and automated data processing systems. JOPES is used to monitor, plan, and execute mobilization, deployment, employment, and sustainment activities associated with joint operations. Also called JOPES. (Joint Pub 1-02)

Joint Worldwide Intelligence Communications System. The sensitive compartmented information portion of the Defense Information System Network. It incorporates advanced networking technologies that permit point-to-point or multipoint information exchange involving voice, text, graphics, data, and video teleconferencing. Also called JWICS. (Joint Pub 1-02)

metadata. Information about information; more specifically, information about the meaning of other data. (This term and its definition are approved for inclusion in the next edition of Joint Pub 1-02.)

mission specific data sets. Further densification of global geospatial foundation data. Information created to support specific operations, operation plans, training or system development. Information conforms to established DOD data specifications. Also called MSDS. (This term and its definition are approved for inclusion in the next edition of Joint Pub 1-02.)

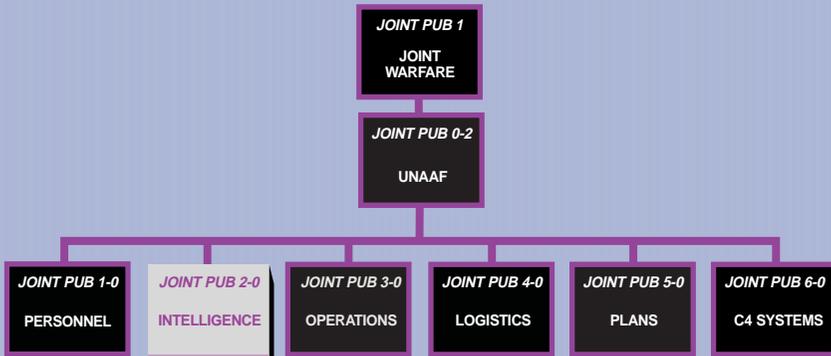
planning factors data base. Data bases created and maintained by the Military Services for the purpose of identifying all geospatial information and services requirements for emerging and existing forces and systems. The data base identifies: unit requirements, at the information content level, for geospatial data and services; system requirements for standard DOD geospatial data and services; research, development, test, and evaluation requirements for developmental systems, identified by Milestone; and initial operating capability and full operating

capability for emerging systems. Also called PFDB. (This term and its definition are approved for inclusion in the next edition of Joint Pub 1-02.)

war reserve stock(s). That portion of total materiel assets which is designated to satisfy the war reserve materiel requirement. Also called WRS. (This term and its definition modifies the existing term and definition and are approved for inclusion in the next edition of Joint Pub 1-02.)

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JOINT DOCTRINE PUBLICATIONS HIERARCHY



All joint doctrine and tactics, techniques, and procedures are organized into a comprehensive hierarchy as shown in the chart above. **Joint Pub 2-03** is in the **Intelligence** series of joint doctrine publications. The diagram below illustrates an overview of the development process:

