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Geospatial Information and Intelligence

U.S. Marine Corps

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CHANGE 1 to MCRP 2-10B.4
Geospatial Information and Intelligence

1. This publication has been edited to ensure gender neutrality of all applicable and appropriate terms, except those terms governed by higher authority. No other content has been affected.

2. File this transmittal sheet in the front of this publication.

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BY DIRECTION OF THE COMMANDANT OF THE MARINE CORPS

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FOREWORD

Marine Corps Warfighting Publication (MCWP) 2-26, *Geospatial Information and Intelligence*, complements and expands upon the information included in Marine Corps Doctrinal Publication 2, *Intelligence*, and MCWP 2-1, *Intelligence Operations*. This publication details doctrine, tactics, techniques, and procedures for conducting geospatial intelligence and supporting Marine air-ground task force geospatial information and intelligence operations.

Marine Corps Warfighting Publication 2-26 describes aspects of geospatial intelligence operations, including doctrinal fundamentals, command and control, communications and information systems support, planning, execution, equipment security, and training. This publication provides information that Marines require to understand, plan, and execute geospatial intelligence operations in support of the Marine air-ground task force and provides support information to intelligence personnel who are responsible for planning and executing geospatial intelligence operations.

This publication supersedes MCWP 2-12.1, *Geographic Intelligence*, dated 6 July 2000.

Reviewed and approved this date.

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CHAPTER 1
FUNDAMENTALS OF GEOSPATIAL INTELLIGENCE

Geospatial intelligence (GEOINT) was originally formed by integrating imagery, imagery intelligence (IMINT), and geospatial information (GI). In 2006, the meteorological and oceanographic (METOC) discipline was added as a Marine Corps capability. Advances in technology, coupled with the development of geospatial data standards, have created an environment in which the elements of GEOINT can be combined with each other as well as with other information sources. This fusion of resources has enabled the conduct of complex analysis and creation of new specialized products. Geospatial intelligence is the exploitation and analysis of imagery and GI to describe, assess, and visually depict physical features and geographically referenced activities on the Earth.

Note: Refer to Marine Corps Warfighting Publication (MCWP) 2-21, Imagery Intelligence, for details concerning the doctrine and tactics, techniques, and procedures (TTP) for IMINT and MCWP 3-35.7, MAGTF Meteorology and Oceanography Support, for the corresponding information for METOC.

Elements

The three elements of GEOINT are imagery, imagery intelligence, and GI.

Imagery is a likeness or presentation of any natural or constructed feature, related object, or activity. It is also the positional data acquired at the same time as the likeness or representation. Imagery includes information produced by space-based national intelligence reconnaissance systems and likenesses or presentations produced by satellites, airborne platforms, unmanned aerial vehicles, or other similar means. It does not include handheld or clandestine photography taken by or on behalf of human intelligence (HUMINT) collection organizations.

Imagery intelligence is the technical, geographic, and intelligence information derived through the interpretation or analysis of imagery and collateral materials.

Geospatial information is what identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth, including statistical data; information derived from, among other things, remote sensing, mapping, and surveying technologies; and mapping, charting, geodetic data, and related products. See US Code, Title 10, *Armed Forces*, for more information.

Components

Geospatial Intelligence Discipline

Geospatial intelligence encompasses all activities that are related to the planning, collection, processing, analysis, exploitation, and dissemination of spatial information that is used to gain intelligence concerning national security or the operational environment. It visually depicts this knowledge and fuses the acquired knowledge with other information through analysis and visualization processes.

Data

Geospatial data refers to any data that is used to create GEOINT products. This data can be derived from either a single source or multiple

sources that can be classified or unclassified. Geospatial data is the primary source for all elements of GEOINT. Analysts within the GEOINT discipline may also incorporate data from other intelligence disciplines, such as HUMINT or signals intelligence (SIGINT), to create fused all-source intelligence products.

Products and Services

Geospatial intelligence products range from standard geospatial data-derived products to specialized products that incorporate data from multiple sensors.

Standard Products

Standard GI products are data-derived products, such as maps, charts, imagery, or digital information to support visualization activities (a common operational picture [COP]), that may be used alone or with multiple layers of data (e.g., vegetation, culture, languages, weather) and intelligence information. Standard products are derived primarily from electro-optical sensors and existing geospatial data.

Specialized Products

Each specialized product is tailored for a particular purpose. The products may be developed using advanced technology to integrate multiple types of geospatial data, as well as data from other intelligence sources that may incorporate the dimension of time. These features enable analysts to create more comprehensive GEOINT products, such as two-color multiview, change detection, multispectral/hyperspectral, line of sight (LOS), or fly-through studies.

Services

Geospatial intelligence services include all of the tools that enable users to access and manipulate data. Such tools include geodetic surveys, software development, tailored products and services to support weapons systems, calculation of precise locations for targeting of precision munitions, training, and on-site technical support.

Marine Corps Geospatial Intelligence Enterprise

Marine Corps GEOINT enterprise provides timely, relevant, and accurate GEOINT for planning, decisionmaking, and action in support of Marine Corps joint and combined operations. It integrates GEOINT systems, sensors, processes, and organizations into the Marine Corps distributed common ground surface/system and the larger Marine Corps intelligence, surveillance, and reconnaissance-enterprise (MCISR-E) architecture. This integration, both horizontal and vertical, provides a GEOINT enterprise that is capable of supporting all Marine Corps operational objectives. The Marine Corps adheres to established data standards to facilitate data sharing across the enterprise. This compliance enables end users to manipulate existing data for their particular mission requirements rather than recollecting data from previously serviced targets.

CHAPTER 2
FUNDAMENTALS OF GEOSPATIAL INFORMATION AND INTELLIGENCE

Geospatial information and intelligence (GI&I) fuses data regarding terrain, inland and coastal water, climatology, meteorology, and cultural intelligence to display a single, comprehensive picture of the battlespace for the commander. Geospatial information and intelligence encompasses several discrete functions and associated data, including the following:

- Defining requirements for training, exercises, and operations.
- Providing a command and Service focal point for geospatial information and services (GI&S) expertise and consultation.
- Coordinating both force and staff GI&S products, data sets, and prototypes as well as specifications and standards developed and produced by the National Geospatial-Intelligence Agency (NGA).
- Providing guidance and coordination to the GI&I and other intelligence cycles.

Geospatial information and intelligence is information concerning physical aspects, resources, and artificial features of the Earth. Geospatial information and intelligence is independent of any other intelligence and can be used directly to support planning and conducting military operations. It is produced from terrain information interpreted in relation to its effects on personnel, equipment, and material (see Military Handbook NGA 850 [MIL-HDBK-850], *Glossary of Mapping, Charting and Geodetic Terms*).

The Marine Corps approaches GI&I as a component of GI&S, within the GEOINT discipline. Geospatial information and intelligence can include cross-country movement (CCM) studies, LOS analyses, natural and constructed obstacles, and various terrain studies (e.g., road, railroad, airfield, bridge, port, helicopter landing zone [HLZ]).

Geospatial information and intelligence analysis—

- Supports intelligence preparation of the battlespace (IPB) by addressing Marine air-ground task force (MAGTF) intelligence requirements (IRs) that are related to key terrain, observation and fields of fire, cover and concealment, obstacles, and avenues of approach (KOCOA).
- Includes intensification/verification of current information through comparison with data that is received from new sources.
- Incorporates clarifying detail and resolution in order to meet the defined tactical requirements, when required.

A traditional NGA map is not only GI, but also a basic form of GI&I. A GI&I production combines maps, standard NGA digital products, and intelligence sources to produce specialized intelligence that is tailored to fulfill a specific requirement related to a mission, force, or weapon system.

The value of the output that is produced from the GI&I cycle is limited by both the quality of the data input and the limitations of the geographic information system (GIS) that processes the data.

Geospatial Information

Geospatial information provides the foundation for battlespace visualization construction. It may be produced and replicated in the form of printed maps, charts, and publications; digital simulation and modeling databases; photographs; or digitized maps and charts.

Geospatial information and intelligence has replaced the traditional term geographic intelligence (i.e., mapping, charting, and geodesy) to reflect the increasing need for digital geospatial data to support the following systems:

- Intelligence.
- Command and control (C2).
- Weapons.
- Mission planning.
- High-end GISs.
- Marine Corps enterprise network (MCEN).

Military operations require GI to provide the necessary foundation for the COP and/or common tactical picture (CTP) that is the basis for all other relevant strategic, operational, and tactical information layering, subsequent planning, and decisionmaking. Digital GI forms the foundation for the MAGTF's battlespace visualization. See figure 2-1.

The National System for Geospatial Intelligence (NSG) integrates the technologies, policies, capabilities, and doctrine that are necessary to conduct GEOINT in a multi-intelligence environment. The director of NGA is the NSG functional manager. In order to exploit GI&I within the NSG, the Marine Corps must sustain a compatible global information infrastructure. It must also support joint and Service policies and doctrine; operational, systems, and technical architectures; data standards and specifications; equipment technologies; and personnel (to include their training and education).

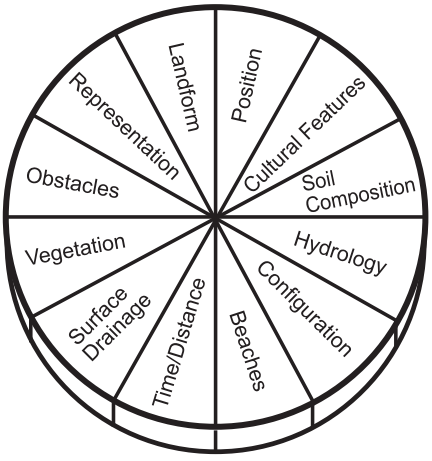


Figure 2-1. Geospatial Information.

The Marine Corps' global information infrastructure is a collaborative production environment (see fig. 2-2 on page 2-3) that supports global expeditionary missions and provides responsive access to the NSG production network that supports Service, joint, and multinational operations.

Geospatial Intelligence

Geospatial intelligence includes topography, foundation data, and mission-specific data as detailed in the following subparagraphs.

Topography

Topography is the configuration of the ground (i.e., its relief and features) and addresses both dry land and the sea floor (i.e., underwater topography). Refer to Joint Publication (JP) 1-02, *Department of Defense Dictionary of Military and Associated Terms*, for more details on topography.

Foundation Data

The NGA's foundation data is a seamless, integrated geospatial database composed of elevation data, map feature data, and reference imagery that is produced predominantly at a medium equivalency of resolution (similar to a 1:250,000 scale chart). Foundation data forms the basis of a particular geospatial foundation from which other data is referenced and has the following characteristics:

- It is one of the principal components of the Department of Defense (DOD) GI&S readiness strategy designed to meet joint and MAGTF requirements.

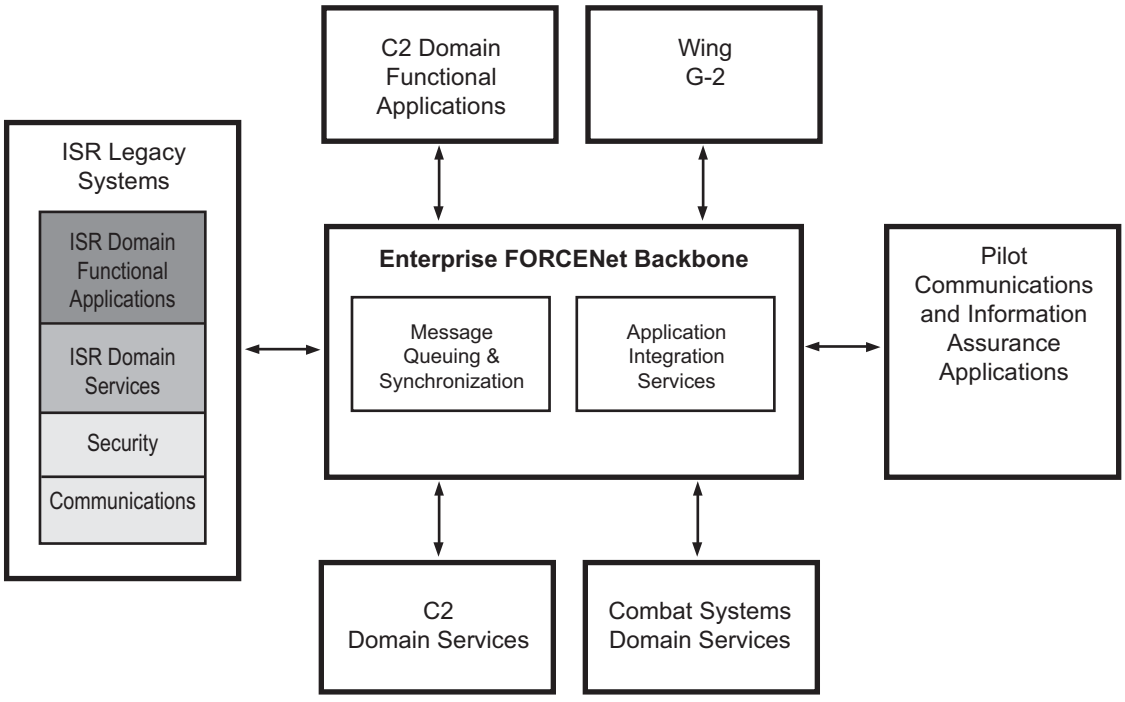
- It is relatively stable, generic information that is mission- and force-independent, specification compliant, and geopositioned to the World Geodetic System 1984 (WGS-84) datum.
- It is used primarily to support initial planning (at 1:250,000 scale) and to establish the foundation for intensification of data within the objective area that is necessary to support specific operations.

Foundation data orthoimagery occurs when transitioning from a 5-m controlled image base (CIB) to a 1-m CIB. This improvement of spatial resolution will allow for rapid generation of image maps at up to 1:5,000 scale for planning purposes (see fig. 2-3 on page 2-4.)

Mission-Specific Data

Mission-specific data is information that is created to support specific operations, operation plans (OPLANs), training, and/or system development. Mission-specific data conforms to established DOD data specifications and has the following characteristics:

- It is developed by enhancing the information contained in the foundation data set. It includes higher resolution controlled imagery, elevation and/or bathymetric depth information, and vector features (i.e., point, line, or polygon). It also includes data density, spatial accuracy, and the specificity of the available descriptive information that differentiates mission-specific data levels. Levels 1 through 5 become increasingly dense, spatially accurate, and specific.
- It is managed, manipulated, and maintained by the geographic intelligence specialist (military occupational specialty [MOS] 0261). Updated mission-specific data will be forwarded to the Marine Corps Intelligence Activity (MCIA) Geospatial Intelligence Division (GID) that is located at Quantico, Virginia. The GID conducts quality assurance checks on the mission-specific data and then forwards the final product to NGA for inclusion in the appropriate NGA database.



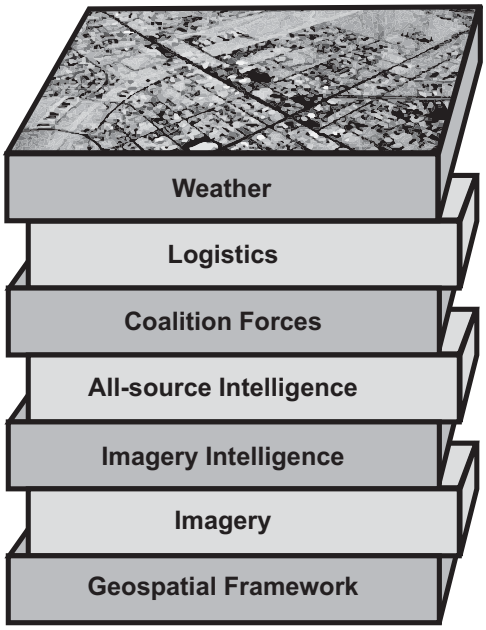
LEGEND
ISR intelligence, surveillance, and reconnaissance

Figure 2-2. Global Information Infrastructure.

Categories of Geospatial Information and Intelligence

Geospatial information and intelligence must be considered during each phase of an operation in order to minimize environmental impacts on friendly forces, while exploiting the effects of environment on enemy forces. Terrain and METOC are interdependent, so METOC conditions impact and alter the capability of terrain to bear traffic and of travelers to see terrain features. Since terrain features, such as mountains and ridgelines, can influence local weather and oceanographic elements, both METOC conditions and terrain features must be considered when planning ground, air, and logistic operations (see fig. 2-4 on page 2-5).

Geospatial information and intelligence may be classified as strategic, operational, or tactical, with each classification containing unique sets of characteristics: planners tasked with developing strategic plans also prepare for potential problems that involve GI&I in particular areas (e.g., an entire country or a continent) and for a variety of missions, while operational and tactical planners focus on missions in their area of responsibility (AOR).



An integrated view of the mission space that uses a shared framework of trusted geospatial information capable of supporting global readiness and mission specific operations.

Figure 2-3. Foundation Data.

Strategic Geospatial Information and Intelligence

Strategic GI&I is produced continuously. It requires the compilation and interpretation of information by specialized GI&I personnel and must support theater and national plans. Strategic GI&I analysis is normally keyed to small-scale or low-density source equivalents (i.e., 1:1,000,000 or smaller scale charts) that support an entire country or regional area and include macrodescriptions and analyses of the following:

- Beaches, ports, facilities, inland waterways, urban areas, and other major terrain features.
- Transportation networks and communication systems.
- Types of soils and rocks.
- Underground installations.
- Climate.
- Vegetation.
- Hydrography.
- METOC.

Capabilities of Strategic Geospatial Information and Intelligence

Strategic GI&I provides broad information that covers countries and regions. It focuses on developing the broad situational awareness to support the Office of the Under Secretary of Defense for Intelligence and the commanders of the combatant commands. Strategic GI&I, based on foundation data, provides a stable base for intelligence intensification. This stable base ensures a common operational view of the battlespace, both militarily and politically.

Limitations of Strategic Geospatial Information and Intelligence

Resolution and information density are the key limitations of strategic GI&I. Strategic GI&I, focusing on the macroview (an entire country or

region), supports strategic planning completely; however, it does not provide the critical, focused, high-density, high-resolution information that is needed to support lower-level tactical planning efforts.

Operational Geospatial Information and Intelligence

Operational GI&I is used by the combatant commanders (CCDRs), joint task forces (JTFs), Service component commands, and MAGTF command elements. It has the following characteristics:

- It is transient and requires the compilation and interpretation of information by specialized GI&I personnel who are located within the joint intelligence operations centers (JIOCs), joint analysis centers (JACs), and Service intelligence centers.
- It will normally focus on the theater of operations and is concerned with the effects that weather, enemy, and terrain (WET) have on mission accomplishment.
- It is used for planning and coordinating missions within a theater and is based on information from all-source national, theater, and other intelligence assets.
- It will focus support on several different types of missions, units, and weapon and/or mission planning systems within the commander's AOR.
- It is usually keyed to small-scale or low-density source equivalents (i.e., 1:500,000 or smaller scale charts) supporting an entire theater of operations.

Operational GI&I includes information derived from strategic analysis, but focuses more attention on detailed support for large military forces within the theater of operations and includes detailed analysis and production regarding the following:

- Landing areas and sites.
- Inland waterways.
- Urban environments.
- Transportation and communication systems.
- METOC and terrain effects on potential courses of action (COAs) within the theater of operations.

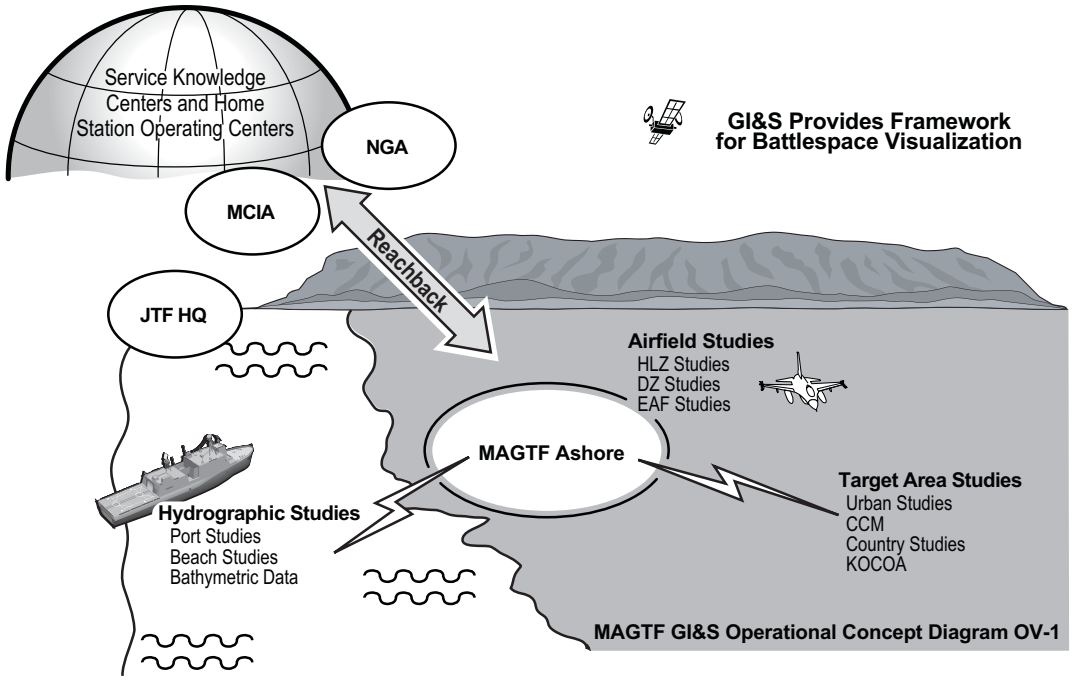


Figure 2-4. Geospatial Information and Intelligence View of the Littorals.

Capabilities of Operational Geospatial Information and Intelligence

Operational GI&I is produced for use by CCDRs, JTF command elements, and Marine expeditionary force (MEF) command elements to reduce uncertainty during IPB activities. Operational GI&I has the following capabilities:

- It includes information derived from strategic analysis.
- It supports several different missions, units, weapons, and/or mission planning systems that are operating at the same time within the commander's AOR.
- MAGTF GI&I supports the analysis of WET effects on MAGTF capabilities and plans within the area of interest (AOI). It provides detailed support for large maneuvers and other forces, such as a division or wing, within the AOI.

Key Limitations of Operational Geospatial Information and Intelligence

Operational GI&I lacks the resolution and information density that is needed to support specific tactical planning efforts and has the following key limitations:

- It is oriented toward large areas (e.g., a theater of war) for a macroview of the problem set and may include limited evaluation of specified beaches, landing zones, airfields, and road networks.
- It does not provide the critical information needed to support infantry and artillery regiments, Marine aircraft groups, and combat logistics regiments.

Tactical Geospatial Information and Intelligence

Tactical GI&I analysis and production includes information from the strategic and operational levels. Tactical GI&I, derived from commercial imagery (civilian), imagery (military), local mapping sources, local all-source intelligence collections, and production provides greater detail than the other classes of GI&I. Tactical GI&I is primarily concerned with the effects of the environment on a particular mission, unit, and/or weapon system. It is keyed to either medium- or large-scale map source equivalents and data density (i.e., 1:100,000) to support a specific mission or operation.

Specific products of tactical GI&I include CCM analysis, line of communications (LOC) analysis, and a more focused evaluation of the commander's logistical support requirements (e.g., staging areas or depot sites within the area of operations).

Note: Marine expeditionary force staff planners focus on the AOR at a 1:250,000 scale equivalent with the appropriate data density (although 1:50,000 and 1:100,000 scale products are needed for specific requirements), while their major subordinate commands (MSCs) need analysis that contains greater detail to support specific mission requirements.

Capabilities of Tactical Geospatial Information and Intelligence

Tactical GI&I addresses the effects of METOC and terrain on specific operations of the MAGTF (i.e., a particular mission, unit, weapon, and/or mission planning system). Tactical analysis for each mission focuses on intensifying and integrating GI from all geospatial sources and value adding local all-source intelligence.

In 1968, Marines manned the combat base at Khe Sanh, South Vietnam, located on the eastern slopes of a plateau with drainage into the Rao Quan River. Marines called the drainage "the fog machine." Prevailing winds channeled moist, warm air up the drainage, forming orographic fog over the runway and open areas of the base, often when the rest of the plateau was cloud-free. Various other geographic and climatic factors caused nearly constant fog and low ceiling over this isolated Marine outpost for much of the year. Poor visibility often left the base without close air support and/or aerial resupply and placed the Marines at great risk from surrounding North Vietnamese forces.

In the situation from the vignette, analysis by GI&I personnel in advance of tactical operations may have led to the selection of a site that would not have been as affected by the orographic fog and therefore more operationally suitable than Khe Sanh proved to be.

Limitations of Tactical Geospatial Information and Intelligence

Tactical GI&I has limited time available to collect, integrate, process, analyze, and produce tailored products that support the MAGTF commander's IRs. Additionally, the MCEN limits the MAGTF's ability to disseminate these products to lower echelons of command.

Support to Intelligence Functions

During the deliberate planning process, GI&I provides information to support AOI battlespace visualization. This information enables planners to assess the enemy and friendly COAs based upon potential environmental conditions within the AOI.

During crisis planning, GI&I allows planners to initiate planning. The geographic intelligence specialist accelerates the GI&I production and intensification processes in order to provide the mission-specific data required for MAGTF mission execution.

Commander's Estimate

Geospatial information and intelligence provides topographic, environmental, and meteorological information to support both the commander's visualization of the battlespace and his/her estimate of the situation. Once GI&I has been analyzed, it can be fused with other intelligence to support the commander's situational awareness, planning, and decisionmaking, allowing commanders at all levels to anticipate and react quickly to evolving situations.

Situation Development

When potential trouble spots are identified, MAGTF geographic intelligence specialists use existing geospatial databases to support planning and situational awareness. As the situation develops, geographic intelligence specialists rely on indications and warnings to provide the lead time that is needed to collect information. They integrate terrain and METOC studies into the database and work to ensure that a seamless geospatial foundation is available to support MAGTF planning.

Force Protection

Geospatial information and intelligence uses high-resolution data and mission-specific data to provide analysis to support maneuver, engineering, and barrier operations as well as the unique missions that are associated with rear area operations. Geospatial information and intelligence is used to identify ingress and egress routes, locations for defensive barriers (both natural and constructed features), potential obstacles needing reinforcement, and mobilization locations.

Targeting

Foundation data provides high-resolution, orthorectified, and georectified stereoscopic imagery for accurate identification and location of potential targets within the area of operations. Analysis of the surrounding environment supports evaluation of all military aspects of the terrain that could affect weapon delivery systems. Such analysis also identifies potential air and ground ingress and egress routes to be used in conjunction with planned fires.

Combat Assessment

The IPB process, including WET, is critical for situational awareness; COA development; and identification of targets, decision points, and tactical visualization of the battlespace. Geospatial

information and intelligence provides the foundation for the integration of all assessment criteria (i.e., operations, logistics, and communications) and supports the rapid intensification and deconfliction of tactical intelligence within a target area.

Support to Operations

Since air, ocean, and land environments affect the composition, deployment, employment, sustainment, and redeployment of every MAGTF, MAGTF operations require a common geographic reference. Geospatial databases provide the common reference for different missions, forces, and weapon systems that are needed to create a common view of the battlespace. This geospatial foundation, portrayed in the COP/CTP, facilitates the accurate positioning of information in operational and tactical contexts. In addition, GI&I and METOC support the IPB and Marine Corps Planning Process (MCPP) by portraying intelligence information in relationship to the environment, threat, and friendly forces. Geographic information and intelligence also support the evaluation of different COAs based on friendly and enemy capabilities and limitations related to environmental factors.

Command and Control

Command and control encompass critical support to all warfighting functions and operations, enabling a commander to recognize what needs to be done and then direct the appropriate action to accomplish the task. The ability to visualize and assess the battlespaces, forces, weapon systems, and their interaction are essential to command and control.

Accurate depiction of the environment and all entities that are operating within it depends on the resolution level and detail of the GI&I and its integration with other intelligence. Though many Marines engaged in C2 processes have developed the ability to picture the battlespace, it is very difficult to convey that picture and intent to other friendly forces without effective command and control and MCEN. This capability requires a well-developed GI&I foundation for anchoring mission-specific information. The requirements for higher levels of geospatial resolution and detail to support command and control have encouraged GI&I to find more effective ways of providing the geospatial foundation for both the COP and CTP.

Maneuver

The C2 network, connectivity, and display directly support maneuver operations by providing detailed, mission-essential GI&I to the operating forces.

Identifying key transportation and main supply routes to facilitate the rapid movement of personnel and materials is critical to battlefield support. Detailed visualization of the terrain supports rehearsal during all phases of operations and the rapid transition of maneuver and supporting forces from ship to shore during amphibious operations. Maneuver is affected by the following various natural and constructed conditions:

- Surface materials, such as soils, rocks, and vegetation.
- Surface configuration.
- Cultural and other human modifications of the terrain and their impact on the Earth's physical features (i.e., obstacles).
- Surface water conditions.
- Surface drainage.
- Hydrographic effects.
- Precipitation.
- Visibility.
- Wind.

The effect of weather on soil and slope must also be considered. Obstacle factors include—

- Slopes that exceed the maximum angle that a vehicle can climb.

- Cultural modifications, such as ditches, fences, plowed fields, irrigation, or drainage, that may alter the natural soil strength.

In some areas, only one obstacle factor may determine whether terrain is navigable by vehicles, but, more commonly, it is the combination of two or more factors that determines whether vehicles can move across terrain. Obstacle factors determine whether terrain is nonrestricted, restricted, or severely restricted.

Fire Support

The accurate positioning of weapon systems and integrated GI&I ensure that fire support planners have the information needed to place rounds on the target accurately. The potential impact of terrain and METOC on weapon systems must be reflected in the detailed descriptions of both high-value targets and high-payoff targets.

Aviation

A thorough analysis of the airspace within the MAGTF's AOR must consider both GI&I and METOC. The GI&I analysis—

- Provides the geospatial foundation for determining the most effective deployment positions for both enemy and friendly air defense weapons and radar.
- Assists the commander in maximizing battlespace air interdiction efforts and planning counterairborne and air assault operations.

When integrated with a METOC analysis, GI&I—

- Provides the geospatial foundation for determining the routes by which aircraft can enter and exit an area of operations.
- Identifies air avenues of approach (AAs) and air mobility corridors.
- Provides the geospatial foundation for determining where aircraft can ingress and egress target areas while being screened from enemy air defense weapons and radar, when terrain-masking analysis is integrated with aircraft attack profiles.
- Determines the best areas and best approaches to those areas for HLZs, drop zones (DZs), and forward arming and refueling points.

Logistics

The extent and general nature of the transportation network are key concerns for operational planners. Geospatial information and intelligence support to logistic operations includes the transportation infrastructure analysis of an area (e.g., road networks, railways, or waterways on which forces and supplies can be moved). The importance of a particular facility is relative to both the type of operation and the units involved in that operation. For example, an area with a dense transportation network is normally favorable for major operations; whereas, an area crisscrossed with canals and railroads, but with few roads, can limit the use of wheeled vehicles and the maneuver of armor and motorized convoys.

Railroads and highways extending along the axis of advance may assume greater importance than those that are perpendicular to the axis. Therefore, when preparing GI&I studies and databases in support of MAGTF operations, planners must carefully evaluate all transportation capabilities and limitations to determine their effect on possible COAs.

Multilevel Geospatial Information and Intelligence Support Operations

Marine Expeditionary Force

Geographic information and intelligence support operations for the MAGTF depend on the information provided by the topographic platoon. In order to provide a push/pull information management capability to all levels of the MAGTF, the topographic platoon is tied to both the MAGTF

intelligence operations center (IOC) and the supporting MCEN.

The geographic intelligence specialist connects to the NSG and supports intensification and integration of multisource geospatial databases. Topographic platoons, intelligence battalions, and the MEF G-2 provide the MAGTF with general support. Topographic and METOC personnel provide comprehensive GI&I support to all units and METOC collection and production capabilities can produce and disseminate geospatial products. Additional information regarding MAGTF METOC support operations is found in MCWP 3-35.7.

Geographic intelligence specialists and METOC personnel provide organic support to the following MEF MSCs:

- Marine division (MARDIV) support is provided by organic personnel.
- Marine aircraft wing (MAW) support is provided upon request by personnel from the intelligence battalion.
- Marine logistics group (MLG) support is provided by organic personnel.
- Marine expeditionary brigade (MEB) support is provided by a detachment of augment personnel from the intelligence battalion, which is task-organized to support the operational mission.
- Marine expeditionary unit (MEU) support is provided by augment personnel from the intelligence battalion. Within the MEU command element, GI&I is produced by the geographic intelligence specialists. Geospatial information and intelligence systems are connected to shipboard communications. By using the ship's enterprise architecture, geographic intelligence specialists can facilitate reachback to the MEFs, topographic platoons (also known as topo plts), and the MCIA. This reachback capability provides the MEU with substantial GI&I production resources that enable them to integrate, deconflict, and intensify the land, air, and water interface environment into the rapid response planning process.

  Note: When the MEU is detached from the MEF, it is under the operational control of its assigned fleet.

United States Marine Corps Forces, Special Operations Command

Geographic intelligence specialists are organic to Marine Corps special operations command (MARSOC). These Marines are integrated into the Marine special operations team and, when required, into other Marine special operations forces. Geographic intelligence specialists are responsible for—

- Providing operational GEOINT support (i.e., collection, analysis, production, and dissemination) within the assigned area of operations. This capability supports and facilitates tactical operations and collection of information supporting the commander's priority intelligence requirements (PIRs).
- Tracking and accounting for essential geospatial collection equipment deployed in support of a particular mission.
- Performing other roles, functions, and mission support activities within the Marine special operations team and/or other special operations units as required.

Chemical and Biological Incident Response Force

When directed, GI&I and METOC personnel will forward-deploy and/or respond to a credible threat of a chemical, biological, radiological, nuclear, or high yield explosives incident in order to assist local, state, or Federal agencies and unified CCDRs in the conduct of consequence management operations. The chemical-biological incident response force accomplishes this mission by providing capabilities for agent detection and identification, casualty search and rescue, personnel decontamination, and emergency medical care and stabilization of contaminated personnel.

Joint and Theater

During joint operations, GI&I is connected to theater C2 networks, providing access to both theater and Service-level geospatial databases. Access to JIOC and JAC GI&S branches provides GI&I for both production support and a repository for tactical production to ensure a common foundation for visualization throughout the theater.

The theater geospatial libraries provide operational GI&I to ensure standard interoperability among theater forces. When coalition or multinational partners are present within a theater, the geospatial libraries provide a common foundation across multiple networks.

National and Strategic Support

The MCIA is a coproducer in the National Distributive Intelligence Production Network. The primary function of this network is to provide a dedicated geospatial production support capability to Marine Corps operating forces. The MCIA is the primary interface into this network and has the following functions:

- Provides value-added, tactically-collected data to the NSG.
- Maintains the Marine Corps Geospatial Database (MCGDB), which provides GI&I foundation for tailored, fused production in coordination with IMINT. See chapter 5 for more detail on the MCGDB.
- Enables MAGTFs to query the NSG and receive GI&I from Central Intelligence Agency (CIA), Defense Intelligence Agency (DIA), NGA, the other Services, and commercial sources.

Geospatial Information and Intelligence Cycle

Geospatial information and intelligence activities occur during all phases of this cycle. Throughout this cycle, GI&I is incorporated to ensure that the collection, integration, analysis, dissemination, and use of intelligence data are tied to the geographic foundation. It is updated continually with intelligence studies, evaluations, estimates, and databases.

The GI&I cycle has six phases—planning and direction, collection, processing and exploitation, production, dissemination, and utilization (see fig. 2-5 on page 2-12). During each phase, GI is gathered, assembled, analyzed, and converted into tailored GI&I products. These products are then disseminated to commanders and other users.

Phase 1: Planning and Direction

The GI&I cycle begins with receipt of either the warning order or the initiating directive and continues beyond completion of the mission. While afloat or deployed for operations, either the topographic platoon or geospatial intelligence team (GIT) begins the GI&I cycle for identified missions. Topographic methods of adapting the GI&I cycle vary from unit to unit and depend upon the mission, commander's intent, and IRs.

The GI&I planning and direction phase supports the following:

- Defining the AOR and AOI.
- Accessing and reviewing existing data holdings and intelligence products.
- Identifying information shortfalls and associated geospatial and GI&I requirements.

Once a warning order has been issued and the commander's intent expressed, IRs are identified and prioritized. During the planning and direction phase, the following occur:

- G-2/S-2 and GI&S staff, in conjunction with the G-3/S-3, must identify the command's AOI and/or area of influence in relation to the assigned AOR.
- Specific objectives and targets must be identified as soon as possible in order to ensure that requirements are levied for both production and subsequent intensification actions.

- The commanders and planners identify and submit essential elements of terrain information (EETI) as an IR.
- The GI&S staff coordinates GI&I production requirements with the intelligence battalion. Close integration with the MAGTF command element's operations and intelligence sections is critical to support COA development and to identify potential GI&I issues affecting mission alternatives.
- The MAGTF's G-6 must always be included when planning GI&I activities. Accurate management and storage of theater and MAGTF geospatial and GI&I databases ensure availability and interoperability with all components of the MAGTF. Ready access to critical battlespace views by all commanders and planners requires adequate communications paths to all MAGTF command echelons and other supported units.

Note: Chapter 6 contains more discussion concerning MCEN support.

Phase 2: Collection

The collection phase begins with the identification and prioritization of EETIs. Collection involves gathering GI from all available sources, including querying the geospatial libraries for potential solutions, sourcing materials (e.g., METOC data), and developing a request for intelligence (RFI) for tactical collection support. Prior to arrival in the area of operations, the MAGTF depends primarily on external collection resources.

Collection planning involves matching the numerous GI&I requirements along with the other IRs to the appropriate collection source. Collection may include multisource intelligence reports, such as IMINT, SIGINT, or HUMINT. It must be able to access both tactical intelligence and reconnaissance reports (e.g., route reconnaissance, bridge studies, or engineering reports) as well as information and reports available from nonintelligence sources (e.g., engineers, civil affairs, or military police units).

Note: Organic topographic collection activities include tactical geodetic and topographic surveys, analysis of riverine and oceanographic surveys, and terrain reconnaissance. Organic MAGTF collection assets should always be considered first because of their responsiveness and local control.

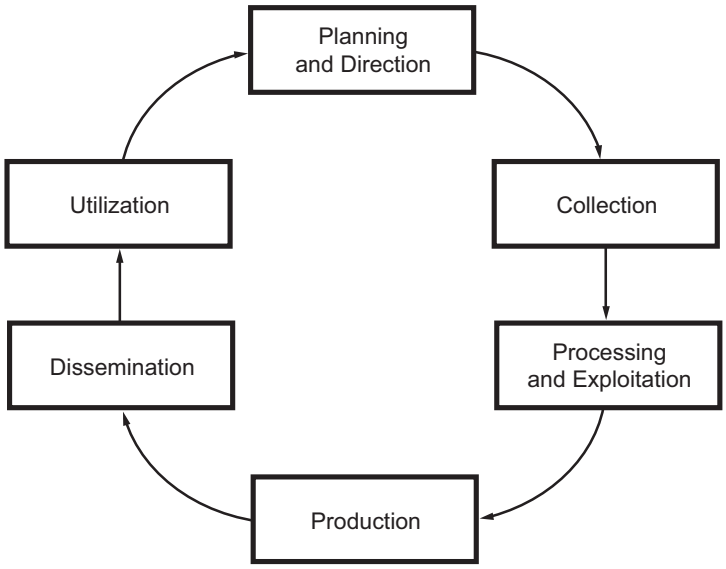


Figure 2-5. Geospatial Information and Intelligence Cycle.

Phase 3: Processing and Exploitation

Geospatial information is converted into a form suitable for GI&I production and support to other intelligence products during the processing and exploitation phase. Processing and exploitation is continuous action accomplished concurrently with collection/production. Activity in this phase requires topographic units to have MCEN connectivity to national, joint, theater, and other GI sources.

The processing and exploitation phase includes the compilation and deconfliction of various sources to ensure that a single, accurate geospatial database is created and maintained to support MAGTF operations within the theater. The geographic intelligence specialist provides the capability to retrieve, integrate, deconflict, and store multisource GI in a tailored, seamless database in order to meet MAGTF requirements.

Phase 4: Production

The production phase involves the conversion of GI into GI&I and the creation of usable products through a process of evaluation, intensification, and integration with other all-source intelligence products, analysis, and interpretation. This process demands a focused approach for managing, tasking, and operating a collaborative GI&I production capability to ensure that all efforts are prioritized and accomplished according to the needs of the MAGTF. See appendix A for the different types of GI&I products and resources.

During the production phase, a geographic intelligence product is created. This product is the fusion of geophysical or analytical data into a synthesized format for dissemination. It involves the following activities:

- Processing the data by intensifying critical detail and resolution within distinct objective areas, value-adding, locally-collected tactical intelligence, and analyzing the output to isolate significant elements with respect to the mission, target, and type of command.
- Integrating geospatial and METOC elements to develop the foundation for the COP/CTP.
- Analyzing significant mission-related elements to develop potential impacts to MAGTF personnel, systems, weapons, and/or equipment.
- Creating logical views (or products) for the geospatial library and hard copy production.

Phase 5: Dissemination

Dissemination involves the publishing and delivery of appropriately formatted GI&I to the MAGTF. It is the culmination of simultaneous efforts at each level of the MAGTF to publish GI&I for discovery and retrieval in support of operations.

The Marine Corps employs an open technical architecture, which has evolved within the NSG architecture, to support the geospatial domain. Dissemination of geospatial data that is external to operational and tactical forces is through the MCISR-E distributed common ground surface/system-Marine Corps and the Global Broadcast System (GBS). Primary access to the topographic platoon's geospatial libraries is through the MAGTF's tactical data network (TDN).

The topographic production capability (TPC) family of systems (FoS) provides low volume production of tailored GI&I paper products (e.g., media for maps and image maps) as follows:

- Unit operations center printers can reproduce quantities of locally generated maps and special products with overlays.
- MAGTF mass replication is provided by combat camera replication capabilities.
- NGA supports medium to high volume production.

Phase 6: Utilization

Utilization is the last and most important phase of the GI&I cycle. Intelligence officers and geographic intelligence specialists are responsible for ensuring that the final GI&I product satisfies all

of the commander's IRs. Geospatial information and intelligence provides commanders and staffs with the necessary foundation to visualize the battlespace in all dimensions as they develop, analyze, and select COAs; develop plans and orders; make decisions; and execute the OPLAN.

CHAPTER 3
ORGANIZATIONS AND RESPONSIBILITIES

The Marine Corps operating forces and supporting establishment for geospatial activities, particularly GI and GI&I missions, functions, organizations, and assigned responsibilities, are discussed in this chapter.

Within Headquarters, Marine Corps (HQMC), two staff sections have overall staff cognizance for Marine Corps GI&I: the Deputy Commandant of the Marine Corps, Installations and Logistics (I&L) and the Director of Intelligence (DIRINT). The staff sections supporting the DIRINT and Deputy Commandant, I&L, conduct detailed coordination and program development through the Marine Corps Geospatial Council (MCGC) to ensure a total force approach to geospatial activities across the Marine Corps organization. See appendix B for GI&S and geographic intelligence tasks.

The DIRINT is the functional manager for GI&I within Marine Corps intelligence and represents Marine Corps intelligence as a member of the NSG. The Deputy Commandant of the Marine Corps, I&L, is the functional manager for GI and related activities supporting installation management. The Assistant Deputy Commandant of the Marine Corps, I&L, represents the Marine Corps with the Office of the Secretary of Defense, Real Property Life Cycle Management Domain Governance and Investment Review Boards.

Geospatial Information and Intelligence

Marine Corps Geospatial Council

Mission

The MCGC is chartered by the Assistant Commandant of the Marine Corps to coordinate all Marine Corps activities involving GI&I.

Organization

The MCGC is co-chaired by DIRINT and the Deputy Commandant of the Marine Corps, I&L. Subordinate to the MCGC is the Marine Corps Geospatial Board (MCGB). The MCGB conducts routine coordination of GI activities. Other Marine Corps organizations that have geospatial investments sit on the MCGC and/or the MCGB.

The DIRINT's representatives to the MCGC reside in the GI section of the Geospatial Intelligence Branch (information planning intelligence [IPI]), Intelligence Plans and Policy Division (intelligence planning), HQMC Intelligence Department. The IPI GI section is described in table 3-1.

Note: Personnel considerations may preclude the staffing of all billets listed.

The Deputy Commandant of the Marine Corps, I&L, representative to the MCGC is identified in table 3-2 on page 3-2.

Table 3-1. Headquarters, Marine Corps Intelligence Department Geospatial Information and Services Support.

Table of Organization 5108 Intelligence Department, HQMC			
Line #	Billet	Grade	MOS
168	Geospatial information officer	Major	0202
172	Geospatial information requirements manager	GS-13	0132
173	Topographic chief	Master sergeant	0261

Table 3-2. Deputy Commandant of the Marine Corps Installation and Logistics Geospatial Information and Services Support.

Table of Organization 5103 Installations and Logistics Division, HQMC			
Line #	Billet	Grade	MOS
186	Industrial engineer	GS-14	0896

Responsibilities

Both the MCGC and HQMC IPI have certain responsibilities. Responsibilities of MCGC are as follows:

- Coordinating all Marine Corps activities involving GI&I. The MCGC meets as needed to fulfill its responsibilities.
- Ensuring that the Marine Corps develops and maintains a strong, resilient, cost-effective geospatial capability that is fully interoperable with Service and national assets as follows:
  - The MCGB shall meet annually to review and coordinate Marine Corps programs of record that have geospatial investments.
  - The MCGB shall report its findings and recommendations to the HQMC Program Objective Memorandum Working Group.

Responsibilities of HQMC IPI are as follows:

- Providing a single point of contact (POC) for all Marine Corps GI&I issues within national, international, DOD, joint, and Service forums.
- Supporting the operating forces, the Deputy Commandant for Combat Development and Integration (DC CD&I), Marine Corps Systems Command (MARCORSYSCOM) and other organizations with technical assessments, evaluations, and review authority for all Marine Corps GI&I matters; thereby, providing an integrated and centrally-managed approach across all functional aspects of GI&I within the Marine Corps.
- Representing the DIRINT on the MCGB.
- Providing the Marine Corps direct interface to the NGA for all new GI&I development and production.
- Ensuring that Marine Corps requirements are met by providing input regarding the technical design and description of emerging GI&I and related products early within the development process.
- Ensuring the interoperability of GI&I standards that support legacy and emerging MAGTF C2 systems, communications and information systems (CIS), weapons delivery systems, and other systems.
- Coordinating with HQMC, DC CD&I, and MARCORSYSCOM to ensure that all aspects of GI&I support are addressed and integrated. These aspects include the following:
  - HQMC issues related to policy, personnel, programs, logistics, and resources.
  - DC CD&I issues related to training, education, doctrine, total force structure, and requirements.
  - MARCORSYSCOM issues related to equipment/software generation or use of GI&I.
- Coordinating with Marine Corps Component Command (MCCC) headquarters, MEF command elements, MEF MSCs, intelligence battalions, and topographic platoons to ensure interoperability, standardization, and compliance with Joint Chiefs of Staff, DOD, and Marine Corps directives.
- Supporting the HQMC Director, Command, Control, Communications, Computers, and Intelligence with Service-level oversight for all Marine Corps GI&I functional areas, including the following:
  - Evaluating development of terrain and oceanographic data and systems.
  - Developing policy for Marine Corps GI&I standardization and interoperability.
  - Validating Marine Corps GI&S requirement submissions.
- Ensuring that all aspects of the Marine Corps GI&I are compatible with doctrine.

Tasks

For a list of GI&S and GEOINT tasks, refer to appendix B.

Marine Corps Component Command, Geospatial Information and Services Section

The MCCC GI&S section, under the functional control of the Assistant Chief of Staff (AC/S) G-2, serves as the technical representative with subordinate GI&I elements. In addition, the MCCC GI&S section provides—

- A dedicated POC for GI&S issues within the commander's specified theater or area of operations.
- An integrated approach to identifying, consolidating, and validating GI&S production requirements and supporting operations (see fig. 3-1).

Mission

The mission of the MCCC GI&S section is to coordinate the development, validation, and establishment of the MCCC's requirements for GI&S priorities, standard products, and supporting operations with the appropriate unified and subordinate commands. It also represents the MCCC in GI&S forums that are responsible for validating GI&S resource allocations and system capabilities within the MCCC's AOR.

Organization

The GI&S section consists of two geographic intelligence specialists (MOS 0261) billets. These billets require a gunnery sergeant and a sergeant who have completed the Geospatial Information and Services Joint Staff Officer Course that is offered by the National Geospatial College, Fort Belvoir, Virginia. The GI&S section is under the cognizance of the G-2 plans officer. It assists in the coordination of geospatial issues concerning intelligence operations, collections, production, targeting, dissemination, counterintelligence, and other staff sections.

Responsibilities

Responsibilities of the MCCC GI&I are as follows:

- Validating requirements and coordinating the production of all GI&S requirements for the MCCC headquarters and MSCs.
- Ensuring that global-sourcing imagery analysis specialists (imagery [MOS 0241] and GEOINT [MOS 0261]) are available in the MCCC G-1.
- Working with the MCCC in the following ways:
  - G-3 to define the area of operations, mission objectives, and force list.

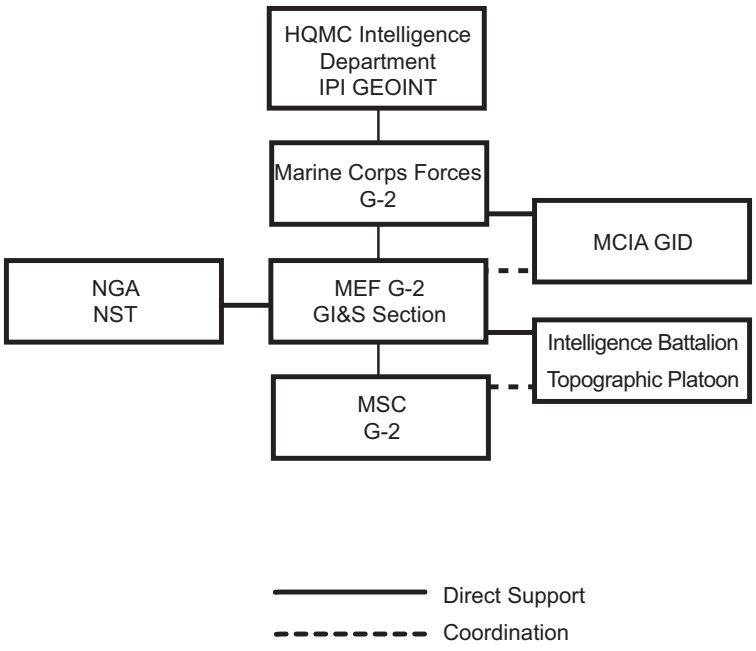


Figure 3-1. Marine Corps Forces Geospatial Information and Services Support.

  - G-4 to develop the distribution of hard copy GI&S products.
  - G-5 and intelligence production personnel to identify production requirements for long-range objectives.
  - G-6 to coordinate GI&S MCEN requirements for national, theater, and MAGTF operations.
- Coordinating all national GI&S production requirements for Marine Corps training areas with the HQMC IPI.
- Providing MCCC oversight to theater GI&I functions, including policies, TTP architectures, technologies, and personnel.
- Influencing both the identification and development of unit and mission profiles to support operations within their area of operations to ensure that tactical requirements are met.
- Ensuring interoperability of GI&S standards within the area of operations, supporting both tactical MAGTF systems and weapons delivery systems.

Tasks

Refer to appendix B for a list of GI&S and GEOINT tasks.

Marine Expeditionary Force Assistant Chief of Staff, Intelligence Geospatial Information and Services Section

The MEF GI&S section is a functional staff office under the cognizance of the MEF G-2 plans officer. It provides the MEF commander with a technical representative for all GI&S activities and is designated as the single POC for MEF GI&S issues within a particular theater or area of operations (see fig. 3-2).

Mission

The MEF GI&S section has the following mission:

- Coordinates all MAGTF area requirements for GI&S priorities, products, and supporting operations in coordination with the appropriate MCCC and MSC GI&S offices.
- Implements plans and policies and supports future plans for collections, collaborative production, and the use of GI&S.
- Provides professional, technical GI&S advice and assistance to subordinate commanders.

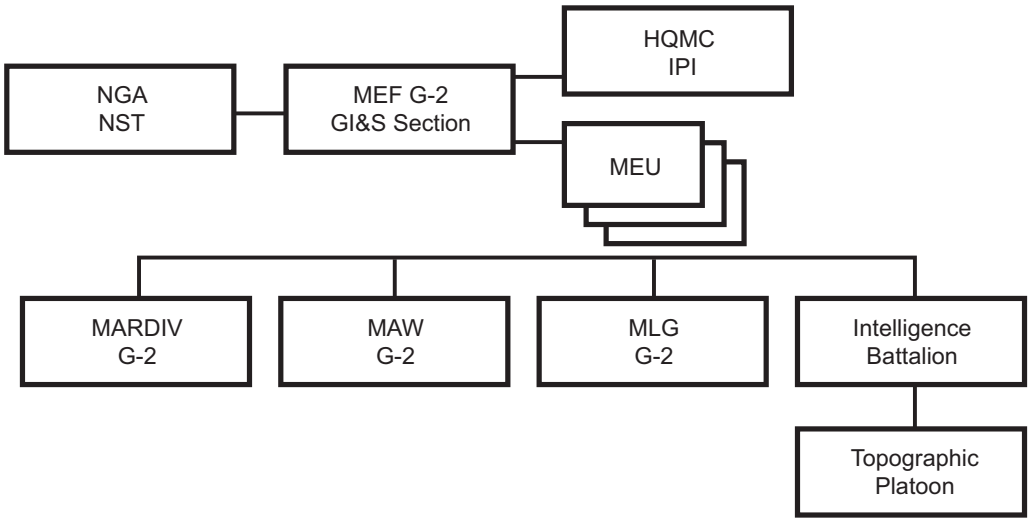


Figure 3-2. MEF Geospatial Intelligence Section Support Relationships.

- Develops, coordinates, and forwards all recommendations regarding GI&S product specifications and standardization agreements to the appropriate MCCC GI&S office(s).
- Represents the MEF in the appropriate Service and theater GI&S forums that are responsible for validating topographic production resources and system capabilities within a particular theater of operations.

Organization

The MEF GI&S section is located in the Plans Branch of the G-2 and falls under the cognizance of the intelligence plans officer. It assists the intelligence support coordinator (ISC) and other intelligence personnel with the coordination of geospatial issues concerning intelligence plans, collections, all-source production, dissemination, targeting, and other support as required. The MEF GI&S section is staffed by a GI&S officer and a geographic intelligence specialist.

Responsibilities

Responsibilities of the MEF GI&S section include the following:

- Validating requirements, coordinating the production of all GI&S requirements, and supporting operations for the command element and subordinate elements with appropriate GI&S and GEOINT organizations, including the following:
  - Supervising National Geospatial-Intelligence Agency support team (NST) representatives assigned to the MEF.
  - Providing recommendations to the AC/S G-2 regarding NST representatives assigned to the MEF.
  - Ensuring that global-sourcing personnel are available within the MEF G-1.
  - Assisting the G-2, G-3, and G-5 with defining the area of operations, mission objectives, and force list.
  - Assisting the ISC and MEF G-4 with developing the distribution of GI&S products.
  - Identifying production requirements with the MEF G-5 and intelligence personnel for long-range objectives.
  - Assisting the ISC and MEF G-6 with coordinating MCEN requirements for national, theater, and MAGTF GI&S distribution.
- Coordinating the development and submission of all GI&S requirements from all MEF command element staff.
- Coordinating the validating, prioritizing, and tasking of all GI&S requirements that are submitted by MEF subordinate units.
- Coordinating all standard NGA GI&S production requirements with either the MCCC GI&S staff for validation by HQMC IPI (for training areas) or by the appropriate CCDR (for contingency planning and operational areas).
- Providing oversight of all MEF GI&S functions, including policies, architectures, technologies, and personnel.
- Assisting the G-2 plans officer and ISC with identifying and developing unit and mission profiles that support operations within the area of operations to ensure that MEF requirements are being satisfied.
- Assisting the ISC with oversight of MAGTF GI&S production and support to ensure compatibility with the intelligence concept of operations (CONOPS) and supporting plans, MEF operations, and CIS CONOPS and plans.

Tasks

Refer to appendix B.

Marine Expeditionary Force Major Subordinate Commands Geospatial Information and Services

Each MSC G-2 must designate a single POC for GI&S issues. This POC will help to consolidate, integrate, and validate GI&S production requirements from the MSCs and participate in

the planning and execution of supporting operations. The MSCs are assigned intelligence specialists in the following manner:

- The MARDIV has organic geographic intelligence specialists assigned to the G-2 section.
- The MLG has organic geographic intelligence specialists assigned to the G-2 section.
- The MAW has neither organic GI&S personnel nor equipment; they can be augmented by intelligence battalion through the MEF G-2. See figure 3-3.

Mission

The MSC's GI&S section coordinates all MAGTF area requirements for GI&S priorities, products, and supporting operations in coordination with the appropriate MEF and MSC ISCs. This section—

- Implements plans, policies, and support to future plans regarding collections, collaborative production, and the use of GI&S. It also provides professional, technical GI&S advice and assistance to subordinate commanders.
- Develops, coordinates, and forwards all recommendations regarding GI&S product specifications and standardization agreements to appropriate MEF GI&S offices.
- Represents the MSC in appropriate Service and theater GI&S forums that are responsible for validating topographic production resources and system capabilities within a theater of operations.

Organization

The MSC AC/S G-2 designates a GI&S representative within the G-2 section. The GI&S representative reports to the G-2 intelligence operations officer.

Responsibilities

Responsibilities of the MSCs GI&S section include the following:

- Planning, directing, and coordinating GI&S operations in support of the command's requirements.

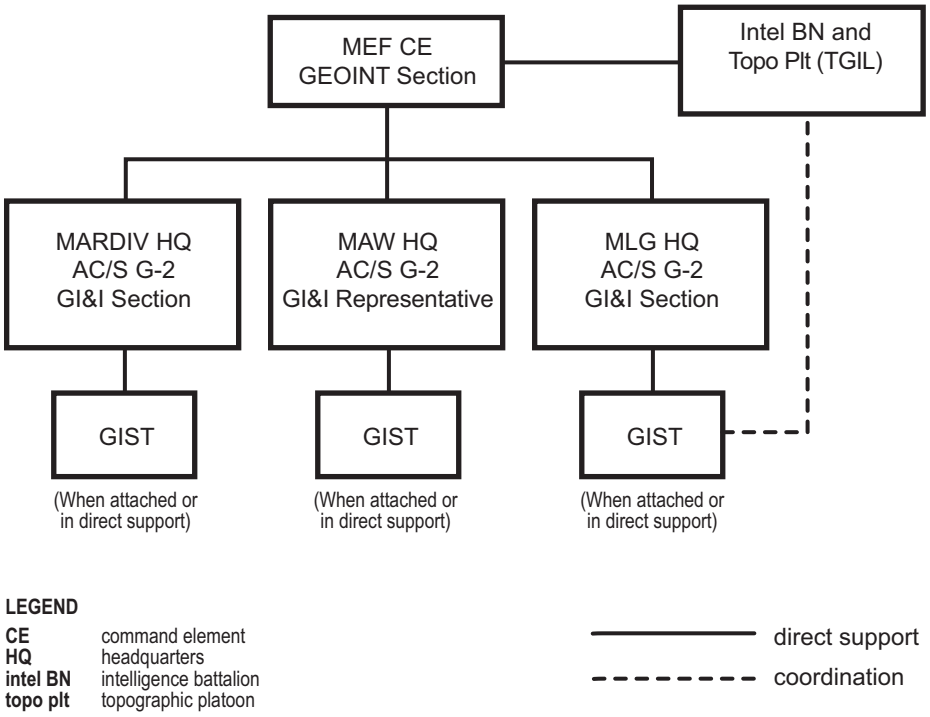


Figure 3-3. Major Subordinate Command Geospatial Information and Services and Geospatial Intelligence.

- Validating and developing GI&S requirements and supporting operations from other MSC staff divisions and subordinate commands (e.g., regiments, groups, battalions, squadrons) as the command's single POC.
- Developing unit and mission profiles that are needed to acquire mission-specific data for tactical operations (see chap. 4).
- Providing guidance and assistance to support any command request for GI&S.

Tasks

Refer to appendix B.

Marines Responsible for Geospatial Information and Services

Marine Expeditionary Force Intelligence Staff Planning and Direction Responsibilities

Figure 3-4 contains a representation of principal staff officers and their relationships within the MEF G-2. Table 3-3, on page 3-8, summarizes the principal responsibilities of the AC/S G-2 principal staff officers.

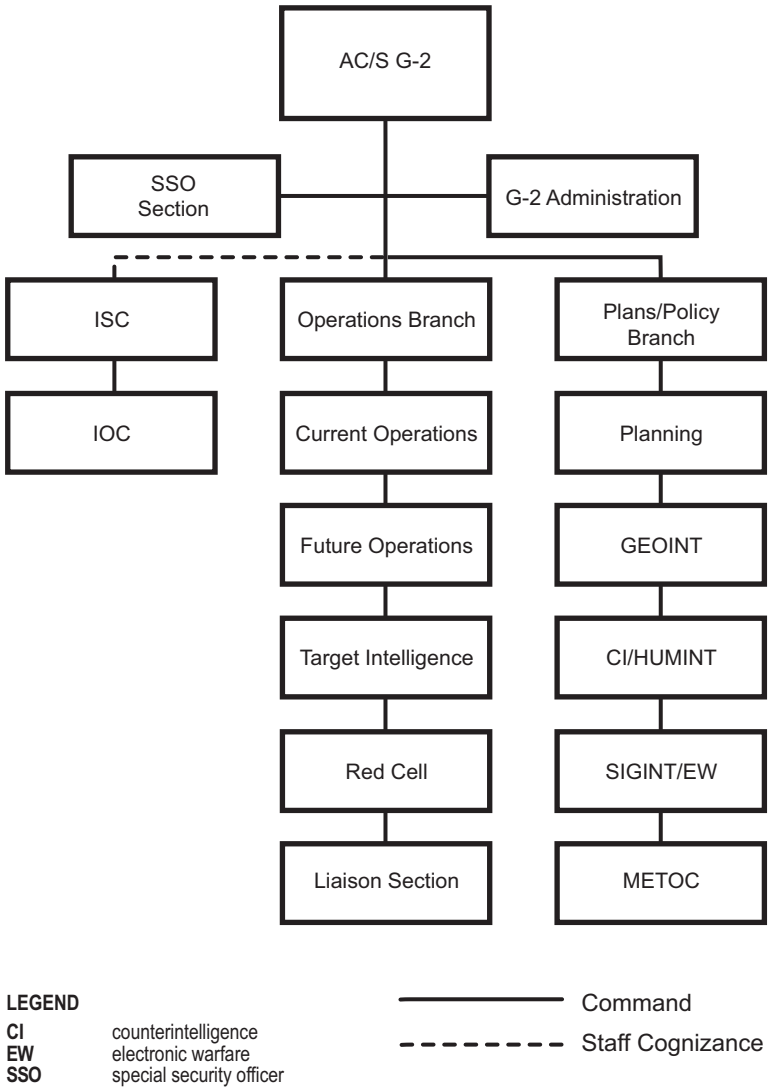


Figure 3-4. MEF AC/S, Operations Division Principal Staff Officers and Relationships.

Assistant Chief of Staff, Intelligence Operations

The AC/S G-2 has staff responsibility for intelligence operations, including GI&S (see table 3-3). The commander relies on the intelligence officer to provide the necessary information regarding the weather, terrain, enemy capabilities, status, and intentions. Using the intelligence OPLAN, supporting intelligence, and reconnaissance and surveillance plans, the MEF AC/S G-2—

- Validates and plans IRs.
- Coordinates intelligence priorities.
- Integrates collection, production, and dissemination activities.
- Allocates resources.
- Assigns specific intelligence and reconnaissance missions to subordinate elements.
- Supervises the GI&S and overall intelligence and reconnaissance efforts.

Specific all-source and GI&S responsibilities include the following:

- Developing and answering outstanding PIRs and IRs that are submitted by the MEF and its subordinate units by planning, directing, integrating, and supervising organic GI&S and multidiscipline intelligence operations.

  Note: These operations may be conducted by MEF assets and/or the assets of other supporting organizations.

- Preparing appropriate GI&S and other intelligence plans and orders for the MEF.
- Reviewing and coordinating the GI&S and all-source intelligence plans that are developed by JTFs, theaters, and other organizations.
- Ensuring that both GI&S and other appropriate intelligence are processed, analyzed, and incorporated into all-source intelligence products and then disseminated rapidly to all appropriate MEF and external units.
- Evaluating theater, national, JTF GI&S, and all-source intelligence that support and adjust established IRs, when necessary.
- Coordinating and submitting all-source and GI&S collection, production, and dissemination requirements for JTF, theater, or national GI&S systems support.
- Identifying and correcting deficiencies in GI&S and other intelligence and reconnaissance personnel and equipment resources.
- Incorporating exercise GI&S into training exercises in order to improve MEF individual, collective, and unit readiness.

Table 3-3. Summary of Marine Expeditionary Force Staff Responsibilities.

Assistant Chief of Staff	G-2 Operations Officer	G-2 Plans Officer
Plan and execute intelligence operations to support all MEF IRs	Provide intelligence support to MEF command element and COC agencies	Provide intelligence support to the G-5 future planning team for future planning IRs
Establish and direct the IOC (P&A cell, SARC, and support cell)	Coordinate support to higher and adjacent headquarters and agencies	Recommend IR validation, prioritization, and tasking to AC/S G-2
Provide IR management (collection, production, and dissemination), validation, prioritization, and tasking per AC/S G-2 direction	Recommend IR validation, prioritization, and tasking to AC/S G-2	Establish and direct the G-2 future planning intelligence element
Command intelligence operations of intelligence battalion and provide staff cognizance over SIGINT, counterintelligence, HUMINT, MASINT, GEOINT, and air-ground reconnaissance (includes staff cognizance of designated G-2 elements)	Establish and direct intelligence elements and support to the COC, FOC, target intelligence section and force fires, red cell, and MEF intelligence liaison teams	Lead G-2 sections: GEOINT, counterintelligence/HUMINT, SIGINT, and weather (less that under the staff cognizance of the ISC)
Legend: COC current operations center FOC future operations center		

- Facilitating the understanding and use of GI&S and other intelligence in support of the planning and execution of MEF operations.
- Assigning NST representatives within the MEF command element.

G-2 Operations Officer

The G-2 operations officer, under the direction of the MEF AC/S G-2, has primary responsibility for intelligence support to the MEF commander and his/her command element for both current and future operations. The G-2 operations officer's specific all-source and GI&I-related duties (see table 3-3 on page 3-8) include the following:

- Providing and coordinating intelligence support, including key GI&I support to the MEF commander, the G-3 operations section, and the MEF command element's battlestaff.
- Supporting the single battle transition process by coordinating and supervising the transition of intelligence planning and operations from the G-2 plans section to the G-2 future operations section and, subsequently, from the G-2 future operations section to the G-2 current operations section.
- Providing coordinating and supervising intelligence support to the MEF command element current operations center, future operations center, and force fires section.
- Ensuring that MEF intelligence operations are unified and focused by coordinating with both the ISC(s) and the G-2 operations officer(s) at each of the MEF's MSCs.
- Providing intelligence input and other support to the development of MEF warning orders, fragmentary orders, and operations-related reporting (e.g., periodic situation reports).
- Acting as the G-2 representative to the MEF command element crisis action team.
- Planning, directing, and supervising the red cell.
- Providing recommendations to both the AC/S G-2 and the ISC concerning PIR and IR validation, prioritization, and tasking.
- Planning, directing, and supervising the MEF's liaison teams to external commands (e.g., JTF, Joint Functional Component Headquarters) and other intelligence organizations.
- Providing G-2 oversight for the MEF intelligence training program and coordinating intelligence training for the MEF G-2 section.
- Undertaking other intelligence tasks and support functions as directed by the AC/S G-2.

G-2 Plans Officer

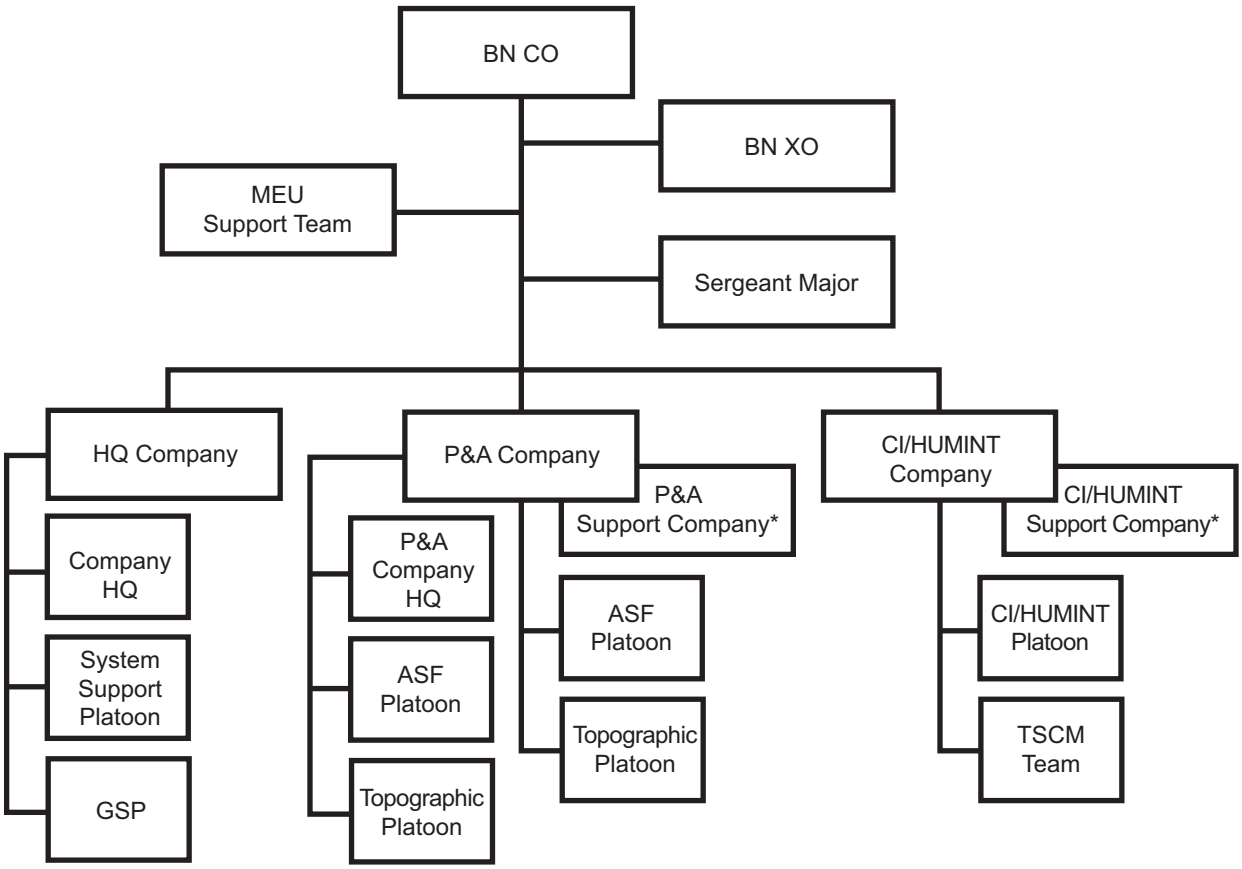
The G-2 plans officer, under the direction of the MEF AC/S G-2, has primary responsibility for intelligence support to the MEF command element's future plans section. Specific all-source and key GI&I-related duties (see table 3-3 on page 3-8) include the following:

- Planning the MEF concept of intelligence operations based upon the mission, threat, commander's intent, commander's guidance, and CONOPS. The concept of intelligence operations must have a supporting GI&I CONOPS. The MEF concept of intelligence operations should be submitted to the AC/S G-2 for approval and subsequent implementation by the ISC.
- Leading, providing, and coordinating intelligence support for the MEF G-5 future plans section.
- Planning and coordinating intelligence support requirements for and the deployment of intelligence elements and resources into the area of operations.
- Providing recommendations on PIR and IR validation, prioritization, and tasking to both the AC/S G-2 and the ISC.
- Coordinating the development of the intelligence annexes (Annex B [Intelligence] and Annex M [Geospatial Information and Services]), appendices to the MEF OPLAN, and other supporting appendices. All intelligence input should be coordinated to other OPLAN annexes.
- Ensuring that the G-2 section, other command element staff sections, intelligence liaison personnel, individual augments, and other pertinent personnel are kept apprised of MEF intelligence planning actions and requirements.

- Identifying requirements and providing recommendations to the G-2 operations officer regarding MEF intelligence liaison teams to both external commands, such as the JTF or other components' headquarters, and intelligence agencies.
- Developing and coordinating policies for MEF intelligence, counterintelligence, and reconnaissance operations.
- Supervising the MEF G-2's GEOINT, counterintelligence/HUMINT, SIGINT, and weather sections.
- Undertaking other intelligence tasks and support functions as directed by the AC/S G-2.
- Supervising NST representatives via the GI&S chief.

Intelligence Battalion Commander/Intelligence Support Coordinator

The intelligence battalion commander is responsible for providing both intelligence and counterintelligence support to the MEF, MEF MSCs, subordinate MAGTFs, and other commands as directed (see fig. 3-5).



* 3d Intelligence Battalion will neither have the P&A support company nor the CI/HUMINT support company.

LEGEND

ASF	all-source fusion	**HQ**	headquarters
BN	battalion	**MEU**	Marine expeditionary unit
CI	counterintelligence	**TSCM**	technical surveillance countermeasures
CO	commanding officer	**XO**	executive officer
GSP	ground sensor platoon		

Figure 3-5. Intelligence Battalion.

In garrison, the principal task of the intelligence battalion commander is to organize, train, and equip detachments that support either MAGTFs or other designated commands. The commander conducts integrated collection, intelligence analysis, production, and dissemination of intelligence products. Intelligence battalion structure is depicted in figure 3-5 on page 3-10.

During operations, the intelligence battalion commander functions in both a command role and as the ISC and serves under the direct staff cognizance of the MEF AC/S G-2. The intelligence battalion S-3 section and the MEF G-2 operations center form the core of the ISC support effort, with planning, direction, and command and control conducted within the IOC's support cell. The ISC is responsible to the MEF AC/S G-2 for the overall planning and execution of MEF all-source intelligence operations. The ISC's specific operational all-source and GI&I responsibilities include the following:

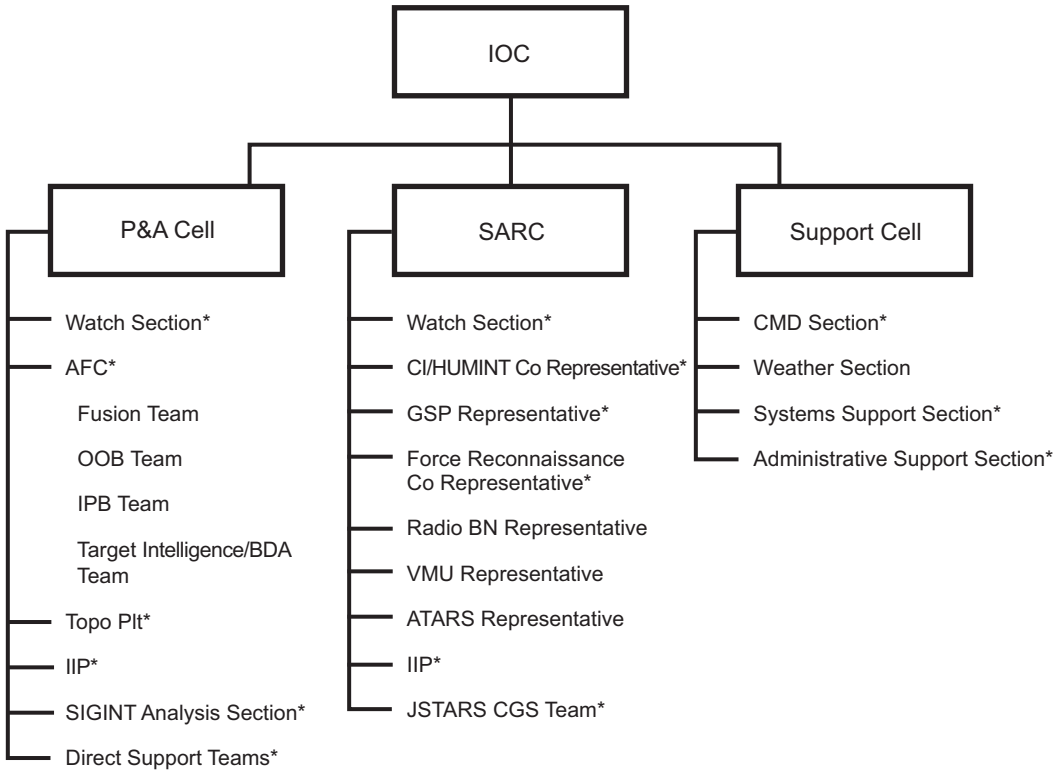
- Implementing the concept of intelligence operations (and the supporting GI&I CONOPS) developed by the G-2 plans officer and approved by the AC/S G-2.
- Establishing and supervising the operation of the MEF IOC, which includes the support cell, the surveillance and reconnaissance cell (SARC), and the production and analysis (P&A) cell (see fig. 3-6 on page 3-12). Normally, the IOC will be collocated with the MEF command element main command center.
- Supporting MAGTF planning and operations by developing, consolidating, validating, and prioritizing PIRs and IRs.
- Planning, developing, integrating, and coordinating MEF intelligence collection plans, production plans, and dissemination plans to ensure effective use of all organic and external intelligence assets (i.e., GI&I, IMINT, SIGINT, counterintelligence, HUMINT, ground remote sensors, ground reconnaissance, tactical air reconnaissance intelligence collections, production, and dissemination operations).
- Coordinating the development of the intelligence annexes (Annex B [Intelligence], Annex M [Geospatial Information and Services]), appendices to the MEF OPLAN, and other supporting appendices.
- Coordinating all intelligence input to other OPLAN annexes of operation orders (OPORDs) in conjunction with the G-2 plans officer and G-2 operations officer.
- Planning, developing, integrating, and coordinating intelligence and counterintelligence support to the commander's estimate, situation development, indications and warnings, force protection, targeting, and combat assessment.
- Managing and fusing the threat (i.e., red force) COP/CTP inputs from subordinate units, external commands, and intelligence agencies into the threat COP/CTP for the MEF command element.
- Providing intelligence support to both the MEF G-2 and MSCs.
- Preparing the intelligence and counterintelligence estimates for the G-2 plans section.
- Planning, developing, and coordinating intelligence communications and information systems architectures, including overall integration with and in support of MEF GI&I and other intelligence and reconnaissance requirements.
- Coordinating and integrating MEF GI&I and all-source intelligence operations with other Service components, the JTF joint intelligence support element (JISE), theater joint intelligence center (JIC), or JAC and national intelligence agencies, including all aspects of intelligence reachback support.
- Evaluating MEF GI&I and all-source intelligence operations and subsequently developing strategies to improve the quality of support to the MEF.
- Undertaking other intelligence tasks and support functions as directed by the AC/S G-2.

Collection Management/Dissemination Officer. The collections management/dissemination officer (CM/DO) is the first principal subordinate to the ISC and is located in the support cell. The CM/DO is sourced from the intelligence battalion S-3 section and has the following responsibilities:

- Coordinates intelligence MCEN requirements and maintains awareness of available MCEN connectivity both inside the MEF and with key external organizations.
- Formulates detailed intelligence collection requirements and intelligence dissemination requirements, and then tasks both internal and external assets to collect against those requirements.
- Validates and forwards national and theater collection requirements from the MEF and its MSCs, using the appropriate intelligence tools and TTP when appropriate.

The CM/DO, in coordination with the officer in charge (OIC) of the P&A cell, the SARC OIC, G-2 operations officer, GI&I-related unit commanding officers/OICs, and the MEF G-6, is responsible to the ISC for several GI&I-related tasks as follows:

- Determining and coordinating the collection effort of IRs and PIRs that can be collected using GI&I and supporting resources (e.g., force reconnaissance company, unmanned aircraft systems, and engineers).



*Personnel provided in whole or part by intelligence BN

LEGEND

AFC	all-source fusion center	**Co**	company
ATARS	Advanced Tactical Airborne Reconnaissance System	**GSP**	ground sensor platoon
BN	battalion	**JSTARS**	joint surveillance and target attack radar system
BDA	battle damage assessment	**OOB**	order of battle
CGS	common ground station	**topo plt**	topographic platoon
CI	counterintelligence	**VMU**	Marine Unmanned Aerial Vehicle Squadron

Figure 3-6. Intelligence Operations Center Structure.

- Preparing requests for intelligence to both higher headquarters (HHQ) and external agencies that, when collecting against IRs and PIRs, cannot be accomplished by organic capabilities.
- Recommending dissemination priorities, developing intelligence-reporting criteria, and assisting in selecting the most efficient means for disseminating GI&I.
- Developing and coordinating GI&I and all-source intelligence collection plans and coordinating and integrating these plans with MEF, component, JTF, theater, and national intelligence production operations.
- Developing and coordinating GI&I and all-source intelligence dissemination OPLANs and supporting architectures for both voice and data-networked communications; coordinating and integrating these plans with MEF, component, JTF, theater, and national intelligence production operations.
- Ensuring the timely delivery of pertinent, usable GI&I to the intended recipients by monitoring the GI&I flow throughout the MEF.
- Evaluating the effectiveness of GI&I collection and dissemination operations both inside and outside the MEF.

Surveillance and Reconnaissance Cell Officer in Charge. The SARC OIC is responsible for supervising organic, attached, and direct support intelligence collection and reconnaissance operations. In addition, the SARC OIC is responsible to the ISC for accomplishing the following GI&I-related tasks:

- Coordinating, monitoring, and updating the status of all ongoing GI collection operations, including missions and tasked intelligence collection requirements.
- Reporting the criteria for all collection missions, locations and times for all pertinent fire support control measures, and primary and alternate CIS plans for both routine and time-sensitive requirements.
- Conducting detailed GI&I collection, planning, and coordination with the MSCs and planners from GI&I organizations, with emphasis on ensuring the understanding of both the collection plan and specified intelligence-reporting criteria.
- Ensuring that other MAGTF C2 nodes, such as the current operations center and force fires, are aware of the status of ongoing GI&I and other intelligence and reconnaissance operations.
- Receiving routine and time-sensitive GI&I-related reports from deployed collection elements; cross-cueing among intelligence collectors, as appropriate; and rapidly disseminating GI&I reports to MAGTF C2 nodes and others per the established intelligence-reporting criteria and dissemination plan.

Production and Analysis Cell Officer in Charge. The P&A cell manages the MEF's all-source intelligence processing and production efforts. The P&A cell OIC is responsible to the ISC for accomplishing several GI&I-related tasks as follows:

- Planning, directing, and managing operations of the all-source fusion platoon (i.e., fusion, order of battle, IPB, and target intelligence and battle damage assessment teams), the topographic platoon, the imagery intelligence platoon (IIP), the direct support teams, and other analysis and production elements as directed.
- Maintaining all-source automated intelligence databases, files, workbooks, country studies, and other intelligence studies.
- Planning and maintaining imagery, mapping, topographic resources, and other intelligence references.
- Administering, integrating, operating, and maintaining intelligence processing and production systems—both unclassified general service (message) and sensitive compartmented information systems (i.e., the TPC, imagery product library, joint deployable intelligence support system [JDISS], and intelligence analysis system [IAS]).
- Analyzing and fusing GI&I with other intelligence to produce tailored, all-source intelligence

products to satisfy the supported commander's stated or anticipated PIRs and IRs.

- Developing and maintaining current and future intelligence situational, threat, and environmental assessments and target intelligence based upon all-source analysis, interpretation, and integration.

Key Geospatial Information and Intelligence Producers' Responsibilities

Geospatial Intelligence Division, Marine Corps Intelligence Activity

The MCIA's GID provides a dedicated Marine Corps Service-level production capability focused on producing and maintaining GI&I. The GID provides GI&I production support to the operating forces, HQMC, DC CD&I, Marine Corps University, and other supporting establishment organizations.

The GID, using Web-based technologies, provides a limited reachback capability for MAGTFs and other organizations that require tailored GI&I. In addition, the GID provides a dedicated production environment for supporting deliberate and crisis query, receipt, analysis, production, and dissemination of GI&I for MAGTF requirements within the littoral regions of the world. This GI&I must be detailed enough to support tactical analysis, planning, and decisionmaking. It becomes the frame of reference for fusing information and intelligence from other sources (e.g., environmental, logistical, operational, intelligence, or diplomatic). It also supports rapid intensification in order to meet the mission-specific requirements of deployed MAGTFs (see fig. 3-7).

Mission. The GID provides GI&I support to the contingency planning efforts conducted by the Marine Corps forces and other GI&I requirements that are not satisfied by organic, theater, other Service, or national GI&I research/analysis capabilities. The GID also provides tailored GI&I support to the Commandant of the Marine Corps (CMC), the CMC's staff, and the extended supporting establishment. It maintains the Marine Corps geospatial information library (MCGIL), which is a point of entry into the larger national GEOINT Distributive and Collaborative Production Network.

Organization. The GID falls under MCIA's Intelligence Production Division. It consists of five civilians (GS-07 to GS-14), one gunnery sergeant, one staff sergeant, and four sergeants that are geographic intelligence specialists (MOS 0261). All production requirements are established, tracked, and coordinated with the Operations/Production Management branches, MCIA.

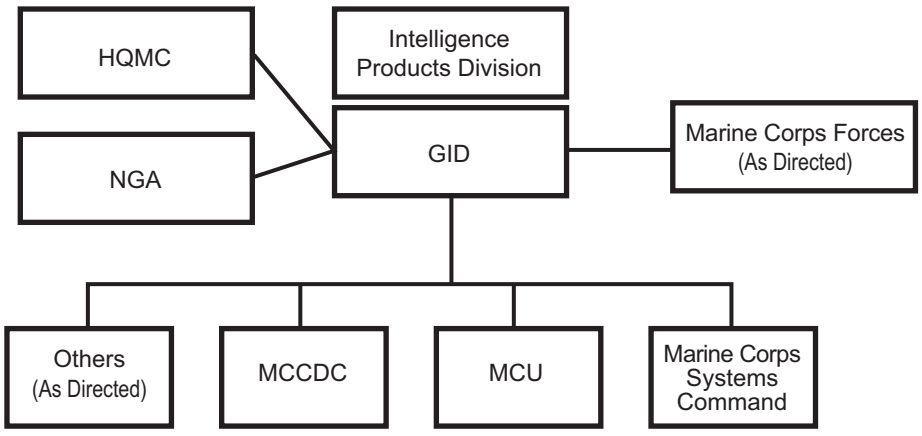


Figure 3-7. Marine Corps Intelligence Activity Geographic Intelligence Division Geospatial Intelligence Support Relationships.

Responsibilities. The GID is responsible for the following tasks in response to prioritized production tasking from the CMC, the operating forces, and the supporting establishment:

- Querying, retrieving, integrating, deconflicting, and analyzing multisource GI from national, international, joint, coalition, and other Services to produce timely, relevant GI&I in support of validated requirements.
- Supporting the rapid integration of national databases and products to support forward-deployed MAGTFs by providing access to the MCGIL for a smart push/pull capability. The MCGIL client and server is connected to multiple communication paths (i.e., MAGTF TDN, GBS, SIPRNET [SECRET Internet Protocol Router Network], INTELINK [Intelligence Link]) to support the topographic platoon and all deployed GITs by providing access to the National Production Network.

  Note: Future implementations of the National Production Network will establish GID as an NGA-trusted coproducer with the commensurate capability to access and insert data into the national repositories.

- Supporting the HQMC IPI in establishing policy and standards for implementing both NGA and DOD databases, per the NSG.
- Assisting MAGTFs in establishing and maintaining their tactical geospatial information libraries (TGILs).
- Populating the Marine Corps GI&I repository for all littoral areas within the NSG production network. The MCGIL capability supports the intensification and generation of detailed terrain studies using all-source GI to create GI&I products (e.g., land use classification, slope, trafficability studies, LOC, soils, obstacle analysis). These products are geodetically referenced; produced in soft copy format; and disseminated in hard copy, electronic, or digital format. Unclassified data may be enhanced with digital high-resolution video products for the widest possible dissemination.
- Providing a technical forum for evaluating emerging databases and new products, systems, and software technologies. This evaluation supports interoperability and standardization by facilitating the formulation of integration and training requirements before new equipment and software are fielded to the Marine Corps operating forces.

Tasks. Refer to appendix B.

Topographic Platoon, Intelligence Battalion

The topographic platoon, intelligence battalion, provides each MEF with organic capability for GI&I analysis, production, and dissemination. It offers MEFs tailored geographic views and other GI&I activities that provide general support of IRs generated by the MEF and/or the supported commands.

The topographic platoon falls under the command of the intelligence battalion. During operations, the intelligence battalion (or its designated detachments) fall under the operational control of the supported unit's commander, with staff cognizance being executed by the supported unit's intelligence officer. It receives its production requirements from the intelligence battalion commander/ISC, with staff assistance by the G-2 geospatial section and the intelligence battalion's P&A company commander and/or P&A cell OIC. This coordination ensures both the availability and interoperability of the geospatial database within a theater of operations and the effectiveness of overall MEF GI&I operations and support.

Mission. The topographic platoon produces tailored GI&I products, which includes geodetic and topographic surveys, coastal and riverine hydrographic analysis, and other GEOINT products and services in support of the MEF and other organizations, as directed.

Organization. There are three Marine Corps topographic platoons, one organic to each MEF's intelligence battalion. All three topographic platoons have the same combination of MOS

positions: the intelligence officer (MOS 0202) to serve as the platoon commander and the geographic intelligence specialist (MOS 0261) to provide the technical expertise needed to plan, produce, and disseminate GI&I.

Each topographic platoon is organized around two separate functional areas: GEOINT and GI collection. The GEOINT section is focused on integrating, value adding, and producing GEOINT. In addition, GEOINT also populates the TGIL in support of all elements of the MAGTF. The GI collection section consists of a geodetic and hydrographic survey team and is focused on tactical GI collection for the intensification and value adding of new attributes to the GEOINT section's geospatial database (see fig. 3-8). During tactical operations, the focus of effort is on GEOINT analysis and production that supports MAGTF mission-specific requirements and IRs.

A single topographic platoon can simultaneously support a MEF, three MEUs, and special purpose Marine air-ground task forces (SPMAGTFs) as needed, while providing two task-organized capabilities to various levels of the MAGTF—geographic information support teams (GISTs) and GEOINT teams.

The GIST is the principal GI&I support that a topographic platoon provides to MSCs. Normally a four-Marine team of geographic intelligence specialists who use specialized equipment, the team may either be attached to or placed in direct support of a MAGTF, MSC, or subordinate unit. Normally, the GIST will operate under the staff cognizance of the unit intelligence officer. The mission, tasks, and functions of a GIST parallel those of the topographic platoon.

The GEOINT teams are the principal GI&I support that a topographic platoon provides to a MEU. Geospatial intelligence teams are sourced from the MEU, support team section, intelligence battalion. When not deployed, these GITs are integrated into the topographic platoon's regular operations. Normally, a GIT is a two-Marine team of geographic intelligence specialists who use specialized equipment. The team is attached to the MEU command element and operates

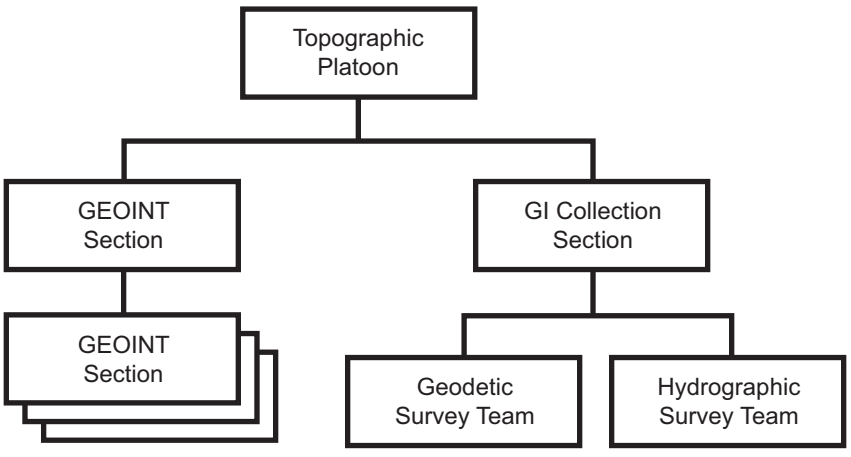


Figure 3-8. Topographic Platoon Organization.

under the staff cognizance of the S-2. The mission, tasks, and functions of the GIT parallel those of the topographic platoon.

Responsibilities. When planning MAGTF GI&I operations per ISC tasking and providing tailored GI&I support to MAGTFs and other commands as directed, the topographical platoon has the following responsibilities:

- Providing tailored mission-oriented topographic map products to supplement standard NGA maps and charts.
- Coordinating with the CM/DO; SARC OIC; P&A cell OIC; and other MAGTF and supporting intelligence, reconnaissance, and combat units to collect, analyze, synthesize, produce, and disseminate GI&I and to assist with all-source intelligence production (e.g., HLZ studies).
- Preparing map substitutes, such as overlays, overprints, photomosaics, map revisions, and multicolor charts.
- Revising and reproducing limited quantities of combat charts, coastal charts, port charts, and harbor charts. Products may include 3-D [three-dimensional] terrain models, LOS studies, range fan studies, terrain factor overlays, hydrographic charts, HLZ studies, and similar products.
- Preparing coastal hydrographic surveys from the 6-fathom depth curve (or from where the Navy ocean survey ends) to the high-water line. The survey is extended beyond the beach to the first LOC that allows lateral movement beyond the beach.
- Collecting coastal data regarding trafficability, routes of egress, and inland water bodies.
- Populating the TGIL with databases to support all MAGTF requirements.
- Supporting specific missions, target areas, and IRs by integrating and intensifying additional information rapidly.
- Operating the TPC. The topographic platoon, when functioning as a multiworkstation, high-end GIS that is capable of integrating, deconflicting, analyzing, producing, and disseminating theater, Service, and national geospatial databases and GI&I products (see app. C), can provide the following three key capabilities for the commander:
  - GI&I capability within a designated battlespace.
  - Rapid integration and analysis of multispectral, hyperspectral, and national imagery with GI&I and other intelligence.
  - Ability to query, retrieve, integrate, deconflict, and analyze multisource GI&I provided by the geospatial analysis branch, JICs, JAC, other Services, and coalition GI&I databases.

Tasks. Refer to appendix B.

National Support

National Geospatial-Intelligence Agency

Mission

The NGA provides timely, relevant, and accurate GEOINT to support national security objectives and meet national and military operational and training needs.

Organization

The most recently established DOD combat support agency, NGA was established by the National Geospatial Intelligence Act of 1996. In recognition of its unique responsibilities and global mission, NGA is also designated as a part of the US intelligence community.

Responsibilities

Responsibilities of the NGA include the following:

- Coordinating GEOINT collection, processing, exploitation, and dissemination requirements among DOD, intelligence communities, the National Security Council, and other Federal Government agencies and departments.

- Serving as the clearinghouse for acquisition of commercial imagery collection and commodity geospatial data sets.
- Providing strategic direction support as follows:
  - Identifying and obtaining products and services that are available from other activities to meet the needs of the customer.
  - Establishing an easily accessible database with the information and applications required by customers.
  - Transitioning from custom systems to flexible commercial solutions by using innovative and open systems technology to reduce overhead costs and provide the best solutions—only developing custom systems when commercial solutions are inadequate.
  - Defining and leading the NSG development, to include defining operational, technical, and systems views of the NSG architecture in order to permit organizations to share data, services, and resources.
  - Sharing resources and workload by leveraging partnerships with other US and foreign government organizations, commercial organizations, and schools.
  - Developing policies to facilitate NSG activities that support members' goals to provide information at the lowest possible classification level, establish partnerships, and purchase commercial products and services.

Tasks

Tasks of the NGA include consolidating and deconflicting the CCDR's GEOINT requirements and priorities that need approval by the joint staff and Under Secretary of Defense for Intelligence, subsequently assigning resources against the prioritized requirements for production and distribution. Tasks also include the following:

- Providing a full range of geospatial databases, products, and services to support missions identified by the Joint Strategic Capabilities Plan, while continuing to provide the essential support required for navigation and flight safety.
- Maintaining an immediate crisis-response capability to support major regional conflicts, peace operations, intervention, and humanitarian assistance operations.
- Coordinating with other agencies or civilian contractors for surge support for crisis or contingency operation production.
- Deploying command support teams, at the request of DOD components, to assist in either support planning or the actual execution of GEOINT support.
- Maintaining a command, Service, and agency liaison program and conducting frequent staff-assistance visits to both identify and satisfy DOD component GEOINT requirements.
- Promoting unified, joint, combined, and coalition operations by adopting/promulgating GEOINT standards within DOD, the Federal Government, and international military and civil standard organizations.
- Acquiring and assessing foreign-generated GEOINT products and databases for use by the NSG.
- Acting as the primary DOD Executive Agent for purchasing satellite remote sensing data for the Services, CCDRs, and defense agencies.
- Promoting joint GEOINT operations and TTP development among the Services and federal agencies.
- Developing, maintaining, and operating the National GEOINT Data Library.
- Conducting or requesting Service GEOINT assets to conduct collection of conventional geodetic, satellite geodetic, topographic, hydrographic, bathymetric, geomagnetic data, and aerial cartographic photography.

National Geospatial-Intelligence Agency Support Team-Marine Corps

Mission

The NST-Marine Corps serves as the focal point for GEOINT requirements that support the Marine Corps' ability to organize, train, and

equip. The team enhances partnerships within the Marine Corps and the NSG to maximize the contribution of GEOINT.

Organization

The NST-Marine Corps is part of the Office of the Director of Military Support. The Director of Military Support synchronizes/integrates agency support for expeditionary operations, future warfare capabilities, and deployed NGA personnel in order to provide timely, relevant, and accurate GEOINT to warfighters and other government agencies.

Responsibilities

Responsibilities of the NST include the following:

- Providing GEOINT analysis and production support at MCIA and a reachback capability to produce or to coordinate production of Marine Corps GEOINT requirements.
- Providing access to NGA GEOINT data, products, and services by locating NGA analysts, workstations, and network connections at designated locations and supplying NGA GEOINT data, products, and services as requested by Marine Corps units.
- Coordinating onsite GEOINT training at designated locations and coordinating mobile training teams for training requirements beyond the capability of onsite personnel.
- Providing GEOINT subject matter expertise to staffs at designated commands and in support of acquisitions and training at the Service level.
- Coordinating GEOINT support across the NGA by providing access to the full range of NGA GEOINT support and coordinating and deconflicting support provided by various elements within the NGA.
- Assisting in the development of GEOINT plans and policy by providing Marine Corps senior leadership with a unified view of support provided by NGA and making recommendations concerning employment of NGA support. The team ensures that Marine Corps senior leadership is informed regarding current and emerging GEOINT issues and making recommendations on potential COAs.

Tasks

Not applicable.

National Geospatial-Intelligence Agency Support Team Representatives to the Marine Corps

Mission

The NST representatives train and work with the MEF intelligence personnel to integrate GEOINT and future NSG capabilities into MCCC, MARSOC, and MEF operations. The NSTs also evaluate the use of GEOINT and NSG concepts and products that support the MAGTF mission.

Organization

The NSTs are collocated within the Marine operating forces under the MEF AC/S G-2 and within the intelligence battalion. They are an extension of the NST-Marine Corps; Pacific Command, NST; and Special Operations Command, NST. The MEF memorandum of agreement dictates how each NST representative will be implemented. The NSTs provide direct access to the NGA geospatial information libraries (GILs), the imagery product libraries, and support interoperability between the Marine Corps and NGA. The NSTs execute all tasks in coordination with guidance provided by the DIRINT's staff.

Responsibilities

Serving as the focal point for NGA GEOINT activity within the Marine Corps, NST has the following responsibilities:

- Assisting each MEF in identifying GEOINT requirements.
- Installing and maintaining NGA application software and new NGA prototype and products as they become available and familiarizing Marine GEOINT personnel with the software applications.

- Training MEF intelligence personnel in the use of NGA data and applications for planning and integration into organizational systems.
- Developing, maintaining, and presenting demonstrations of both current and projected GEOINT capabilities.
- Evaluating GEOINT software and data.
- Reporting findings to NST chief(s), their Marine supervisor (in the chain of command), and HQMC intelligence staff.
- Coordinating all actions affecting MAGTFs that include NST chief(s), their Marine supervisor (in the chain of command), and HQMC intelligence staff.
- Providing technical support for NGA products used in MAGTF systems.
- Assisting in development of TTP to support the rapid generation of new data and/or the intensification of existing data sets.
- Assisting in technical reviews of developmental data sets, products, systems, and associated documents to ensure that standard NGA data is used and new product requirements are promptly identified.
- Assisting the Marine Corps (i.e., Marine Corps forces, MCCC) in the technical use of GEOINT and NSG products.
- Assisting with the technical integration of NGA's NSG concept into existing MAGTF architectures and migration plans.

Tasks

Not applicable.

CHAPTER 4
PLANNING

Accurate, integrated, deconflicted, and timely GI&I is needed in all phases of an operation. This chapter serves as a GI&I planning guide to support MAGTF operations and outlines the various planning processes. It explains the GI&I roles and responsibilities during deliberate and crisis planning, defines the GI&I that is available to support planning and addresses sources of GI&I, and provides guidance regarding the identification and acquisition of GI&I at various echelons of a MAGTF within a theater of operations.

Planning Process

Marine Corps Planning Process

The MCPP helps to organize the thought processes of commanders and their staffs throughout the planning and execution of MAGTF operations. The MCPP, which is based on the Marine Corps expeditionary maneuver warfare philosophy, focuses on both the threat and the mission. It takes advantage of unity of effort and helps to establish and maintain operational momentum. Refer to MCWP 5-1, *Marine Corps Planning Process*, for more details concerning MCPP doctrine and TTP. The MCPP—

- Applies to command and staff actions at all echelons and can be as detailed as allowed by time, staff resources, experience, and the situation. Commanders and staff members, from the Marine Corps component headquarters to the battalion and squadron, must master the MCPP in order to conduct fully integrated planning.
- Complements both deliberate and crisis action planning (CAP) as outlined in the Joint Operation Planning and Execution System (JOPES).
- Enables all levels of command to begin a planning effort with a common understanding of the mission and commander's guidance. Interactions among planners during the various steps of the process will ensure a concurrent, flexible, coordinated effort that uses time efficiently and promotes information sharing.
- Establishes procedures for analyzing a mission, developing and analyzing COA against the threat and environment, comparing friendly COAs against the commander's criteria and each other, selecting a COA, and preparing orders for execution.

Joint Planning Processes

Joint Publication 5-0, *Joint Operation Planning*, provides a detailed discussion of the joint planning processes.

Roles of Geospatial Information and Intelligence in the Marine Corps Planning Process

Emerging DOD and Marine Corps GEOINT capabilities will support MAGTF requirements for accurate, high-resolution, mission-focused GI&I that provide the following:

- Robust analytical capabilities.
- An interoperability among coproducers and across diverse systems.
- A list of base maps of the area of operations that include standard topographic line maps (TLMs) for tactical planning and smaller-scale products, such as joint operations graphics (JOGs), for operational planning. These products can be requisitioned with standard supply requests via unit supply/S-4.

- A consistent and documented set of foundation data with near-global coverage.
- A foundation data intensification capability that meets specific mission information and intelligence needs.
- An integrated and deconflicted data that is derived from multiple sources.
- A tactical or exploited data from other providers, adding capability to create tailored views.
- An improved access to digital information using Web-based technologies.
- A consistent data quality information (i.e., positional accuracy, currency, completeness, correctness of attribution) to support a more informed exploitation by users.
- Any additional information that is required to support and enhance collaborative planning throughout the MAGTF.

Geospatial Information and Intelligence Planning Considerations

Essential Elements of Terrain Information

During initial planning, GI&S identifies gaps in the EETI that must be answered in order to complete an accurate presentation of the battlespace. These EETIs help planners to generate IRs for submission to the MAGTF intelligence officer. The CM/DO and the GI&S officer must identify tactical, theater, or national sources to fill defined EETIs and IRs.

Coordination Requirements

The MEF GI&S section and the P&A cell are the focal points for coordinating GI&S requirements. The MEF command element establishes coordination procedures as part of the staff planning process. Coordination ensures that GI&S identification, prioritization, analysis, collection, production, and dissemination are provided to all MAGTF elements.

Position and Navigation

The MAGTF must be prepared to conduct operations in all environments—air, land, and sea. During peacetime, MAGTF units and collection platforms must conform to applicable national and international agreements for controlled airspace and for coastal and inland areas. The MAGTF's position and navigation systems must have access to global GI&S coverage, effective real-time response, standard grid and reference systems, and map data information. Increased emphasis on urban terrain/environments requires more refined information and resolution to provide a stable and accurate geospatial foundation.

Geodetic Data

In geographic terms, a datum is a mathematical model of the Earth's shape that is used as a basic reference to make maps and calculate position coordinates, heights, and distances. The datum is the origin or point of reference. Many countries have developed their own types of datum, which usually differ from those of neighboring countries. The WGS-84 is the standard horizontal datum for all US operations. The CCDR or JTF commander will designate another datum only when necessary to support multinational operations.

Standard Grid and Reference System

There is a critical need for all forces to operate with the same grid and associated reference system. Computer systems today can function in multiple coordinate systems; however, multiple systems ultimately induce operational friction. The military grid reference system (MGRS), overlaid on the universal transverse mercator coordinate system, is the American standard per Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3900.01_, *Position (Point and Area) Reference Procedures*. The MGRS shall be used for operations either involving or in support of ground forces. The MGRS is the positional reference

standard when aviation assets are providing close air support. Geographic coordinates may be used in operations that do not directly involve ground forces.

Global Positioning System

Global Positioning System (GPS) provides position, navigation, and timing to operational forces. It is a critical part of GI&I, command and control, mission planning, fire support, intelligence, weapons, and logistic operations and systems. All GPSs must be linked by a common reference system. The WGS-84 datum is the default geodetic reference system used by GPS. In some operations, the mapping datum must be shifted to local datum (e.g., Tokyo datum) for combined or multinational support. When using GPS, it must be set to the designated datum to ensure that navigation is safe and that common coordinates are being exchanged among all forces involved in the operation.

For example, in Caleta Cifuncho Bay, Chile, on 12 September 2000, the USS LaMoure County [LST-1194] was involved in an accident that was the result of using multiple datums in GPS and GI&S.

Product Accuracy

The accuracy of all GI&I products depends on the scale, resolution, and source that was used to produce them. Accuracy must be considered when comparing map coordinates to the coordinates derived by either GPS or high-resolution imagery. The NGA's digital point positioning database (DPPDB) is the only source that is authorized for deriving coordinates for precision weapons.

Support to the Planning Process

Marine air-ground task force GI&I products and services must be introduced early into the Joint Deliberate Planning Process and JCAPP. Such timing facilitates timely and effective force planning because of the characteristics of modern joint operations and the broad scope of operational and warfighting functional requirements.

Deliberate Planning

The deliberate planning process (see fig. 4-1) is a longer-term, step-by-step process that is conducted primarily during peacetime. The planning effort must be responsive to both the commander's requirements and to the requirements of subordinate units/elements. The G-2 plans officer, MEF G-2 GI&S section, and the intelligence battalion must coordinate and share information with the G-2, G-3, G-4, G-5, G-6,

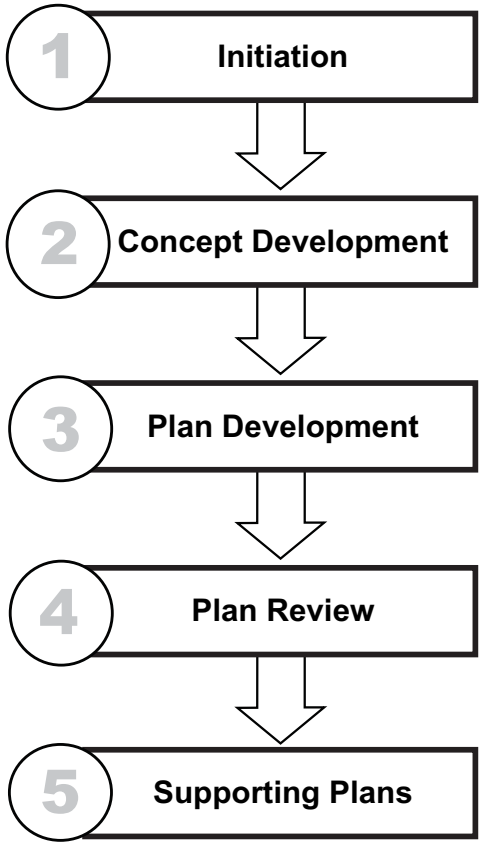


Figure 4-1. The Deliberate Planning Process.

and all subordinate commanders. Deliberate planning requires the following:

- Commander's intent and guidance.
- Mission development.
- Commander's estimate and intelligence estimate, including the GEOINT estimate (see app. D).
- Force list identification.
- Development of intelligence.
- Development of COAs.
- Annex M (Geospatial Information and Services) to the supporting OPLAN or OPORD.

The G-2 plans officer, GI&S section, the intelligence battalion, and the topographic platoon support the deliberate planning process by preparing for possible contingencies based on the best information and intelligence available. This effort relies heavily on the political and military circumstances that exist when planning begins. The deliberate planning process can engage the entire DOD GEOINT establishment in the development of plans for contingencies. These contingencies are identified in the *Marine Corps Midrange Threat Estimate: 2005-2015*.

During deliberate planning, the G-2 plans officer, GI&S section, and the ISC section work closely with GI&I representatives from subordinate commands, the appropriate CCDR and JTF GEOINT officers, MCIA, and NGA to develop strategies for GI&S support to future operations. Appendix E outlines general guidance and considerations used to assist MAGTF staff sections with deliberate GI&S planning. The following paragraphs discuss GI&S planning from an integrated MCPP and/or Joint Deliberate Planning Process perspective.

Deliberate Planning Phase 1: Initiation

During deliberate planning phase 1, the Services provide information to the supported commands regarding available GI&I-capable forces and the requirements needed to support the plan. The Services maintain a current GI&I planning factors database (PFDB) to support this task. The PFDB describes the geospatial data requirements for all weapons, command and control, CIS officer, and other systems. It provides the G-2 plans and GI&I planners with an estimate of product quantities that are needed to support the proposed force structure. During deliberate planning phase 1, the G-2 plans officer, GI&S section, and the ISC should review the PFDB carefully to ensure that all units and weapon systems are included. It is also important to maintain a dialog with the appropriate NST to inform them of emerging plans or modifications to the existing plan.

Deliberate Planning Phase 2: Concept Development

During deliberate planning phase 2, the supported commander's CONOPS is developed and documented as part of the commander's strategic concept. The G-2 plans officer, GI&S section, and the ISC should conduct the following actions:

- Submit planning information to the primary staff to be included in the COA development.
- Work closely with all MEF sections and subordinate units' intelligence officers during the IPB process to provide input on available and required geospatial data.
- Prepare the initial GEOINT estimate (see app. D) and GI&S CONOPS.
- Refine the geographic footprint or the extent of the area of operations for the plan. The NGA, MCIA GID, and topographic platoon need this information to begin their assessment of available GI&I source materials, data, EETIs, IRs, and production assets.
- Review the CCDR's and/or joint force commander's (JFC) guidance regarding datum issues. Although CJCSI 3900.01_ establishes WGS-84 and MGRS (for ground operations) as the joint operations datum and positional reference standards, these standards may not be achievable in the short term to support the plan. Many large-scale standard NGA products still exist using other local datum. Efforts to change these products to WGS-84 may not

be able to be accomplished in the time available. The GI&I section and the ISC must explain to the MEF commander, subordinate commander(s), and associated staff(s) any nonstandard datum and its impact on operations.

- Identify possible issues that may arise and that are related to disclosure, release of limited distribution, classified GI&I products, and data to multinational/coalition forces. The G-2 plans officer, GI&S section, and ISC must coordinate these issues with the CCDR and NGA.

Deliberate Planning Phase 3: Plan Development

The commander's intent and guidance provide the basis for planning efforts conducted by the MEF staff. During deliberate planning phase 3, the MEF staff develops annexes and appendices to support the OPLAN. The G-2 plans officer and the ISC, assisted by the GI&S section, should conduct the following actions:

- Determine existing shortfalls in GI&I coverage. Develop a production strategy in conjunction with the CCDR and the pertinent JTF to eliminate/reduce the risk of identified shortfalls. Determine the appropriate priority for the production or update of required geospatial data and products.
- Determine existing shortfalls in GI&S capabilities of supporting forces in the MEF. This information is forwarded to either HQMC IPI or the CCDR GEOINT officer for assistance.
- Develop Annex M (Geospatial Information and Services) to the OPLAN. Refer to appendix F of this publication for a sample format.
- Update and produce Appendix 15 (Geographic Intelligence) to Annex B (Intelligence) and Annex M (Geospatial Information and Services) to the OPLAN. Refer to appendix D of this publication for a sample of format.
- Assist the P&A cell OIC in developing Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) of an OPORD. Appendix 11 requires the following tabs:
  - Tab A (Tactical Study of the Terrain).
  - Tab B (Beach Studies).
  - Tab E (Helicopter Landing Zone and Drop Zone Studies).

  Note: Refer to appendices G, H, and I of this publication for format samples.
- Ensure that MEF GI&S assets and products are included in the time-phased force and deployment list (TPFDL) to ensure proper movement of critical personnel, equipment, and GI&I data and products into the area of operations. For both the MAGTFs and MEF MSCs, the unit's intelligence officer is responsible for building the TPFDL. Continuous coordination with both the MEF G-2 and component and subordinate GI&S sections is required.

Deliberate Planning Phase 4: Plan Review

During deliberate planning phase 4, detailed analysis of OPLAN supportability is conducted. The MEF may request HQMC IPI assistance in the review. The G-2 plans officer, with the assistance of the ISC, topographic platoon, and MSC GI&I representatives, conducts the following actions:

- Determines the appropriate level of readiness for the plan. The assessment of the possibility of execution and calculation of preparation times is based on indications and warnings. This assessment is forwarded to the CCDR for input at the final readiness level that is assigned to the OPLAN.
- Reviews the current status of topographic equipment, personnel, and training as well as MEF and MSC GI&I education and standing operating procedures (SOP) needed to support deployment and execution of the OPLAN. Unit training plans and SOPs shall be modified as required.

Deliberate Planning Phase 5: Supporting Plans

Deliberate planning phase 5 addresses mobilization, deployment, employment, sustainment, and redeployment of forces and resources in support of the concept that is described in the approved plan. During this phase, the G-2 plans officer,

GI&S section, and ISC should conduct the following actions:

- Ensure that support planning efforts have identified the quantity of GI&I supplies, equipment, distributive production support, and replacement personnel needed to move the force into theater and then sustain that force while deployed.
- Task subordinate units to determine their GI&I basic load and war reserve stocks (WRSs).
- Determine locations for GI&I WRS storage and coordinate the development of facilities and maintenance plans. The CCDR, NGA, MEF command element, MAGTF command element, or another Service component should maintain the WRS. The CCDR's OPLAN shall delineate responsibilities. In some cases, a memorandum of understanding will be prepared that will assign maintenance responsibilities.
- Task subordinate units to provide automatic distribution requirements to support basic load and planning stock requirements.
- Ensure that subordinate units have included GI&I requirements (i.e., people, equipment, and products) in their time-phased force and deployment data (TPFDD) records.
- Ensure that subordinate units have included GI&I MCEN requirements in their supporting plans.
- Plan to secure MAGTF reachback GI&I production support from the GID and other sources, if necessary.
- Coordinate either formal agreements or memoranda of understanding to support other aspects of the GI&I plan, such as provisions for support from host nations, logistics and distribution support, or the role of multinational units in GI&I operations.
- Coordinate GI&I product disclosure and release issues so that multinational/coalition forces have access to the appropriate products.
- Develop a plan for residual, unclassified GI&I stocks that may remain in theater after termination of operations. This plan may delineate the destruction of GI&I stocks, the turnover of stocks to host nation forces only after proper release and disclosure have been granted, or shipment of stocks back to theater or US depots.
- Dispose of classified GI&I data and products per Department of Defense directive (DODD) 5200.1, *DOD Information Security Program*.
- Develop a plan for documenting and implementing lessons learned.
- Ensure that all GI&I data and products are scrubbed, validated, and posted to the MCIA GID geospatial library.

Crisis Action Planning

The basic MCPP and Joint Deliberate Planning Process are adapted to execute operations in crisis situations. Crisis action planning procedures provide GI&I planners with an abbreviated process for determining GI&I support to rapidly-developing MAGTF operations for which no deliberate plan exists or for quickly updating and developing an OPORD based on a previously developed OPLAN.

It is impossible to anticipate every crisis; however, detailed analysis and coordination accomplished during the deliberate planning period can make CAP more efficient. The requirements to plan GI&I support for crisis operations depend on the scope of the mission, the number of products that can be adapted from existing deliberate plans, and the amount of time that is available. In certain cases, phases may be compressed or even skipped. To better prepare for this eventuality, command GI&S staffs and representatives should create their own crisis-planning checklists and exercise them regularly.

Geospatial information and intelligence support planning for CAP should always begin with a

thorough examination of relevant deliberate plans. Refer to figure 4-2 for the six phases of CAP.

Crisis Action Planning

Phase 1: Situation Development

Proper development of the situation demands that staffs are able to provide advice to commanders immediately. The MAGTF GI&S section and the ISC must be able to provide the principal staff with the GI&I products, services, and data that are necessary for planning assessments. During CAP phase 1, a key task for intelligence and GI&I planners is developing the commander's situation assessment and the accompanying GEOINT estimate for GI&S support. This assessment must provide an accurate picture of the command's GI&I preparedness to execute MAGTF operations in the area of operations. The MAGTF G-2 plans officer and GI&S section should make this assessment in conjunction with

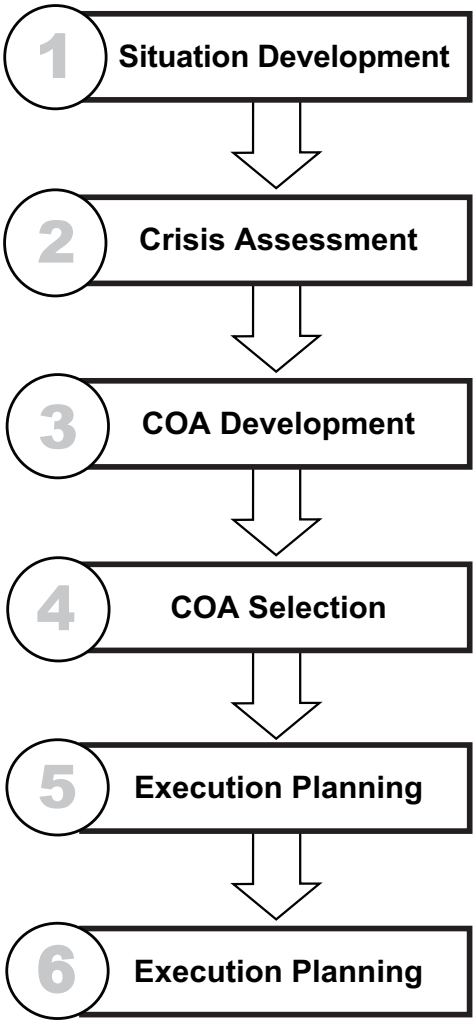


Figure 4-2. Crisis Action Planning.

the appropriate NST. The following data and products must be assessed:

- GI&I requirements based on the mission, intent, IRs, CONOPS, and force structure. The PFDB can be used to determine weapons, command and control, and systems GI&I requirements.
- GI&I product availability and currency, including a base map series of the area (e.g., off-the-shelf continental United States [CONUS]-available products and data or CONUS-based topographic assets and depots). Ensure that the base map series for the area, including NGA formats and other digital data products, is posted and available through the MCIA GID.
- Preliminary recommendation for GI&I-capable forces to be included in the MAGTF task organization and the recommended C2 relationships.
- Initial MCEN requirements estimate in coordination with the G-6. The MCEN is needed to transmit digital geospatial data between forward-deployed units, CONUS production centers, digital data repositions, theater-level data servers, and multinational forces.
- GI&I products to be developed or updated based on prioritized requirements and time available. The ISC must consider the use of interim products (e.g., satellite image maps in lieu of TLMs or foundation data in lieu of mission-specific data). The NGA can assist in determining which data can be made available within the existing time constraints.

Crisis Action Planning Phase 2: Crisis Assessment

In CAP phase 2, the G-2 plans officer, GI&S section, and ISC continue to refine the MEF GEOINT assessment that was completed in phase 1 and begin to consider requirements for transporting and disseminating GI&I throughout the MEF. Crisis action planning phase 2 ends with the commander's decision to develop COAs for consideration. The MAGTF G-2 plans officer, GI&S section, and ISC are responsible for conducting the following actions during CAP phase 2:

- Coordinating with NGA to ensure they are informed of pertinent guidance.
- Identifying the datum and grid reference system to be used for the operation.
- Coordinating with NGA to postpone the distribution of hard copy products and digital media specific to the area of operations. This action will allow GI&I planners to prioritize the distribution of the required data and products to the units involved in the operation. Units obtaining 15 or fewer products for planning purposes will not be restricted by this delay.
- Coordinating with the JTF to develop and provide special procedures to use when requisitioning products for the area of operations to the NGA, subordinate and supporting staffs, representatives, supply units, and appropriate forces. Distribution limits and unit priorities must be established early to prevent the depletion of stocks and to ensure that priority needs are satisfied.
- Coordinating with the G-4/S-4 and G-6/S-6 early in the planning process to determine how transportation and MCEN infrastructure status could impact GI&I production-capable unit operations (e.g., deployment and dissemination for GI&I products).
- Coordinating with the MCCC and NGA for both GI&I personnel and equipment augmentation. The NGA has contingency response teams that are trained in requirements planning, GEOINT production, distribution, and map depot-warehousing operations. To provide the MAGTF the required GI&I support contingency response teams may be deployed quickly to the theater of operations when requested by the CCDR. Global sourcing of Marine personnel and equipment may also be required to provide the MAGTF the required GI&I support.

Staff augmentation requests, via a checklist, should address the important questions listed in table 4-1.

- Coordinating GI&I collection and production priorities and activities as soon as possible with the G-2 operations officer, GI&S section(s), the ISC, the CM/DO, and the P&A cell OIC.
- Coordinating with subordinate and supporting GI&I-capable units, to include those units from multinational forces, other Service assets, and NGA, in order to accomplish critical actions while minimizing duplication of effort. In response to crises, Marine Corps installation GI&S personnel may be called upon to augment topographic platoons, which would be coordinated through the local base commander.
- Coordinating with the G-2, G-3, and G-4 to identify GI&I requirements/requests from multinational forces.
- Coordinating requests for foreign disclosure/release with the NGA.
- Establishing POCs with multinational and subordinate forces for both the supply and receipt of GI&I products and data.

Table 4-1. Staff Augmentation Request Checklist.

#	Staff Augmentation Checklist
1	What is the justification for the request?
2	What specific expertise is needed?
3	Where will teams be located?
4	When will the teams need to be in place?
5	What critical hardware or software deficiencies exist? Who is impacted by the deficiencies?

Crisis Action Planning Phase 3: Course of Action Development

In phase 3, the MAGTF staff attempts to develop COAs based on the commander's guidance. The G-2 plans officer, GI&S section, and the ISC section coordinate the analysis of each COA with the JTF, subordinate units, and the NGA. The GI&S section must determine the advantages and disadvantages of each COA from a GI&I perspective. Crisis action planning phase 3 ends when the commander's estimate, which includes the GI&I staff estimate, has been submitted.

Crisis Action Planning Phase 4: Course of Action Selection

In CAP phase 4, the MAGTF commander reviews and evaluates staff estimates and chooses a COA. Warning orders may be promulgated with sufficient detail to allow subordinate commanders to conduct detailed planning. The focus of subsequent GI&I planning transitions into support of the selected COA. The following actions must be conducted:

- Reviewing the GI&I planning checklist in appendix E of this publication for issues to consider.
- Ensuring that all subordinate GI&I personnel understand the organizational structures, command, support, and multinational relationships that have been established for the mission.
- Briefing subordinate forces and supporting command intelligence officers and GI&S personnel regarding key C2 relationships that may affect their particular missions.
- Coordinating with the G-6 to finalize MCEN support for the MAGTF command element, subordinate unit(s), and supporting GI&I element.
- Ensuring that an adequate communications bandwidth exists to transmit digital GI&I from production elements throughout the MAGTF.
- Developing contingency procedures for maintaining support to subordinate units if the primary communications have been degraded or disrupted.
- Ensuring that requests for GI&I personnel and equipment augmentation are submitted formally and that responses are tracked.

- Ensuring that coordinating logistical preparations for both receiving and supporting personnel augments are coordinated with the MAGTF headquarters.
- Coordinating final personnel, systems, supply, and equipment requirements with the appropriate subordinate GI&S sections and representatives. These requirements shall be integrated into JOPES and will be reflected on the TPFDD.
- Resolving foreign GI&I disclosure/release policies as follows:
  - Finalizing requirements to share geospatial data.
  - Identifying, in annex M of the OPORD, specific products and data to be shared with allied forces.
  - Informing subordinate GI&I personnel regarding procedures for handling disclosure/release of geospatial data to foreign nations.
  - Coordinating with the NGA to ensure that support is being provided to multinational coalition forces, the United Nations, and/or NGOs.
- Obtaining the status of the Crisis Production Plan from the NGA and external supporting intelligence production centers to cover GI&S shortfalls.
- Coordinating intratheater and intra-area of operations map depot establishment and dissemination requirements with the G-4.

Crisis Action Planning Phase 5: Execution Planning

Crisis action planning phase 5 begins with receipt of the alert, warning order, or planning order from either the CCDR or JFC and progresses as follows:

- The approved COA is transformed into an OPORD. Detailed planning occurs throughout the joint planning community.
- The MAGTF commander develops the OPORD by modifying an existing OPLAN, expanding an existing concept plan, or developing a new plan.
- CAP phase 5 ends with the decision to implement the OPORD. The planning emphasis during this phase shifts to focused GI&I production and transportation and dissemination requirements.

The following actions must be accomplished during CAP phase 5:

- Briefing and coordinating with the intelligence and GI&S staffs of subordinate units regarding GI&I priorities and ongoing operations.
- Finalizing any remaining actions that were compressed because of rapid development of the crisis situation.
- Revising and publishing Annex M (Geospatial Information and Services) to the OPORD.
- Refining Appendix 15 (Geographic Intelligence) to Annex B (Intelligence) of the OPORD.
- Ensuring that all subordinate commands understand the MAGTF CONOPS for GI&I support operations.
- Ensuring that C2 relationships have been defined and MCEN plans have been developed for all MAGTF and supported units.
- Informing the commander of the current status of GI&I capabilities and limitations and the status of crisis GI&I production.
- Briefing OPORD to personnel.

Crisis Action Planning Phase 6: Execution

Once a COA has been selected, the JFC issues the execute order, which initiates CAP phase 6. The execute order directs the deployment and employment of forces, defines the timing for initiation of operations, and conveys guidance that is not provided in earlier CAP orders and instructions.

Crisis action planning phase 6 continues until the crisis or mission ends and force redeployment has been completed. If the crisis is prolonged, all or pertinent parts of the CAP process may be repeated as circumstances change and missions are revised. If the crisis expands to a major conflict

or war, CAP will evolve into planning for the conduct of the war.

Once deployment begins, the MEF G-2 plans and GI&S section will coordinate the deployment of requested GI&I augmentation personnel/ equipment to the theater. They may also assist the ISC to develop GI&I production guidance for supporting GI&I organizations and elements.

Collection Planning

Intelligence collection planning requires that the G-2 plans and GI&S section coordinate with the ISC, CM/DO, and the G-3/S-3 future operations officer to ensure that GI&I, EETI, and IR shortfalls have been identified, prioritized, and included in the MAGTF collection plan. Current mapping imagery is critical for supporting GI&I requirements. Mapping imagery supports the intensification and value adding of features and attributes within the geospatial library, the production of new edition standard base maps, and the development of other GI&I products. Hydrographic collection support will be required for amphibious operations. Marine air-ground task force collection assets provide tactical information that supports identification and positioning of features and attributes to assist in populating the geospatial libraries with tailored, mission-specific data within defined target/objective areas. Geospatial information and intelligence planners must evaluate the following information when developing the GI&I requirements for the collection plan:

- Type of unit(s) conducting the operation (e.g., infantry, long-haul truck, reconnaissance, aviation, civil affairs).
- Type of environment in which the unit will be operating (e.g., urban, amphibious).
- Type of mission being conducted (e.g., raid, humanitarian, amphibious landing, maneuver warfare).
- Type of information and level of resolution that is needed to support the mission (normally established in the unit and mission profiles).
- Type of geospatial database shortfalls.
- Type of available sources and prioritization based on the MAGTF commander's intent, commander's critical information requirements (CCIRs), and CONOPS.

Processing, Exploitation, and Production Planning

The most critical factors in GI&I processing, exploitation, and production planning are the commander's PIRs (as the intelligence component of the CCIRs) and the production center's adjustments to keep abreast of changing conditions within the battlespace. This planning will require the ISC and GI&S section to be engaged with staff sections in order to keep abreast of requirements and keep the GI&I production assets updated.

The ISC is responsible for coordinating with the G-2 operations and plans officers, P&A cell OIC, and topographic platoon commander to prioritize GI&S. The ISC is responsible for ensuring that the GI&I production schedules supporting MAGTF requirements are maintained.

Dissemination Planning

The ISC must coordinate the dissemination of GI&I products throughout the MAGTF. The ISC is responsible for—

- Identifying standard MAGTF GI&I product requirements.
- Coordinating the prioritization of MAGTF GI&I requirements with both the G-2 plans and operations officer(s) and the intelligence officer(s) at subordinate units.
- Coordinating CM/DO MCEN support with the MAGTF G-6/S-6 to ensure satisfactory connectivity and support.
- Coordinating the CM/DO with the G-1/S-1 for disseminating limited hard copy GI&I products to subordinate units.

Geospatial Intelligence to Support Planning

Geospatial Foundation Data

Foundation data forms the base of the geospatial foundation. It is one of the principal components of the DOD GI&I readiness strategy that is designed to satisfy both joint and MAGTF GI&I requirements. Fusion of foundation data with other sources of GI&I provides near-worldwide coverage to support planning requirements. Foundation data provides specific, accurate, standardized GI&I data. This data is geopositioned to the WGS-84 standard DOD datum to provide interoperability and commonality across Services, mission areas, systems, and forces. The basic components of foundation data (see table 4-2) can be fused to create a standard base map view that is used for planning and some operations. Foundation data supports 3-D visualization and some analytic activities. It also serves as the base for both intensification and integration of new categories of information.

Digital Terrain Elevation Data

Digital terrain elevation data (DTED) is a uniform matrix of terrain elevation values. The matrix provides basic quantitative data for all MAGTF systems requiring terrain elevation, slope, and/or surface roughness information. Digital terrain elevation data has a post spacing of approximately 30 meters (1 arc second) and provides the macrorelief that is necessary to support most mission planning. The information content is the approximate equivalent to the contour information presented on a 1:50,000 scale map. Table 4-2 provides basic information concerning the various levels of DTED.

Digital Bathymetric Database

The Naval Oceanographic Office developed the digital bathymetric database (DBDB) and the Navy controls its distribution. Depths are given in uncorrected meters for the post spacing of the database. The bathymetric data is used for beach studies, contour charts, planning graphics, and digital displays.

Note: The DBDB does not include tidal references.

Foundation Feature Data

Foundation feature data depicts selected features (e.g., roads, streams, lakes) with additional attribution arranged in relational thematic layers and mission-specific data standard content. Feature density depends on the specific geographic region and will normally look like a traditional TLM. The foundation data provides—

- Transportation and drainage networks.
- Geodetic control points.
- Populated areas.
- Boundaries.
- Vegetation.
- Natural and cultural features of high interest.

Table 4-2. Digital Terrain Elevation Levels.

	Level 0	Level 1	Level 2	Level 3
Posting	30 arc seconds	3 arc seconds	1 arc second	0.4 arc second
At the equator	+ 900 meters	+ 90 meters	+ 30 meters	+ 12 meters
At 45° latitude	+ 630 meters	+ 63 meters	+ 21 meters	+ 9 meters
Note: Posting values decrease near the polar areas to cope with meridian convergence.				

Controlled Image Base

A CIB is an unclassified data set of geodetically controlled, orthorectified, and monoscopic imagery. The CIB supports—

- Various C2 and weapon systems.
- Theater battle management.
- Mission planning.
- Digital, moving map displays.
- Terrain analysis.
- Simulations.
- Intelligence systems.
- CIS.

Digital Point Positioning Database

The DPPDB is a classified, deployable set of geodetically controlled, stereoscopic imagery containing associated support data. Both NGA and other producers develop DPPDBs that provide users the capability to derive accurate positional data for any identifiable feature within a specified area. Analysts need specific hardware and software to exploit DPPDB.

Qualified Data

Qualified data include other data sets of known quality and accuracy that have been neither integrated nor deconflicted with foundation data and mission-specific data sets (MSDSs). National Geospatial-Intelligence Agency standard digital products (see app. A) are a core component of qualified data. Available national and international government databases that satisfy identified requirements can be assessed and integrated into the production plan as qualified data. The assessment will be based on established standards for accuracy, currency, resolution, content, and format.

Commercially available products and databases are a data source of growing importance to the MAGTF. Commercial geospatial production tools have introduced a wealth of worldwide GI&I data. Products and databases (with documented accuracy and quality) that will help meet unfulfilled requirements can be procured and integrated into the production plan to meet mission requirements. Value-added data collected by tactical units can be assessed and integrated as qualified data to support tactical operations.

Geospatial Information and Intelligence

The foundation data analysis determines the intensification level that is required to develop the mission-specific data. The resulting mission-specific data forms the next layer of the geospatial foundation. Enhancing baseline information of the foundation data develops mission-specific data. This information includes high-resolution controlled imagery; elevation/bathymetric information; and high-resolution, heavily attributed, vector features that are needed to meet defined mission requirements. Analysis and production of mission-specific GI&I is conducted to support the requirements detailed in the following subparagraphs.

Intelligence Preparation of the Battlespace

Intelligence preparation of the battlespace is both a systematic, continuous process and an analytical methodology employed by intelligence personnel to reduce WET uncertainties for all types of operations. The IPB builds an extensive intelligence database and specific products for each potential area in which a unit may be required to operate. These areas are analyzed in detail to determine the impact of WET on MAGTF operations. That analysis is incorporated into graphic and/or other intelligence product forms. Geospatial intelligence provides a stable geopositional framework that supports the integration and analysis of WET effects on specific COAs.

The GI&I IPB database development is labor intensive and requires the dedicated efforts of geographic intelligence specialists and staff personnel, the direction and focus of the MAGTF staff, and the cooperation of numerous elements within and outside the MAGTF. Geospatial information and intelligence IPB support uses foundation data to define the AOI. Definition of the AOI

is followed by efforts to intensify and value-add critical features within the area of operations. Further intensification of identified targets and objectives in the area of operations may occur to meet tactical requirements for lower echelon units. The primary function of GI&I within the IPB process is to reduce the uncertainties regarding natural and constructed terrain features on MAGTF operations; therefore, terrain analysis examines KOCOA and mobility corridors as detailed in the following subparagraphs.

Key Terrain. Key terrain is any feature or area (i.e., echelon-, mission-, enemy-, and situation-dependent) that, if seized or controlled, offers a marked tactical advantage. Key terrain is further identified as any terrain that either increases or decreases the capability of the friendly or enemy force to apply combat power. Key terrain also permits or denies maneuver.

Note: Any terrain that has an extraordinary effect on mission accomplishment may be designated as decisive terrain. Mission accomplishment normally depends on the seizure or control of decisive terrain.

Examples of key terrain include the following:

- Bridges.
- Fording sites.
- High ground.
- Choke points.
- Road junctions.

Observation and Fields of Fire. Observation involves the influence of terrain on reconnaissance, surveillance, target acquisition, and direct fires capabilities. When discussing IPB, observation refers to optical and electronic LOSs. Observation systems function as follows:

- MAGTF systems (i.e., radios, radar, laser rangefinders, directed energy systems, electronic intercept, direction finders, jammers, direct fire weapons), aided and unaided human vision of ground, and air observers require LOS to function effectively.
- Air defense target acquisition systems and weapons require LOS from their positions to the primary air AAs. The anticipated target flight altitude, relative to the adjacent terrain elevation, must also be considered. Line of sight affects aerial systems from the aircraft flight route to the AOI forward limits.
- Ground-based systems' LOS is normally limited to the immediate area of operations.

The commander's ability to see the battlespace is influenced by the effects of terrain and weather on these systems.

Fields of fire are impacted by the effects of terrain on weapon systems. The terrain within the target area heavily influences the effectiveness of direct fire weapons. These weapons require LOS to the target. Through LOS analysis, the geographic intelligence specialist determines how terrain affects both optical and electronic LOS. Line of sight views can graphically portray these effects for various types of systems. For example, a horizontal visibility or fields of fire view combines the effects of vegetation and slope on LOS. When this information is portrayed graphically, the relative capabilities of direct fire weapons, communications, collection, and target acquisition systems become apparent. This view also assists in identifying key terrain with greater precision.

Concealment and Cover. Concealment is protection from enemy air, ground, and space observation; cover is protection from the effects of weapon fire. Concealment is vital to operational security and deception. Both concealment and cover are vital for protection from hostile fire and are closely related to observation and fields of fire. The geographic intelligence specialist helps to determine the concealment and cover afforded to both friendly and enemy forces by the terrain.

Rotary-wing aircraft attempt to use terrain, smoke, and obscurants to conceal their activities from ground observation, including loitering on the reverse slopes of hills and using vegetation as a backdrop to enhance the aircraft's camouflage.

High-speed, low-altitude, nap-of-the-Earth flights enhance helicopter and fixed-wing aircraft survivability by reducing the reaction times of the enemy ground forces and associated air defense weapons.

Concealment is a critical component of rear area security. Vulnerable rear area C2 facilities, support units, and logistic facilities must be protected from enemy air and ground observation. Cover should be considered in terms of protection from enemy long-range weapon systems, its effect on the enemy's security mission, and the protection it affords enemy forces that are operating in the rear area.

Obstacles, Natural and Constructed. Obstacles are both natural and synthetic terrain features that stop, impede, or divert military movement. The impact of obstacles on mobility makes them an important consideration during production of both GI&I studies and all-source intelligence studies and estimates. The geographic intelligence specialist must determine how obstacles affect air defense weapon systems and rear area combat and Service support unit placement. The effect of weather on soil trafficability is an important consideration when analyzing obstacles.

Avenues of Approach and Mobility Corridors. Air and ground AAs are routes by which a force may reach key terrain or an objective. Avenues of approach are evaluated in the following terms:

- Maneuver support potential (i.e., the size or type of force that may use an AA).
- Access to key terrain and AAs.
- Degree of canalization, concealment, and cover.
- Observation and fields of fire.
- Obstacles.

Air and ground mobility corridors are subsets of air and ground AAs. Mobility corridors are areas within the AA that permit movement and maneuver. They permit friendly and enemy forces to advance/withdraw in doctrinal configuration and to capitalize on the principles of mass, momentum, shock, and speed.

Identification and analysis of AAs and mobility corridors are essential to effective IPB development and integration of WET. They describe the area where projected enemy activity is most likely to occur and dictate the routes an attacking force must take to their initial, subsequent, and final objectives. Enemy and friendly AAs to known or expected objectives are projected throughout the battlespace. The AAs are depicted and prioritized from most to least likely and are analyzed based on the largest enemy and friendly force that can be doctrinally supported.

Modified Combined Obstacle Overlay

The modified combined obstacle overlay (MCOO) is both the foundation for battlespace analysis and the basic view of the battlespace area evaluation, GI&I production, and METOC analyses and products of the IPB process (most other IPB products are based on this foundation). Normally, the MCOO depicts all obstacles to mobility and may depict CCM classifications (e.g., restricted), objectives, AAs and mobility corridors, defensible terrain, probable engagement areas, and key terrain. Pertinent information may be depicted using either standard base maps and overlays or an electronic GI&I database that renders the effect of the battlespace on military operations within MCEN resources.

Although MCOO is a form of graphic geospatial analysis, it differs from the other views within the IPB process. It presents information that is normally included on the combined obstacle overlay (COO), the AA overlay, and the friendly operational graphic (i.e., friendly boundaries for the area of operations and AOI, objectives, and battle positions). The MCOO also depicts key terrain and known or potential enemy objectives.

Two IPB templates or overlays are prepared at all MAGTF command echelons—the MCOO and a G-2/G-3—coproduced decision support template. The actual level of detail depicted on the MCOO depends on the echelon where it is prepared, the command echelons it will support, and the time available for its preparation. The detail depicted

on the MCOO also depends on the commander's guidance, mission requirements, and type of unit preparing the MCOO. At a minimum, the MCOO should contain the following descriptions:

- Severely restricted terrain (i.e., terrain that severely hinders or slows movement in combat formations unless some effort is made to enhance mobility).
- Restricted terrain (terrain that hinders movement).
- Built-up areas, rivers, and water obstacles.

CHAPTER 5
GEOSPATIAL INFORMATION AND INTELLIGENCE OPERATIONS

Geospatial information and intelligence supports every phase of a military operation in order to limit potential environmental effects on friendly forces, while exploiting the potential impact on enemy forces. When planning MAGTF operations in relation to the enemy force structure, the interrelated factors of terrain, inland and coastal waters, and weather must be considered together in conjunction with intelligence. Weather elements can dramatically alter terrain features and trafficability. Terrain features, such as mountains and ridgelines, can influence elements of local weather and oceanography. In every operation, the relationship between terrain, oceanography, and weather must be carefully considered to provide an accurate description of how environmental factors could impact a particular mission. See figure 5-1.

The GI&I concept of employment serves as a guide for the analysis, production, dissemination, and use of GI&I. It both defines and explains the requirements for integrating, deconflicting, and disseminating a seamless geospatial foundation for all types of missions. Full employment of GI&I is based on the following assumptions:

- Topographic platoon will provide the geospatial foundation needed to fuse elements of the MAGTF COP and CTP (e.g., friendly order of battle, enemy situation, logistic layout, weather).
- Foundation feature data will be available to support the defense information infrastructure and MAGTF mission requirements in a timely manner.
- GI&I reproduction and replication capabilities will be available to support MAGTF operational and tactical requirements for hard copy products.

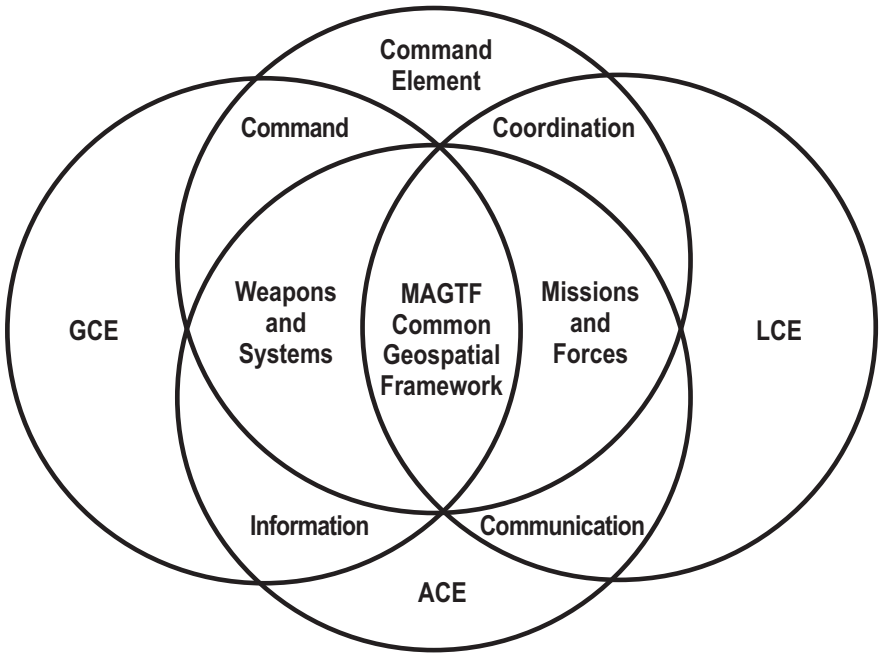


Figure 5-1. Geospatial Information and Intelligence Underpins the MAGTF Operation.

- Marine Corps doctrine, joint doctrine, SOPs, and TTP employed within the theater will facilitate the collaborative and distributive development of GI&I.
- Proliferation of MAGTF systems requiring GI&I will increase proportionally to GI&I functions and applications, timelines, and level of detail of GI&I products (see app. K).

MAGTF Geospatial Information and Intelligence Support

The MEF G-2, via the ISC and GI&S section, oversees the planning and direction, collection, production, and dissemination of GI&I to the MAGTF. The ISC is the focal point for the development of GI&I collection, production, and dissemination requirements. In addition, the ISC validates GI&I requests, prioritizes the production requirements for organic and supporting topographic assets, and supports the following functional capabilities:

- Staff coordination.
- User profile development.
- Mission profile development.
- Information requirements (identification and GI&I production report).
- Product prioritization.
- Database management.
- Dissemination management.

Staff Coordination

Coordination with all elements of the MEF command element for GI&I support ensures requirements are identified early in the planning process. Comprehensive coordination must consider the following staff sections, units, and elements:

- G-2 (operations, plans) and intelligence battalion elements (support cell, collections management and dissemination [CMD] section, P&A cell).
- G-3 (future and current operations, fires).
- G-4 (engineers, transportation, supply).
- G-5 (future plans).
- G-6 (MCEN plans, systems control).

User Profile Development

The G-2 plans GEOINT section and ISC, with assistance from the intelligence officers at all command echelons, are responsible for maintaining the PFDB user profiles for all units within the MAGTF. User profiles are established to identify the types of GI&I product support that each MAGTF unit and section requires. The user profile identifies the following:

- Dissemination methods available to the unit.
- Types of views or products normally used and standard quantities needed.
- Communication links and information systems resources.
- Points of contact.

Mission Profile Development

The ISC and topographic platoon develop and maintain the mission profiles in the PFDB. The mission profile identifies the critical features and attributes that are needed to support a unit conducting a particular operation. The profile changes as the mission assigned to that unit changes. Basic profiles are identified within the PFDB for easy access and modification to meet tailored requirements. The mission profile, when used in conjunction with the user profile, will rapidly identify the requirements for tailored GI&I views and products for each of the tactical

Information Requirements

Information Requirements Identification

All levels of the MAGTF must identify their unique information requirements. These information requirements are then submitted through intelligence channels for validation, prioritization, and subsequent tasking as follows:

- While in garrison, the G-2 operations officer, with assistance from the MAGTF mapping and imagery officer, must validate, prioritize, and task all requirements to the intelligence battalion for follow-on action by either the topographic platoon or through the external distributive network for GI&I production.
- During actual operations, the ISC is responsible for validation, prioritization, and tasking that is consistent with the AC/S G-2's direction.

During both in garrison and actual operations, the topographic platoon commander is responsible to the P&A cell and/or the intelligence battalion commander/ISC for maintaining quality control and meeting production timelines.

Geospatial Information and Intelligence Production Report

During peacetime operations, the topographic platoon provides a monthly GI&I production report (see app. J) to the intelligence battalion commander and MEF GEOINT section via intelligence channels. This report identifies ongoing and completed operations. The MEF GEOINT section ensures that production timelines and resources are prioritized and used efficiently. During actual operations, the topographic platoon and detachments prepare and forward this report to the ISC.

Production Prioritization

The ISC and the MEF GI&S section use the PFDB to develop the list of GI&I production requirements for supporting a particular mission. The MEF GI&S section, in coordination with the G-3, develops a list of production requirements, establishes priorities, and sets production requirement deadlines using information listed on the force list, TPFDL, and mission objectives. The ISC prioritizes the production requirements and then tasks the intelligence battalion's organic and supporting topographic assets to begin GI&I analysis and production.

The ISC may request support from theater/national production assets through the operational chain of command. The distributive and collaborative nature of the production network provides the MAGTF with enhanced production support and allows tactical topographic assets to focus their efforts on concerning the intensification of objectives for mission-specific views.

Database Management

Database management includes the following:

- The MSC's geographic intelligence specialists are responsible for the unit's oversight and management of the geospatial database.
- The topographic platoon is responsible for the oversight and management of the MEF's geospatial library.
- The MCIA is responsible for the quality assurance of GI from all echelons through the MCGIL. The MCGIL shall be made accessible to the NSG.

Dissemination Management

Dissemination is the timely conveyance of GEOINT in an appropriate form and by any suitable means to those organizations/individuals who need it. The MCGIL provides an effective dissemination capability to the MAGTF commander and planners, MAGTF subordinate elements, and other forces and organizations. The ability to disseminate updated GEOINT rapidly to all users through a smart publishing and subscription capability ensures that critical intelligence and other information are readily available to the entire MAGTF.

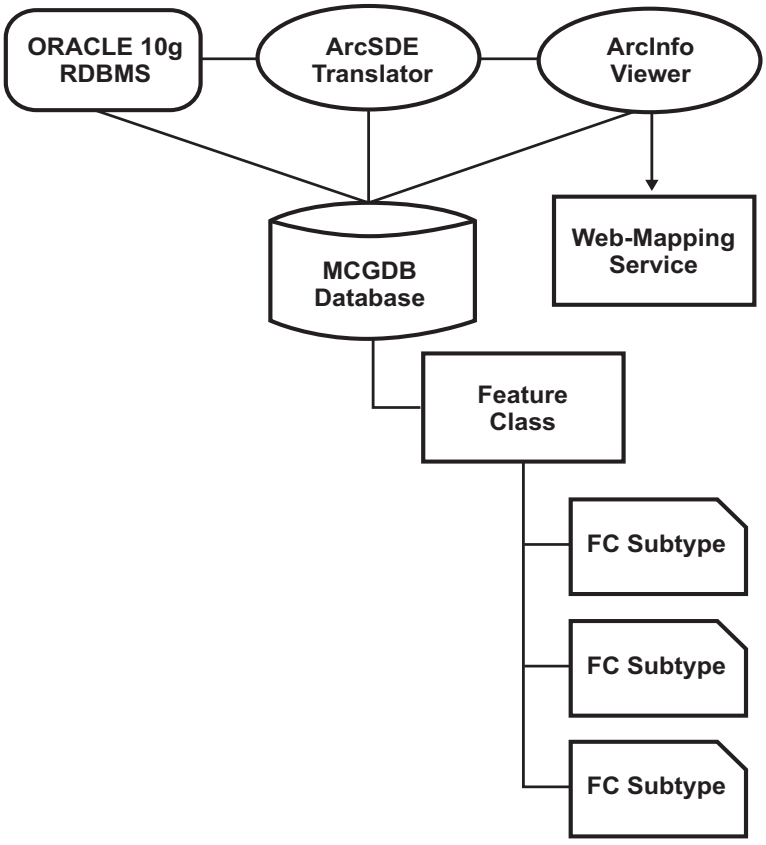
The TPC FoS uses an open technical architecture supporting the GEOINT domain that has evolved within the NSG architecture. It supports receipt and dissemination of GEOINT data external to operational and tactical forces with primary access to the topographic assets within the theater of operations, ensuring that all users have the tailored products necessary to support their specific mission.

Topographic Platoon Support

The topographic platoon provides a seamless, discoverable, geospatial database to support all levels of the MAGTF via the MCGDB. This database (see fig. 5-2) provides a GI foundation that supports all MAGTF operations. Development and sustainment of a standards-based, near-real-time, integrated foundation supports battlespace situational awareness, planning, and decisionmaking.

Responsibilities related to the employment and use of the MCGDB are the following:

- The topographic platoons are responsible for the expeditionary-based MCGDB.
- The intelligence battalions are responsible for the garrison-based MCGDB supporting the MEF's AOR.
- The MCIA is responsible for the fixed-site global MCGDB.



LEGEND

ArcInfo	Arc information
ArcSDE	Arc spatial database engine
FC Subtype	feature class subtype
RDBMS	relational database management system

Figure 5-2. Marine Corps Geospatial Database.

The MCGDB is the initial (i.e., baseline) frame of reference for the fusion of information from other environmental, logistical, operational, intelligence, or diplomatic sources. This database supports updates and modifications so that the data contained therein meets the mission-specific requirements of a high tempo battlespace.

Topographic Platoon Tasks

Topographic platoon tasks include the following:

- Providing tailored mission-oriented topographic map products and services to supplement standard maps and charts.
- Coordinating with the MEF G-2, ISC, CMD section, and the P&A cell to collect, analyze, synthesize, and disseminate terrain information and intelligence.
- Preparing map substitutes, such as overlays, overprints, photomosaics, map revisions, or multicolor charts.
- Revising and reproducing combat charts, coastal charts, port charts, and harbor charts in limited quantities. Products may include electronic 3-D terrain models, LOS studies, range fan studies, terrain factor overlays, hydrographic charts, and landing zone studies.
- Preparing coastal hydrographic surveys from the 6-fathom depth curve (or from where the Navy ocean survey ends) to the high-water line.
- Collecting coastal data and preparing GI&I products that depict trafficability, routes of egress, and inland water bodies.
- Preparing second-order horizontal and vertical geodetic and topographic surveys that encompass astronomic, geodetic, and satellite positioning (i.e., global precise positioning).
- Preparing geodetic and magnetic azimuth surveys.
- Preparing or assisting in the preparation of additional intelligence products, such as CCM, cover and concealment, observation and fields of fire, AAs, flooding and drainage, stream and river gauging, LOCs, and obstacles.
- Assisting with the preparation of all-source intelligence products.

Mission Effectiveness Criteria

The ability of the topographic platoon to perform the following functions determines the effectiveness of the GI&I mission:

- Collecting, querying, accessing, validating, receiving, processing, storing, managing, integrating, exploiting, intensifying, analyzing, visualizing, producing, and disseminating all-source GI&I.
- Developing, storing, retrieving, displaying, and disseminating the geospatial foundation at varying resolutions and data density to support COA development and mission planning.
- Preparing, storing, retrieving, displaying, printing, and disseminating tailored and timely GI&I views, such as overlays with various resolution and data density, to support all MAGTF command echelons (i.e., command and control, current and future intelligence, operations, logistics, aviation, engineering, navigation, communications, and information systems).
- Exchanging information across communication networks following Global Command and Control System (GCCS), MAGTF, and Joint Maritime Command Information System (JMCIS) protocols and standards.
- Providing a client and server smart push/pull configuration that has the capability to acknowledge data receipt and delivery status.

- Importing, integrating, deconflicting, and disseminating available data from GI&I and other sources, such as vector product format, raster product format, text product standard, object-oriented grid, software applications, or video formats.
- Producing and displaying 2-D and 3-D graphic GI&I, imagery, and all-source intelligence models to support both visual walkthroughs and fly throughs with a rapid terrain and feature identification capability. This capability enhances battlefield situational awareness and provides the baseline for database analysis and production and MAGTF planning.
- Displaying, analyzing, and generating stereoscopic GI&I images and importing hard copy products by scanning and digitizing.

Command and Control

Because the topographic platoon is a subordinate unit of the intelligence battalion, P&A company, there are special considerations concerning staff cognizance and support relationships.

Marine Expeditionary Force Command Element Staff Cognizance

The MEF commander exercises command and control over intelligence battalion elements, including the topographic platoon. The MEF AC/S G-2 supports the MEF commander's intelligence requirements through staff cognizance of the ISC. This structure allows for both the effective centralized direction and the effective integration of topographic platoon operations with other MEF GI&I operations and broader all-source intelligence operations.

Support Relationships

Support relationships concerning command and control include general, direct, and attached.

General Support. The topographic platoon can provide general support to the MEF. Under this relationship, the MEF commander, through the AC/S G-2 and the ISC determines priorities of intelligence collections and production activities and support, the task organization and locations of GI&I support nodes, and all-source intelligence dissemination. The ISC exercises command and control of topographic platoon through the intelligence battalion operations officer.

Direct Support and Attached. Elements of the topographic platoon may be employed in direct support of or be attached to a particular unit of the MEF, as directed by the ISC. A topographic platoon liaison element may be employed to assist the supported unit to fully exploit the direct support relationship. The topographic element of the direct support team provides focused GI&I support, including direct connectivity to the MCGDB via the MCEN and dedicated GI&I production and dissemination capabilities.

Concept of Employment

A single topographic platoon supports one MEF and three MEUs/SPMAGTFs simultaneously. Task-organized topographic platoon elements can support MEBs, smaller MAGTFs, MSCs, or other designated forces. The intelligence battalion commander configures GISTs and GITs to support MAGTF-wide operational requirements that are based on the priorities established by the G-2/S-2. The following applies concerning concept of employment:

- *MEF*. One topographic platoon can support one MEF, to include reinforcing/filling global sourcing requests from other MEFs or Marine Corps organizations.
- *MARDIV, MAW, or MLG*. Normally, one GIST will support a MARDIV, MAW, or MLG. A typical GIST consists of two to six geographic intelligence specialists.
- *MEB*. Notionally, one GIST will support a MEB. Since the range of missions and size of a MEB can vary greatly, topographic support will be tailored based on the MEB's mission.
- *MEU or SPMAGTF*. Normally, one GIT will support either a MEU or SPMAGTF. A typical GIT consists of two geographic intelligence specialists.

Distribution and Production

The TPC FoS can access GI&I, from theater, MCIA, and/or other production centers that are supporting the other Services (see fig. 5-3). The modular design of TPC systems enables the topographic platoons with the ability to task-organize to provide distributive and collaborative production support to all MAGTF operations, such as GISTs support to MSCs and other forces with either dedicated or tailored support from a consolidated production center. The major systems that make up the TPC include the following:

- *TGIL*. The TGIL is a MEF-level asset and serves as a data repository for GI&I in support of MAGTF operations.
- *Deployable geospatial information library (DGIL)*. The DGIL server and workstations are organic to the topographic platoons and GISTs that support MEBs, MEUs, SPMAGTFs, and JTFs. It is the primary tool for transforming GI into GEOINT.
- *Digital Terrain Analysis Mapping System (DTAMS)/Digital Terrain Analysis Mapping System-Light (DTAMS-L)*. The DTAMS and DTAMS-L are organic to GISTs that support MEBs and other MEF MSCs and may be available to GITs that support MEU or SPMAGTF command elements. These systems are used to support simultaneous operations afloat and ashore. The DTAMS-L is employed in conjunction with the DTAMS to augment production requirements of the organization that it is supporting.

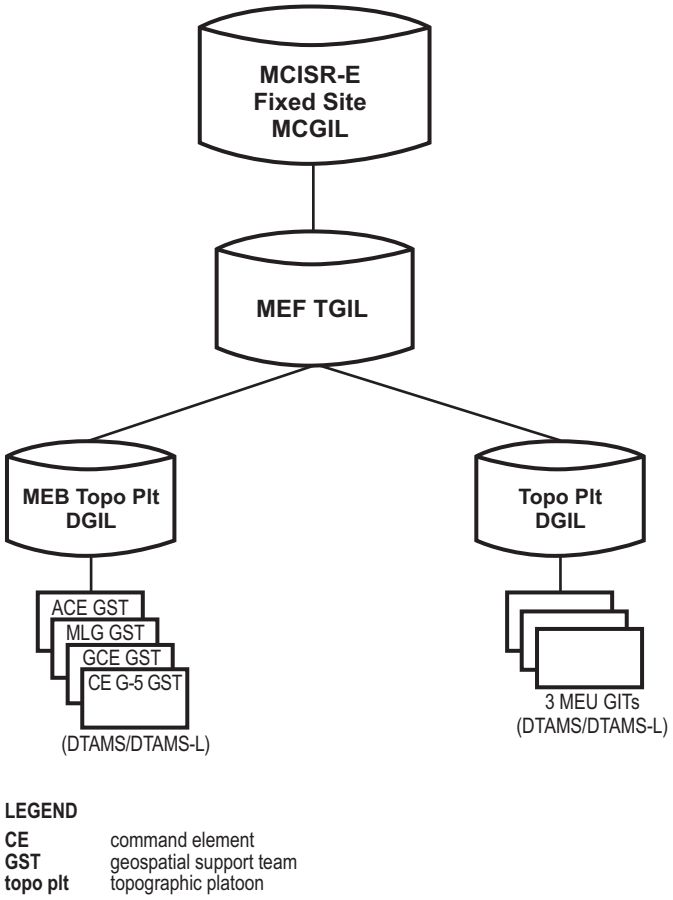


Figure 5-3. Topographic Production Capability.

Communications and Information Systems Configurations

Using the appropriate equipment, the topographic platoon Marines perform a variety of missions while remaining fully integrated with naval systems; forces afloat; and joint, supporting, and allied forces within/external to the joint operations area. The topographic platoon connects to GCCS, JMCIS, and MAGTF TDN using a client and server design. The highly modularized nature of the topographic platoon and its equipment provides a flexible, wide range of employment options. The mission, enemy, terrain and weather, troops and support available-time available (METT-T) factors dictate which option to employ. Refer to appendix C for additional TPC information. The following applies to communications within specific levels of command:

- *MEF*. Normally, the entire TPC with the full client server will deploy with a MEF. Four to six geographic intelligence specialists with a single DGIL cluster (i.e., single server and multiple workstations) from the TPC can be deployed to support the lead echelon of the MEF command element.
- *MSC*. A GIST with a DTAMS and DTAMS-L normally deploys in support of a MEB or an MSC. The GIST's GI&I capabilities parallel those of the TPC.
- *MEU and SPMAGTF*. A geospatial support team with a single DTAMS and DTAMS-L normally deploys with a MEU or SPMAGTF. The GIT's GI&I capabilities parallel those of the TPC and the DTAMS.

Marine Corps Intelligence Activity Support

The MCIA develops prepositioned GI&I databases to provide tailored views, mission-specific intensification for intelligence AOIs, nonstandard views for future operations and GI&I, and all-source product development. The MCIA's support provides the following:

- Direct access to the National Production Network.
- Support to GI&I requirements for specific MAGTF missions across the full range of operations.
- A Service-level GI&I production capability focused on future requirements for the following purposes:
  - Integration of diverse data sets (e.g., national, commercial, scientific, academic).
  - Deconfliction of information content.
  - Intensification of MAGTF-specific features and attributes.
  - Analysis of environmental factors.
  - Storage of information to support MAGTF deployments.
- Virtual reachback support to deployed MAGTFs.
- Support to the distributive and collaborative production network with tailored, mission-intensified views within the littorals, including the integration, intensification, and distribution of tailored amphibious views to support MAGTF expeditionary operations.
- Housing for the MCGIL within the office of the Marine Corps enterprise information officer. The MCGIL is a global littoral data warehouse connected to multiple communication networks for easy query, retrieval, and processing by topographic assets. It provides both standard and nonstandard GI&I views based on user requirements.

Geospatial Intelligence Directorate Support

The GID is the Service-level GEOINT center for the Marine Corps. It provides several key intelligence capabilities and support to the

operating forces and HQMC staff sections, including the following:

- Service-level production and repository for GI&I that facilitates the building of an integrated, deconflicted, and seamless view of any battlespace.
- Access to the national intelligence network.
- Ready source of geospatial and imagery fused intelligence information that is focused on the global littoral environment by integrating the land, air, and sea GI&I required by expeditionary forces.
- Support to forces conducting deliberate planning for contingency and OPLANs, expeditionary training and exercises, and intelligence production requirements.
- Virtual staffing and reachback capability for crisis.

All GID support should be accessed as follows:

- Requests for GID support should be submitted through intelligence command channels to the Director, MCIA, to the attention of the operations officer.
- Support to deployed MAGTFs under CCDR or JTF operational control must be submitted via the operational chain of command and validated by the CCDR prior to submission to MCIA. Prior identification and coordination of production requirements with the GID is recommended.

National Production Network Support

The GID is the Marine Corps Service-level participant within the National Production Network (see fig. 5-4). This standards-based network is a

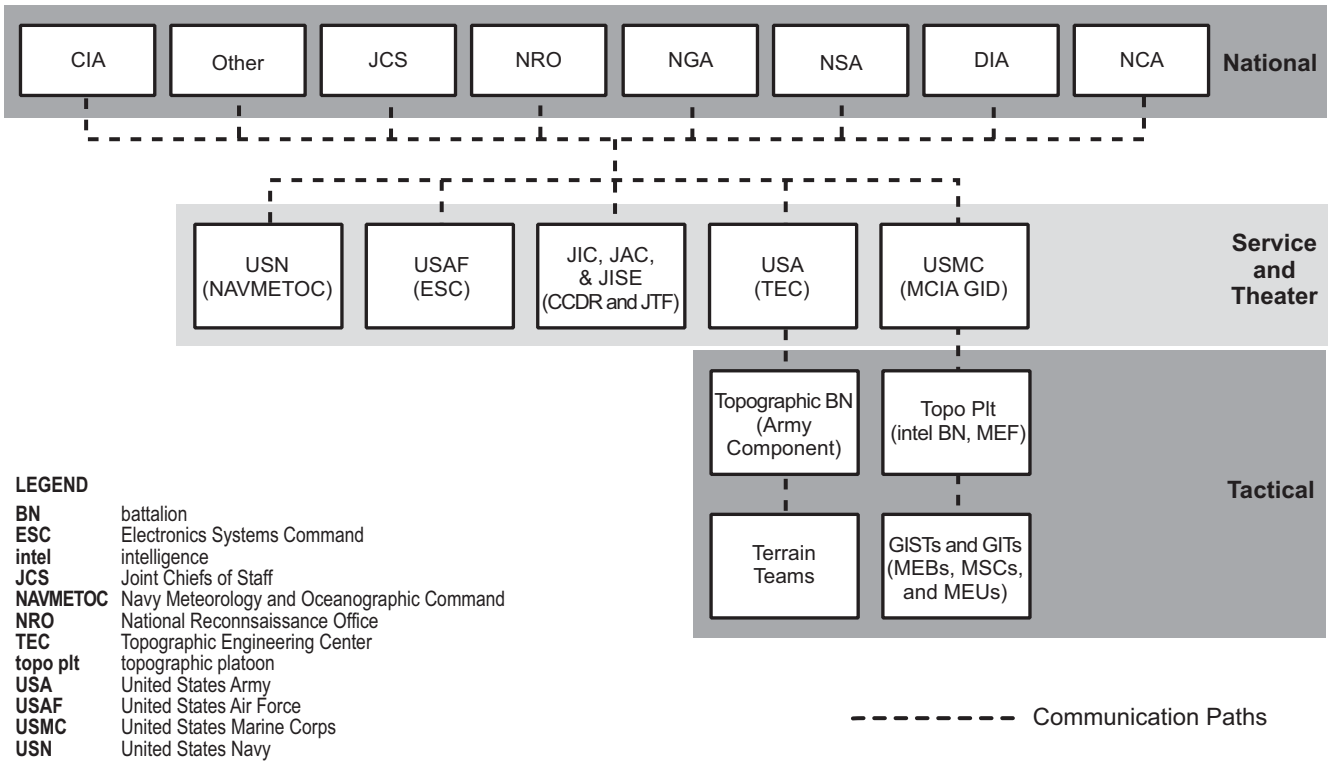


Figure 5-4. National Production Network.

distributive, collaborative production infrastructure that supports the planning, prioritization, and development of GI&I. It allows the MEF topographic platoon to receive GI&I data sets that support a defined mission area by using a single query into the network. The network consists of, but is not limited to, the following organizations:

- NGA.
- DIA.
- CIA.
- National Reconnaissance Office.
- Civil, academic, and Service production centers, such as the National Ground Intelligence Center.

Support to MAGTF Operations

The topographic platoon provides the MAGTF with the ability to value add, integrate, and deconflict GI in order to develop a seamless geospatial database. This database is the geospatial foundation for the COP/CTP, other planning, and decisionmaking. Organic topographic resources can be task-organized to perform a variety of GI&I missions, while remaining fully integrated with joint and allied forces. Collaborative reachback provides a robust production capability, reducing the deployed footprint. Software applications and collaborative production will assist with battlespace C2 planning, terrain and weather effects analysis, visualization, and logistic planning.

Amphibious Operations

The sea constitutes a maneuver space that supports the movement of the landing force from ships to the objectives ashore. Heavy seas, hidden reefs, and marshes beyond the beach may impede or jeopardize an entire operation. Geospatial information and intelligence provides the detailed geospatial foundation that is needed to integrate and deconflict a seamless land, air, and/or sea operation within the littorals.

A task-organized topographic platoon detachment that is attached to a forward-deployed MAGTF can provide the geospatial foundation needed to support each phase of the operation. Topographic assets aboard naval ships transiting to the objective area are used to support planning and database development. Amphibious operations require detailed studies of the terrain, inland and coastal hydrography, weather, and other environmental factors currently existing in the littoral areas. These environmental conditions affect the following:

- Littoral penetration points, helicopter landing platforms, HLZs, and DZs.
- Beaching and unloading conditions.
- Speed of vessels.
- Air support and visibility.
- Beach trafficability.
- Ingress and egress obstacles and routes.

Sustained Operations Ashore

Sustained operations ashore (SOA) are extended operations in which a MAGTF fights predominately as a land force with naval and other support. Marine air-ground task forces conducting SOA require enhanced MAGTF capabilities ashore and the establishment of a MAGTF area of operations. The SOA force size often drives the MAGTF to use several geographically separated sites for logistic points, airfields, port facilities, and other purposes.

The complexity and demands of operating in an SOA environment forces MAGTFs to employ a full topographic platoon in a supporting role. When these scenarios occur, topographic assets may operate as both multifunctional GI&I nodes afloat and specialized GI&I nodes ashore. Primary topographic nodes (i.e., GISTs and GITs with networked TGIL, DGIL, and DTAMS) will be located within the MAGTF area of operations in order to provide direct support to MAGTF forces ashore and will be based upon METT-T and the intelligence CONOPS.

Some topographic nodes will be forward deployed. These forward-deployed nodes are tasked with conducting and coordinating geospatial database management; battlespace COA, tactical decision aid, and visualization support; and other terrain analysis production functions.

Other principal nodes shall orchestrate the fusion, integration, value adding, and intensification of GI&I production and support to all-source intelligence production in general support of the MAGTF. By adding modules and personnel, these nodes can support increased mission requirements. For example, a specialized node ashore within the MAGTF ground combat element (GCE) command element intelligence section ashore provides direct support to GCE operations; while another node within the MAGTF command element intelligence section afloat operates in general support of the MAGTF.

Military Operations on Urbanized Terrain

Military operations on urbanized terrain (MOUT) requires an accurate and detailed understanding of the battlespace to underpin both operational planning and subsequent execution of the planned operation. These operations also require knowledge of the key characteristics of urban areas in the conduct of civil affairs, intelligence, CIS, logistics, and force protection operations.

A substantial intelligence collection and production effort is needed to provide the detail required from urban GI&I. Urban GI&I analysis and production consists of collecting data and developing focused products for particular aspects of the area of operations, including the following:

- Terrain, such as physical composition, vulnerability, and accessibility.
- Productive capacity.
- Military resources.
- Road and communication networks.
- Water and sewer systems.
- Building structures and layout.
- Cultural centers.
- Physical dimensions.
- Geographic location.

Economic and Political Importance in the National Structure Predeployment Requirements

Several processes begin immediately after a unit receives a warning order; they will progress, independent of each other, until completed. Functions may be separated by command levels and/or by differing MAGTF, Navy, and JTF GI&I requirements. Intelligence battalion and G-2 personnel should use the GI&I planning checklists provided in appendix E to ensure that all areas of support are addressed during advance force and preassault operations. These checklists help planners ensure that all GI&I operations and production requirements are identified and prioritized to support the various missions that are included within the operation.

Planning Requirements

Intelligence preparation of the battlespace is the principal analytical methodology employed to reduce enemy and environmental uncertainties inherent within an operation. Geospatial information and intelligence provides the foundation for the IPB process as well as critical support to all-source intelligence assessments by analyzing how the battlespace affects both enemy and friendly forces (see fig. 5-5 on page 5-12). The following five GI&I functions support the IPB process:

- Defining the environmental characteristics of the battlespace.
- Analyzing the military aspects of the terrain.
- Analyzing the effects of terrain on specific COAs.
- Providing the foundation for integrating threat COAs.
- Supporting visualization of COAs for wargaming and rehearsals.

Product Requirements

Geospatial information and intelligence products are needed to conduct the following in support of initial MAGTF planning requirements:

- Problem framing.
- Situation development.
- COA development, analysis, and wargaming.

Initially, the topographic platoon queries local, Service, and national networks for available GI&I within the area of operations and AOI. Next, the topographic platoon intensifies the data and generates the tailored views that are needed to support MAGTF operations. In most cases GI&I products are fused with other intelligence to create all-source intelligence products as described in the following subparagraphs.

Foundation Feature Data

Foundation feature data provides an initial level of information resolution (normally equivalent to medium-scale maps) to allow planning to begin. Foundation feature data provides an overview of the AOI from which mission-specific data requirements can be identified. Foundation feature data will support some missions without intensification; however, for most MAGTF operations, the ISC will task the topographic platoon with producing tailored views for MAGTF tactical operations within the area of operations.

Mission-Specific Data

The topographic platoon must integrate and intensify specific objective or target areas within the area of operations to generate tailored mission-specific data views for tactical forces.

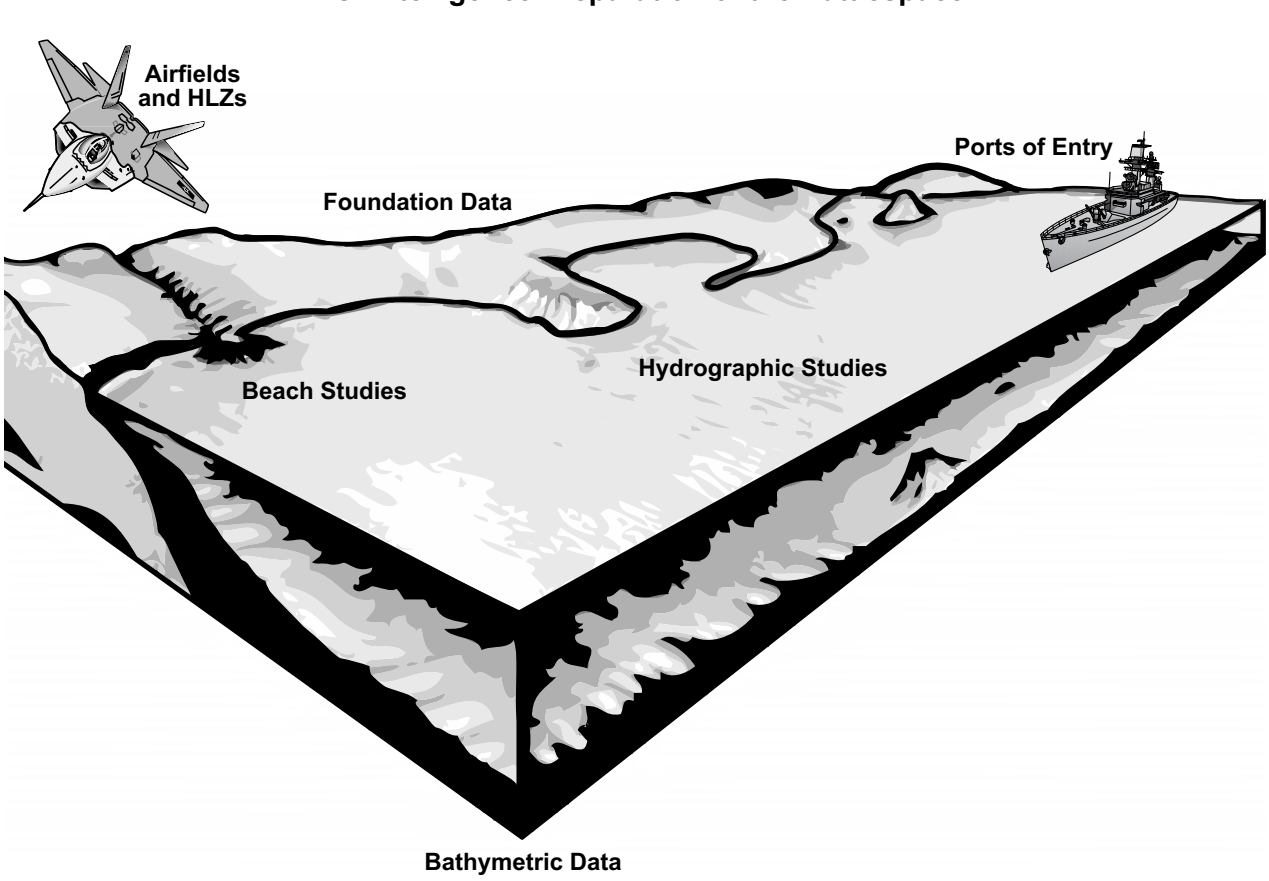


Figure 5-5. MAGTF Geospatial Information and Intelligence Planning Requirements.

Mission-specific data may range from simple road networks for the MAGTF logistics combat element (LCE) to a detailed TLM for an infantry platoon conducting patrols.

Tactical Study of the Terrain

The analysis of terrain, weather, and other factors throughout the commander's area of operations and AOI serve as a basis for developing specific MAGTF COAs and determining enemy capabilities. This analysis will allow commanders and planners to see the battlespace in four dimensions: width, depth, height (airspace), and time. The P&A cell produces Tab A (Tactical Study of the Terrain) to Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) of an OPLAN (see app. G of this publication for the format and an example of a tactical study of the terrain).

Beach Studies

Beach studies determine the environmental effects of the terrain, coastal ocean, riverine, and weather on beaches. Each beach is analyzed with respect to the environmental effects on a specific point within the littoral. A beach study could include traditional beaches, rivers, or any suitable place capable of supporting the operating forces. A beach study includes the following:

- Intelligence affecting mobility.
- Enemy defenses.
- Exits.
- Vegetation.
- Gradients.
- Obstacles.
- Surface materials.
- Urban proximity to support the mission.

Beach analysis provides commanders and planners with critical GI&I that affect the battlespace in width, depth, height, and time dimensions. The P&A cell produces Tab B (Beach Studies) to Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) to an OPLAN (see app. H of this publication for an example format of a beach studies tab).

Helicopter Landing Zone and Drop Zone Studies

The HLZ and DZ studies provide the commander and staff with intensified information and analysis covering a landing that may be needed for air operations. These studies contain the following:

- Analysis for potential obstacles.
- Analysis of enemy defenses.
- Identification of exits to support movement of forces in the objective area.

The P&A cell produces Tab E (Helicopter Landing Zone and Drop Zone Studies) to Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) to an OPLAN. Refer to appendix I of this publication for an example of a HLZ and DZ study format.

Harbors and Ports Studies

Harbors and ports are similar, yet bear distinct landscape features: harbors are the sheltered sea areas where ports are constructed and may be either natural or manufactured; whereas, ports are built within harbors to handle the loading and unloading of goods.

Harbor and port studies are prepared by the P&A cell and may be included as a tab to the intelligence estimate or disseminated in other ways. Information concerning harbors and ports is essential when estimating items of interest needed to support and sustain MAGTF operations, such as their capacity, capability, or vulnerability. Large-scale modern warfare requires the control of harbors and ports to support operations ashore. Aerial bombing, artillery, mortars, missiles, sappers, and other forms of ground attack can easily damage or neutralize ports.

Airfield Studies

Airfields, like ports, can be easily disrupted or shut down completely because any surface degradation or parked disabled aircraft can impede air operations. Seizure, construction, operation, and subsequent control of airfields are essential to most MAGTF operations. Airfields are normally situated near cities, large facilities, and/or along strategic air routes. They are typically located on elevated terrain that is removed from the natural and cultural impediments to flight.

Airfields are important throughout every phase of an operation. Both military and civilian airfields are closely linked to a nation's transportation system. The size and features of an airfield determine both its capabilities and inherent military value. Airfield studies identify the following airfield characteristics:

- Type of airfield.
- Physical dimensions of the airfield.
- Construction material.
- Nature and capability of an airfield's support facilities.
- Condition of the airfield and supporting facilities.

Airfield studies are produced by the P&A cell and may be issued as either a tab to the intelligence estimate or as a separate intelligence product.

Operations Support Requirements

Topographic platoon operational support requirements include nine categories, as detailed in the following subparagraphs.

Query Requirements

The topographic platoon deploys with foundation data that is located in prepositioned databases. As a mission evolves, the platoon uses the United States Imagery and Geospatial Information System (USIGS) to query the National Production Network for new/updated GI&I within the AOI. To conduct queries, the topographic platoon must access both national and theater military, civil, and academic databases. In addition, this capability usually requires connectivity with the GCCS, INTELINK, Joint Worldwide Intelligence Communications System (JWICS), SIPRNET, NIPRNET [Nonsecure Internet Protocol Router Network], or GBS.

Retrieval Requirements

Once the topographic platoon has identified available databases that support GI&I operational requirements, it must be able to pull information from these databases through the CIS network to update the foundation data. The topographic platoon then stores the databases in the TGIL for additional processing and subsequent production or direct access by subordinate commands in the following manner:

- During peacetime, databases should be developed to support contingency plans and then prepositioned for timely operational support. For example, since MEUs deploy with prepositioned GI&I covering the anticipated area of operations, their supporting GIT could pull updated GI&I to value add to the existing database in order to fulfill mission-specific needs.
- During tactical operations, command echelon databases below the command element should be preloaded with GI&I databases to preclude the need to pull large database files from the TGIL.

Integration Requirements

The topographic platoon integrates the database information that it collected during the query and retrieval process with the prepositioned foundation data to populate additional feature and attribute

databases. This process includes integrating the oceanographic and landform databases from GI and other sources into a single, seamless data set to support MAGTF requirements.

Deconfliction Requirements

Often the integration and deconfliction processes can be completed concurrently. For example, when different databases represent the same feature, such as a building, in two different locations, the topographic platoon must use a supplemental source to determine whether there is more than one building in the area and, if so, which of the provided locations is the more accurate. For example, the shoreline from an oceanographic database (lowest water level) and/or the shoreline from a landform database (mean sea level) must be properly annotated as the same features, but with differences in location attributes.

Intensification Requirements

Intensification occurs at three different levels in support of combat operations—tactical, theater, and national. The topographic platoon focuses on the intensification of information collected by tactical forces. This information can be retrieved from a number of sources, as follows:

- Engineer and ground reconnaissance reports.
- Bridge reports.
- Surf reports.
- LOC reports.
- HUMINT, SIGINT, and IMINT reports.
- Imagery.
- Reports from civil affairs teams.
- Battle damage assessment reports.

Tactical intensification can include information and intelligence provided by combatant forces to update existing data, such as bridges or buildings being destroyed, new roads being built, or rice paddies being flooded. These changes are forwarded to the topographic platoon through the MAGTF network. The topographic platoon validates and modifies the changes and then updates the TGIL.

Analysis Requirements

The topographic platoon is responsible for analyzing the terrain within the objective or target area to determine how environmental factors may impact MAGTF missions and enemy capabilities. Each proposed COA must then be evaluated in reference to the findings. When conducting a mission-specific analysis, the topographic platoon and the P&A cell must consider the following:

- KOCOA.
- Commander's intent and guidance.
- IRs.
- Scheme of maneuver and types of units that are conducting the operation.
- Weapons platforms that are associated with the units conducting the operation, both organic and supporting.
- Types of systems that are available within the units that are conducting the operation capable of exploiting the information.

Production Requirements

The topographic platoon is the only organic GI&I production asset within the MAGTF. Using high-end GIS, it can exploit all-source GI, value-added tactical information, and analyze this data for mission-specific criteria. The topographic platoon produces tailored views and products of the battlespace to support specific types of units or functions, such as logistic, maneuver, close air support, or amphibious. It can disseminate its analysis in several media formats based on the user's requirements. Production requirements are prioritized by the ISC with assistance from the CM/DO and the P&A cell and are based on the AC/S G-2's direction and priorities.

Storage Requirements

Storage requirements for data include TGIL and information management:

- *TGIL*. The TGIL provides the topographic platoon with a substantial data store to query for information, request updates, or identify new production requirements. It holds the raw data coverage for the entire AOI, including the intensified information within the area of operations and objective areas. The topographic platoon establishes, updates, validates, and maintains the TGIL for the MAGTF AOI and may post tailored views for each functional area of the MAGTF on the TGIL.
- *Information management*. Tactical management of GI&I must allow all users to define their view of the battlespace. The MAGTF and subordinate commanders must be able to push updated information, knowledge, and understanding to HHQ, subordinates, and adjacent units.

Prepositioning the relevant GI&I that commanders require is critical to planning and conducting missions successfully. Prepositioned GI&I will include the initial foundation data and all mission-specific data available when deployment occurs. As the operation progresses, the baseline database will be refreshed and supplemented using either an automatic push or an intentional pull within the tactical infosphere.

Dissemination Requirements

The topographic platoon can disseminate GI&I through the MAGTF TDN, electronic media, or as hard copy media.

MAGTF Tactical Data Network

The TGIL is a smart push/pull client and server capability that allows every echelon of the MAGTF to access specific views tailored to their operational and functional requirements. It allows the topographic platoon to value-add information and push it to subordinate command echelons. The TGIL is incorporated into the MAGTF TDN to support all MAGTF systems.

Electronic Media

The topographic platoon can generate electronic views or products from the TGIL on compact disc read-only memory, floppy disks, and 8-millimeter tapes for dissemination to subordinate units. The ability to transfer data to electronic media provides both additional security and backup for systems if a TDN failure occurs.

Hard Copy Media

The topographic platoon can produce limited (i.e., 50 copies or less) hard copy GI&I products for dissemination to requesting units. Hard copy output can also be supported at all command echelons by using either the IAS or tactical combat operations printers for small quantity output of views generated on the TGIL. The ability to create hard copy media at all echelons of the MAGTF allows distribution to occur at the lowest level possible without interrupting production requirements.

CHAPTER 6
COMMUNICATIONS AND INFORMATION SYSTEMS

Shifts in DOD policies regarding GI&I operations have changed how MAGTFs access and use GI&I. The NGA has transitioned its production processes to populate digital geospatial data libraries. It has also initiated a multiyear phasing out of traditional hard copy mapping products. The NGA's intent is for tactical commanders and other users to access these digital data libraries to retrieve basic data, value add to the base data locally, and tailor the view of the battlespace to fit their particular mission-specific data and other IRs.

This paradigm shift presents new challenges to the MAGTF, particularly in the way the topographic platoons are supported by the MAGTF CIS networks. The dissemination of geospatial data files, which range in size from hundreds of megabytes to gigabytes, through MAGTF communications systems and TDN requires careful planning to support MAGTF GI&I CIS requirements, while maintaining CIS support to all other MAGTF operations and warfighting functions.

Geospatial information and intelligence planners must coordinate with the CIS staff that is under the direction of the G-6/S-6 to ensure connectivity between the MAGTF and supporting JTF, theater, national, and Service GI&I producers. In addition, data management functions must be coordinated early in the planning process to preclude mismanagement of the control and dissemination of GI&I. The CM/DO that is under the ISC is responsible for coordinating with the G-6/S-6 to ensure that the MAGTF's subordinate units can use the MCGDB. This database helps form the geospatial framework of the COP and CTP within the joint operations area.

Marine Corps Warfighting Publication 3-40.3, *MAGTF Communications System*, provides doctrinal guidance for MAGTF CIS operations.

Communications and Information Systems Requirements

Capability to Command and Control Subordinate Topographic Units

The intelligence battalion commander, P&A cell OIC, SARC OIC, and topographic platoon commander must be able to command and control subordinate units, while integrating the operations of topographic units with the intelligence battalion, MAGTF, and other applicable organizations. In most cases, topographic elements will be collocated with the intelligence sections of the supported units, allowing them to use the CIS capabilities servicing the supported headquarters.

In semistatic situations, telephones and/or secure electronic mail using both local area networks (LANs) and wide-area networks (WANs) may be the primary means for establishing connectivity. Cellular telephones, satellite communications, very high frequency radios, and high frequency radios may provide connectivity when the situation is more fluid and the topographic elements must remain mobile. The CIS architecture must support both communications and the flow of digital information among the following organizations:

- MAGTF command element and the topographic platoon's GISTs and GITs supporting subordinate units.
- MAGTF GI&I elements, JTF, and other external all-source intelligence and GEOINT production centers.
- MAGTF GI&I elements and supported intelligence battalion and MAGTF operations, intelligence, and other C2 centers.

Ability to Receive Information and Collected Geospatial Information Data

Marine air-ground task force topographic elements may receive collected GI data and information over high capacity JWICS, SIPRNET, or NIPRNET. This connectivity allows MAGTF topographic Marines to access a wide range of GI&I databases, coordinate planning, conduct analyst-to-analyst exchanges, and disseminate GEOINT. Topographic elements supporting the MAGTF command element need access to all three networks. Topographic elements supporting MAGTF subordinate units only need access to SIPRNET and NIPRNET.

The CIS architecture must enable topographic elements to receive and exploit information collected by both intelligence and combat units, such as IMINT, ground and air reconnaissance, or engineer. The architecture must support the digital transmission of collection reports, files, and GI&I product reports via fiber, wire, radio, and intelligence broadcasts. The information should be transmitted in formats that can be used by both the topographic platoon and all-source analysts for the production of intelligence.

Ability to Provide Geospatial Information and Intelligence Products

At all command echelons, effective GI&I operations require the timely dissemination of both foundation data and other tailored, accurate GEOINT products to commanders and functional planners. Additionally, MAGTF intelligence and GEOINT personnel must ensure that their communications architectures support the pushing and pulling of information to and from all consumers.

Support to Command and Control Nodes

The topographic platoon is the only organic MAGTF asset containing the mission, personnel, equipment, and training needed to support GI&I users. Every command element staff division and MAGTF major subordinate element has unique functional requirements for tailored GI&I views of the battlespace. These views—

- Are critical to the development of both the COP and CTP and increase the situational awareness across the command element, which improves the effectiveness of planning efforts and enhances the commander's overall decisionmaking process.
- Can be accessed through the MAGTF command element's TPC TGIL. The ability of each MAGTF's subordinate units to access, query, retrieve, and use GI&I depends on how well their TGIL is integrated into the MAGTF communications and TDN architectures.

Marine Expeditionary Force Command Element Intelligence Command and Control Nodes: Combat Intelligence Center and Intelligence Operations Center

The combat intelligence center (CIC), with its subordinate elements, is the first of two principal MAGTF intelligence C2 nodes that provides the facilities and infrastructure for directing the MEF's comprehensive intelligence, counterintelligence, and reconnaissance operations. Since the CIC must support the entire MAGTF, it must be responsive to the requirements of all elements of the MAGTF. See table 6-1 on page 6-3.

G-2 Section

The G-2 nodes support the MEF command element's cross-functional cellular staff organization and CONOPS as follows:

- The G-2 plans section is aligned to provide intelligence support to both the MEF command element's future plans cell and red cell.
- The G-2 operations section is aligned to provide intelligence support to the MEF command element's current operations center, future operations center, and force fires center, while managing the MEF's external intelligence liaison teams (see fig. 6-1 on page 6-3).

Table 6-1. Marine Expeditionary Force Command Element Combat Intelligence Center/Intelligence Operations Center Key Elements.

G-2 Plans	G-2 plans is the main element of the G-2 section for coordinating and providing intelligence support to the MEF command element future plans team as well as providing leadership and direction of the G-2's GEOINT, SIGINT, and METOC sections.
G-2 Operations	G-2 operations is the main element of the G-2 for coordinating and providing intelligence support to the MEF command element commanding general, battlestaff and current operations center elements, target intelligence support to the force fires and future operations, G-2 IRs management activities, red cell support, and MEF intelligence liaison with external commands and organizations.
IOC	The IOC is the principal MEF intelligence operations and C2 center that is established by the intelligence battalion. It performs IRs management, staff cognizance of ongoing organic and supporting collection operations, intelligence analysis and production, and intelligence dissemination. Support Cell. The support cell is the primary element for conducting MEF-wide IRs management, METOC support, collections and dissemination planning and direction, and intelligence staff cognizance of MEF organic and supporting intelligence and reconnaissance operations. P&A Cell. The P&A cell is the primary analysis and production element of the MEF. It processes and produces all-source intelligence products in response to requirements of the MEF and is the principal IMINT and GEOINT production element of the MEF. SARC. The SARC is the primary element for the supervision of MEF collection operations. It directs, coordinates, and monitors intelligence collection operations conducted by organic, attached, and direct support collection assets.
Counterintelligence/HUMINT company command post	The counterintelligence/HUMINT company command post is the primary element for conducting counterintelligence/HUMINT planning and direction, command and control, and coordination of MEF counterintelligence/HUMINT operations with external counterintelligence/HUMINT organizations.
OCAC	The OCAC is the main node for the command and control of radio battalion SIGINT operations and overall coordination of MEF SIGINT operations. It processes, analyzes, produces, and disseminates SIGINT-derived information and directs the ground-based electronic warfare activities of the radio battalion.
Reconnaissance operations center	The reconnaissance operations center is the main node for the command and control of force reconnaissance company operations and the overall coordination of MEF ground reconnaissance operations. It processes, analyzes, produces, and disseminates ground reconnaissance-derived information in support of MEF IRs.

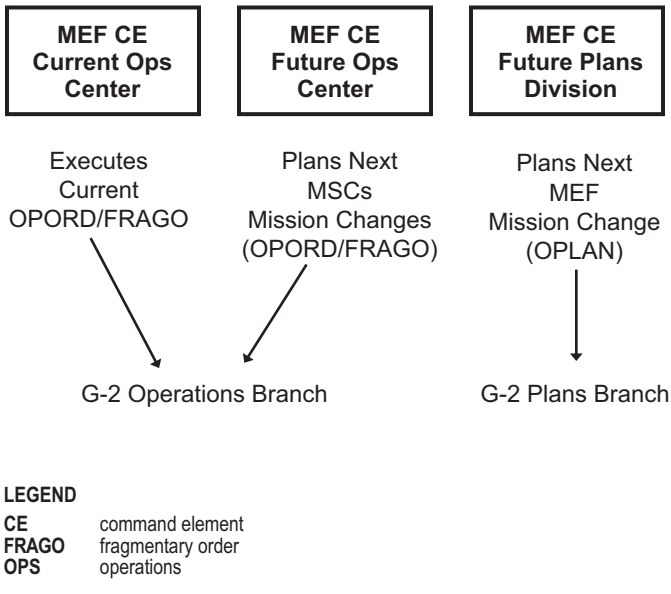


Figure 6-1. MEF Command Element Cross-Functional Cellular Organization and Intelligence Support.

Intelligence Operations Center

The IOC is the second principal intelligence C2 node within the MEF command element. The IOC provides the facilities, CIS, and other support needed by the ISC and the intelligence battalion to accomplish the following tasks:

- Provide centralized direction for MEF intelligence operations under the staff cognizance of the AC/S G-2. The IOC is the core for this task, with key assistance from the G-2 plans officer and the G-2 operations officer.
- Consolidate, validate, and prioritize IRs from the entire force, consistent with the commander's priorities. The CMD section within the IOC's support cell is responsible for completing these tasks. Intelligence specialists from all disciplines, including GEOINT, are normally assigned to this section.
- Plan, develop, and direct the MEF's collection, production, and dissemination plans and operations. The CMD section, with assistance from the P&A cell, is responsible for completing these tasks.
- Submit consolidated requests for external intelligence support through the Marine component headquarters to the appropriate agencies. The CMD section, with assistance from the P&A cell, is responsible for completing these tasks.
- Enable the ISC to exercise principal staff cognizance of the MEF's organic and supporting intelligence, counterintelligence, and reconnaissance operations, including SIGINT, GEOINT, HUMINT, measurement and signature intelligence (MASINT), ground reconnaissance, and aerial reconnaissance.
- Coordinate and manage the employment of MEF organic collection assets through the IOC's SARC. Most organic and supporting intelligence and reconnaissance units provide command and control and reporting of ongoing intelligence operations through their representatives in the SARC.
- Maintain a consolidated, all-source intelligence production center in the P&A cell that is resident in the MEF IOC.
- Coordinate with the radio battalion's operations control and analysis center (OCAC).
- Link the MEF command element to national, theater, joint, and other Service and multinational intelligence assets and operations.

All intelligence battalion and G-2 nodes have common, unique capabilities to perform critical tasks within particular functions. The IOC will also normally have unique intelligence communications capabilities, such as Trojan Spirit II, in addition to MEF command element common communications pathways provided by the communications battalion (see fig. 6-2 on page 6-5).

The CIC is the overarching IOC established within the MEF main command post. It encompasses the primary functions of the MEF intelligence section and intelligence battalion and includes G-2 plans and operations, IOC, counterintelligence/HUMINT company command post, OCAC, and reconnaissance operations center.

CIS Support

Communications and information systems support to CIC and IOC operations may vary based upon METT-T. All nodes will either have or have access to IAS and JDISS; other specialized applications; and/or connectivity with the full range of communications, such as JWICS, SIPRNET, NIPRNET, DSN, defense message system (DMS), voice, video teleconferencing, through either MEF command element common communications or unique intelligence battalion CIS capabilities. Examples of unique intelligence CIS capabilities include the following:

- VMU squadron remote receiving station.
- Radio battalion technical control and analysis center and the AN/MSC-63A Special Security Communications Central.
- Ground sensor platoon's tactical remote sensor system.

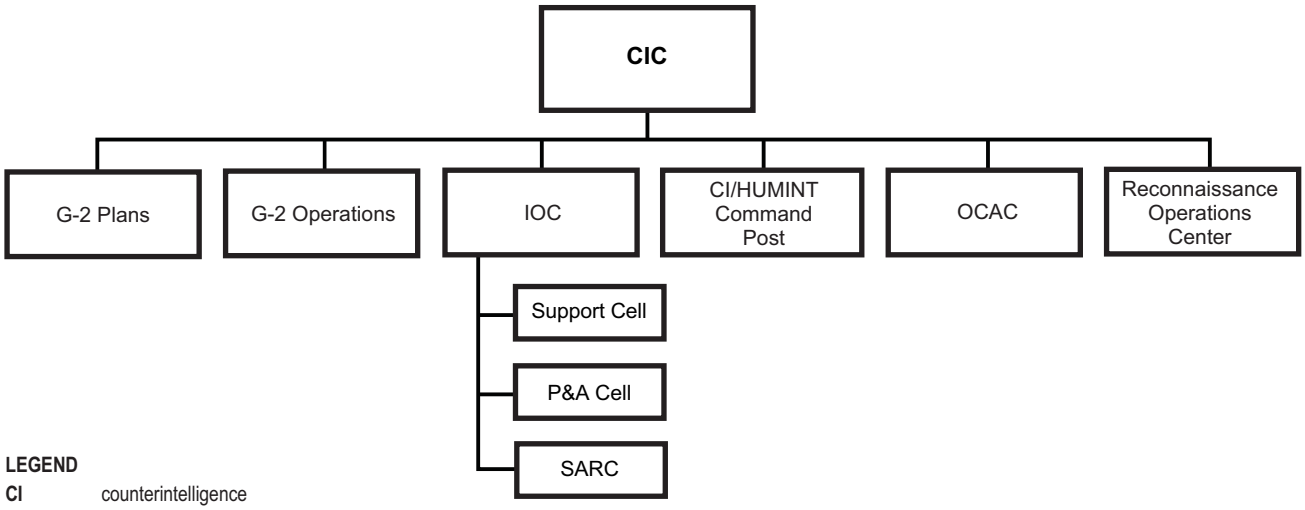


Figure 6-2. MEF Command Element CIC and IOC Key Elements Structure.

- IIP tactical exploitation group.
- Marine tactical electronic warfare squadrons' tactical electronic reconnaissance processing and evaluation system.
- Counterintelligence/HUMINT automated tool set, Manpack Secondary Imagery Dissemination System, Trojan Spirit II, and the Joint Surveillance Target Attack Radar System Common Ground Station.

Figure 6-3, on page 6-6, depicts a notional MEF overarching intelligence CIS architecture as well as the MEF G-2 section's and intelligence battalion's overall C2 relationships and resulting all-source intelligence support flow throughout the MEF.

Geospatial Intelligence Communications and Information Systems Support

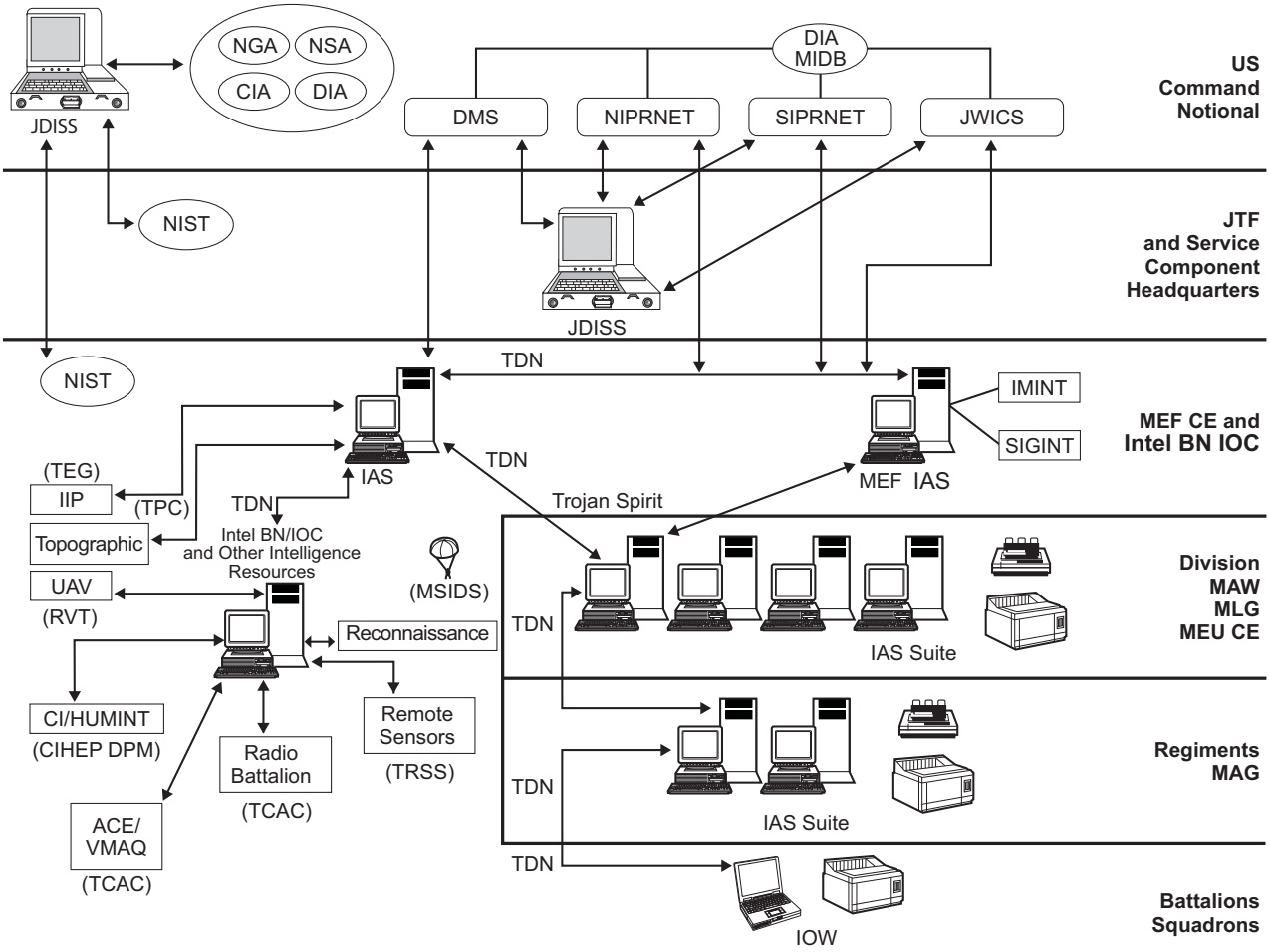
Marine Expeditionary Force

Within the CIC, the primary interfaces for GI&I access and retrieval include the IAS, the TPC, and the IIP's tactical exploitation group. These interfaces support the integrated production concept when connected to the MAGTF's LAN(s), WAN(s), and TDN. The integrated production concept is a basic principle of the NGA's emerging production processes to support the Services, CCDRs, and JTFs. The integrated production concept, supported by the geographic intelligence specialists and all-source intelligence analysts in the P&A cell, provides a collaborative production environment for GEOINT and all-source intelligence products.

Connectivity between the TGIL and the tactical exploitation group imagery product library mirrors national GI and IMINT operations. This connectivity leverages the technologies and standards developed for collaborative planning, production, and dissemination. Intelligence analysts need a fundamental, common picture of the environment (i.e., COP and CTP) in order to provide all-source intelligence products to commanders, their staffs, and subordinate units.

Intelligence production collaboration between geographic intelligence specialists and all-source intelligence analysts is a key factor in both developing and sustaining the COP/CTP and satisfying MAGTF IRs.

Effective GI&I support to the MAGTF staff depends on the connectivity of its C2 systems and supporting CIS to the TGIL. Appendix K contains a list of both current and emerging



LEGEND

BN	battalion
CE	command element
CI	counterintelligence
CIHEP DPM	counterintelligence human intelligence equipment program data processing module
COC	combat operations center
intel	intelligence
IOW	intelligence operations workstations
MAG	Marine aircraft group
MIDB	modernized integrated data base
MSIDS	Marine Air-Ground Task Force Secondary Imagery Dissemination System
NSA	National Security Agency
RVT	remote video terminal
TCAC	technical control and analysis center
TEG	tactical exploitation group
TRSS	tactical remote sensor system
UAV	unmanned aerial vehicle
VMAQ	Marine tactical electronic warfare squadron

Figure 6-3. Notional MEF Intelligence CIS Architecture.

MAGTF systems that will need GI&I support. Linking each of these systems through the MAGTF TDN will enhance GI&I distribution and provide a collaborative environment to support hyper-linking critical information and intelligence both into and out of the topographic platoon's geospatial database. Common usage of this geospatial database across all MAGTF systems supports the development of both the COP and CTP and provides an integrated structure for battlefield visualization.

Figure 6-4, on page 6-7, depicts MEF battalion's C2 relationships and the flow of intelligence support. Figure 6-5, on page 6-8, notionally depicts both the integration of key topographic platoon elements into MAGTF command element intelligence operations and the CIS connectivity with subordinate units.

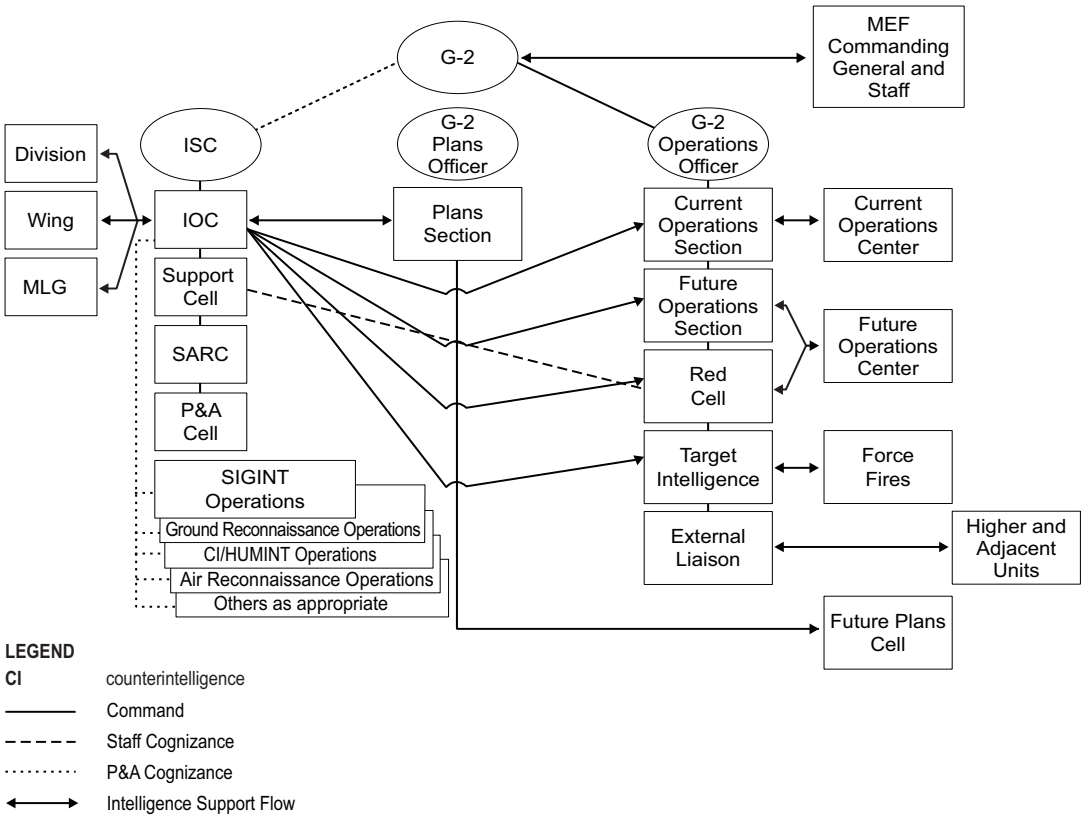
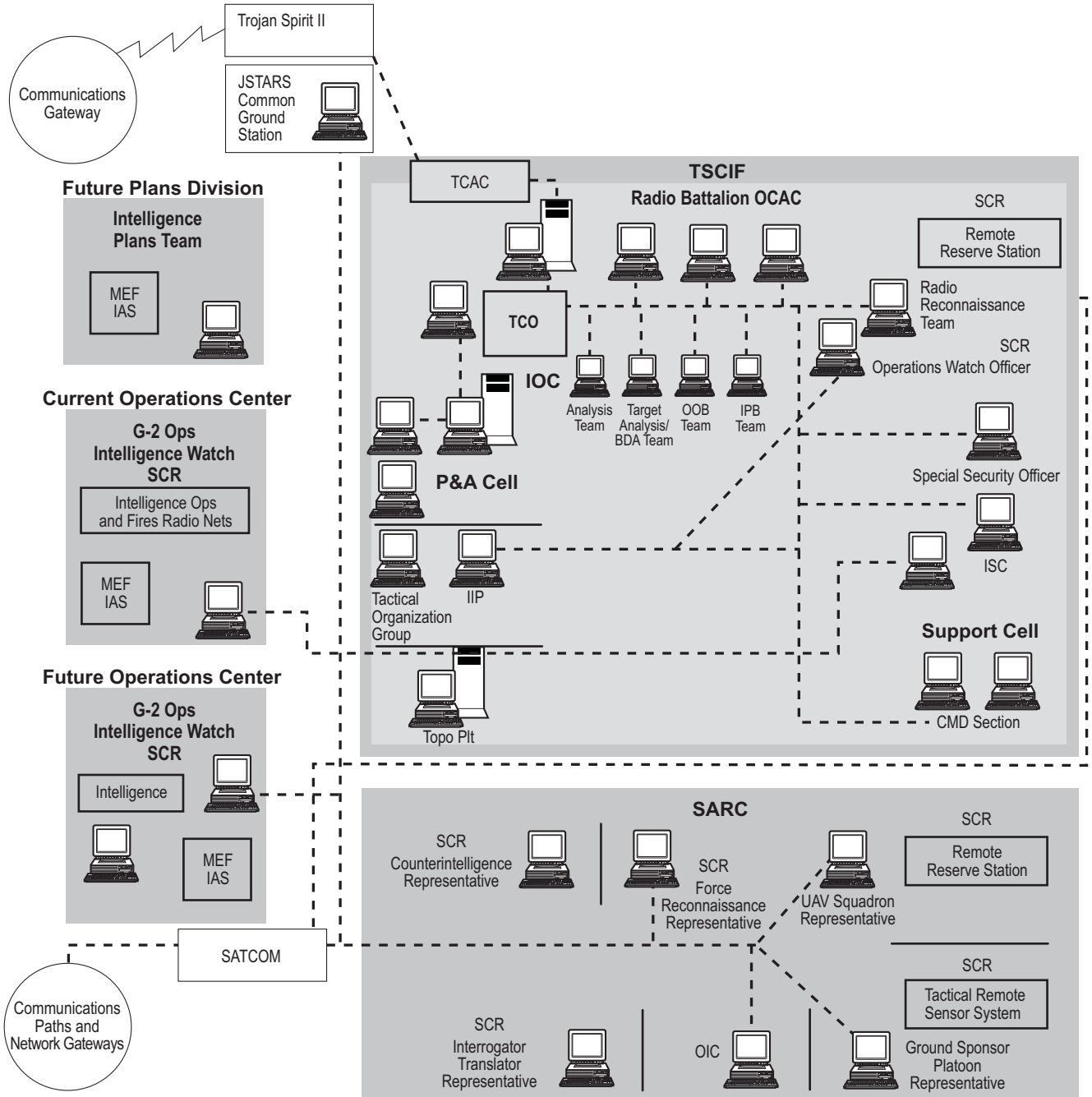


Figure 6-4. MEF AS/C, Intelligence and Intelligence Battalion Command and Control Relationships and MEF Intelligence Support Flow.

Naval Forces

During amphibious operations, the amphibious task force (ATF) and the MAGTF command element intelligence sections integrate their operations. The principal intelligence C2 node is the amphibious task force intelligence center (ATFIC), located aboard the ATF flagship. The ATFIC is composed of designated shipboard spaces containing installed CIS systems that support the intelligence operations of both the ATF and the landing force. Standard CIS connectivity is available via JWICS, SIPRNET, NIPRNET, DMS, and DSN. Access is provided through the flagships general service (message) communication center and the special intelligence communications center within the ATFIC's ship's signals exploitation space. Similar support may be available to other landing force elements embarked on other amphibious ships within the ATF.

Geospatial information and intelligence support is provided to the ATF intelligence center and other C2 centers via the JWICS network. Embarked geographic intelligence specialists and their equipment must be integrated into the ship's CIS network to be able to receive and disseminate GI&I. The integration of GEOINT assets must be coordinated with both the ship's communication officer and the ATF's CIS officer to ensure access to the National Production Network and facilitate distributive production support. Access is necessary to enable pulling GI&I from both afloat and other naval task force intelligence and GEOINT support facilities and pushing tailored mission views forward to the MAGTF to support land-based operations.



LEGEND

BOA	basic ordering agreement
JSTARS	Joint Surveillance Target Attack Radar System
OOB	order of battle
OPs	operations
SATCOM	satellite communications
SCR	single channel radio
TCAC	technical control and analysis center
TCO	tactical combat operations
topo plt	topographic platoon
TSCIF	tactical sensitive compartmented information facility
UAV	unmanned aerial vehicle

Figure 6-5. Notional MEF CIC CIS Architecture and Topographic Elements.

This communications configuration also supports split-based ATF and/or landing force operations with focused support from reachback facilities when shipboard topographic assets are either limited or not available.

National

National Intelligence Support Team. National-level all-source, GEOINT, and other intelligence assets may deploy in support of JTF operations as well as to provide critical support through reachback and collaborative capabilities. National-level intelligence assets may even function in direct support of the MAGTF. The national intelligence support team (NIST) is a tailored, national-level, all-source intelligence team deployed in support of commanders who are normally at the JTF headquarters level. Support may also be provided to other commands during crisis or contingency operations. National intelligence support teams provide the following services:

- Support for coordinating with various national intelligence agencies.
- Analytical expertise.
- Indications and warnings.
- Special assessments.
- Support for targeting.
- Streamlined access to national intelligence databases.
- Other products and assistance facilitating RFI management.

National intelligence support teams are task-organized based on mission, duration, team composition, and the capabilities required. Each deployed NIST is unique, though not self-contained. The teams depend on the supported command for logistic and other support because organic capabilities are limited to intelligence and unique CIS support.

Note: National intelligence support team members are normally drawn from the DIA, National Security Agency, CIA, and NGA (see table 6-2). The DIA controls NISTs through the J-2 for deployment and administrative purposes. Once deployed, a member of any of the represented intelligence agencies may act as the leader of the NIST.

Table 6-2. Notional Composition of a National Intelligence Support Team.

CIA	DIA
Two analysts Two communicators Associated CIS workstations	Three analysts One systems technician Associated CIS workstations
NSA[1]	NGA
Five to twelve personnel that include analysts, technicians, and communicators Associated CIS workstations	One imagery analyst One geospatial analyst Associated CIS workstations
Each NIST is task-organized to fulfill the supported commander's IRs.	
[1]National Security Agency	

National intelligence support team CIS capabilities are also task-organized and may range from a single agency element with voice connectivity to a fully equipped NIST with JDISS and JWICS video teleconferencing capabilities. Current methods of operation continue to rely on communications paths to support deployed NIST elements that are provided by the agency and supported command.

National intelligence support teams are attached in direct support of the JFC or other supported command for operations concerning command and control through the JTF J-2. The NIST analyzes the J-2's RFI, collection, and production requirements to determine which subelement(s) should be responsible for each particular request for action. Then, the leaders of the tasked NIST elements conduct liaison with their parent agencies. All intelligence generated by the NIST is available to the J-2, JFC, and other elements of the JTF, with restrictions based on clearance and programs (see fig. 6-6 on page 6-10).

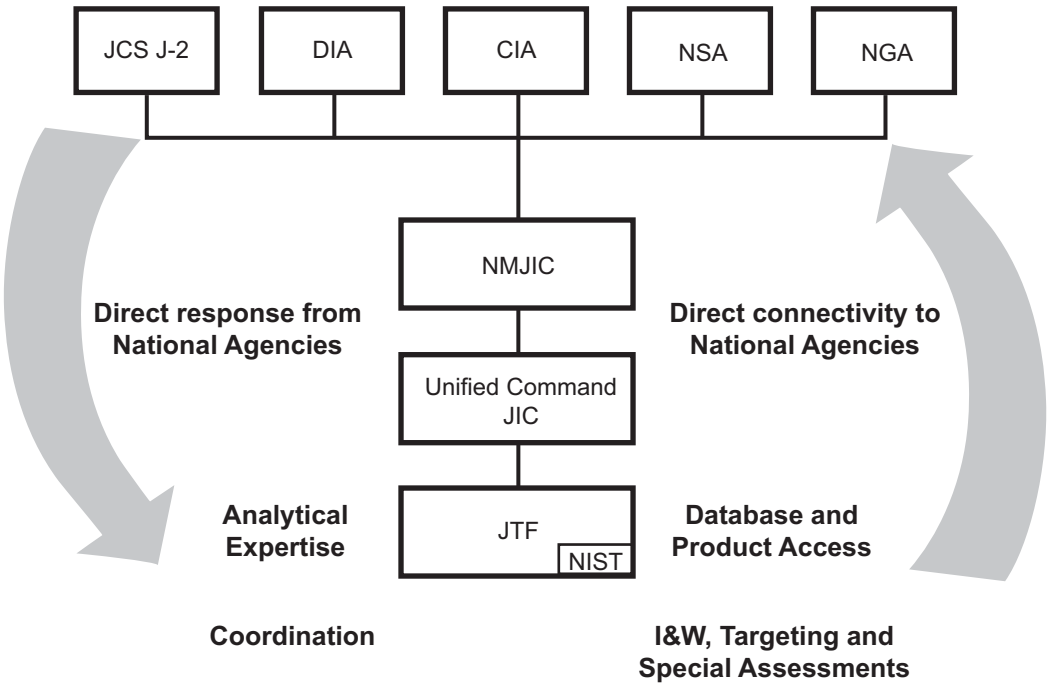
NGA. The Director, NGA, coordinates national CIS support to the Services and national intelligence agencies. The NGA establishes CIS interoperability standards and data formats for all

GI&I operations. The Services and intelligence agencies use these standards and data formats to support interoperable planning, direction, production, and dissemination of GI&I.

An NGA customer support response team may either be integrated into a NIST or deployed in direct support of a military force. It will typically contain a deployable imagery/geospatial server that is known as the quick response system (QRS). The QRS is a self-contained unit, requiring only satellite communications channel access support from the JTF or other supported unit. The JTF J-2 coordinates both the required satellite communications channel and specific communications security support for the QRS through the J-6. The NIST may need other mission-specific CIS and related support from the supported unit, including information systems technical support and an access controlled secure area that is within the supported unit's tactical sensitive compartmented information facility.

During operations, the customer support response team QRS can provide a MAGTF with a wide range of imagery and GI support. In garrison, NGA's geospatial, technical representatives within each MEF's command element assist with NGA coordination, special assessments, access to databases, and requests for intelligence. When needed, NGA can provide MAGTFs with temporary specialized equipment to meet unique operational needs or to satisfy critical deficiencies. For example, the modular remote replication system has been provided to deploying MEUs as a bridge reproduction system until the Marine Corps acquires an organic capability.

Joint Task Force J-2. The JTF J-2 organizational structure is determined by the JFC. That



LEGEND

I&W	indications and warnings
JCS	joint chiefs of staff
NMJIC	National Military Joint Intelligence Center
NSA	National Security Agency

Figure 6-6. National Intelligence Support Team Reachback Capabilities.

structure depends on both the situation and the mission. The JISE is the principal intelligence C2 node within the JTF J-2 and is the focus for JTF intelligence operations. It provides the JFC and component commanders with situational awareness and other intelligence support regarding adversary air, space, ground, and maritime capabilities and activities.

If a NIST is provided in support of the JTF, it generally will integrate its operations within the JISE. The following are some key JISE functions and capabilities:

- Providing collection management support.
- Providing order of battle analysis.
- Identifying threat centers of gravity and critical vulnerabilities, including critical capabilities, requirements, and vulnerabilities.
- Providing intelligence support to targeting and force protection.

All GI&I collection, production, and dissemination activities will be conducted within the JISE. Once initial GI&I products and support have been provided to a JTF and its components, updates will be accomplished by the JISE using push/pull dissemination techniques. Intelligence based on JDISS/JWICS CIS gives the JTF the ability to query theater and national GEOINT servers and databases to obtain the most current intelligence.

Multinational

Geospatial information and intelligence sharing between the MAGTF and allied forces is an important accommodation during both combined and multinational operations. Combatant commands and subordinate JTFs can request from NGA the authority to disclose/release GI to coalition/allied nations.

A JTF must be interoperable with and have access to theater geospatial databases as well as allied/coalition force databases and GI&I dissemination systems. For example, GI&I may be stored on a system, such as the Linked Operational Intelligence Centers, Europe. This automated system serves as the primary means for exchanging information with members of the North Atlantic Treaty Organization.

Joint Communications and Information Systems

A wide range of national, theater, and component CIS is available to joint and subordinate commanders. The continuing evolution of both national and DOD CIS technologies and architectures provides a robust, flexible capability that can be leveraged by the MAGTF (see fig. 6-7 on page 6-12). While these systems are designed and used primarily for the transfer of traditional intelligence and operational information, they can also be used to disseminate basic, current, and estimated GI&I. However, the existence of these capabilities does not ensure that GI&I can be disseminated without significant planning and coordination across all command echelons.

Planning

When planning CIS requirements, the CCDR, JTF GEOINT officer, and MEF ISC identify the mission and tasks, formulate and coordinate the CONOPS, consider joint and Service doctrine and capabilities, and then determine the specific mission requirements. Each echelon of command must work closely with all force intelligence and CIS staffs and subordinate commanders to determine GEOINT data bandwidth requirements and data transmission priorities. They must also work together to develop primary and alternate CIS plans. Supporting communications paths should address connectivity with the Defense Information Systems Network to allow for the transmission of large GI and GEOINT files.

Mission Objectives

As specific mission objectives of the JFC and each of the subordinate component commanders are framed, intelligence and GEOINT planners develop a list of the subordinate joint force GI&I

assets and those assigned from national and Service sourcing. Following the specific time lines for planned operations, these planners produce an estimate of the data bandwidth and other CIS requirements needed to fill gaps in geospatial data transmissions.

Communications and Information Systems Plans

The JTF and MEF J-6/G-6/S-6, assisted by the J-2/G-2/S-2, determine the specific CIS plan to ensure GI&I CIS interoperability between the MAGTF and the other components of the joint force. The plan should include both a node-to-node layout of existing and planned CIS transmission routes and modes and the identification of all organizations/units to be included in the CIS architecture.

MAGTF Communications and Information Systems

Architecture Planning

The transmission and dissemination of GI&I is evolving continually. The DOD GEOINT community is involved in ongoing research to develop newer, faster, and more effective ways to transfer the large data files associated with GI&I.

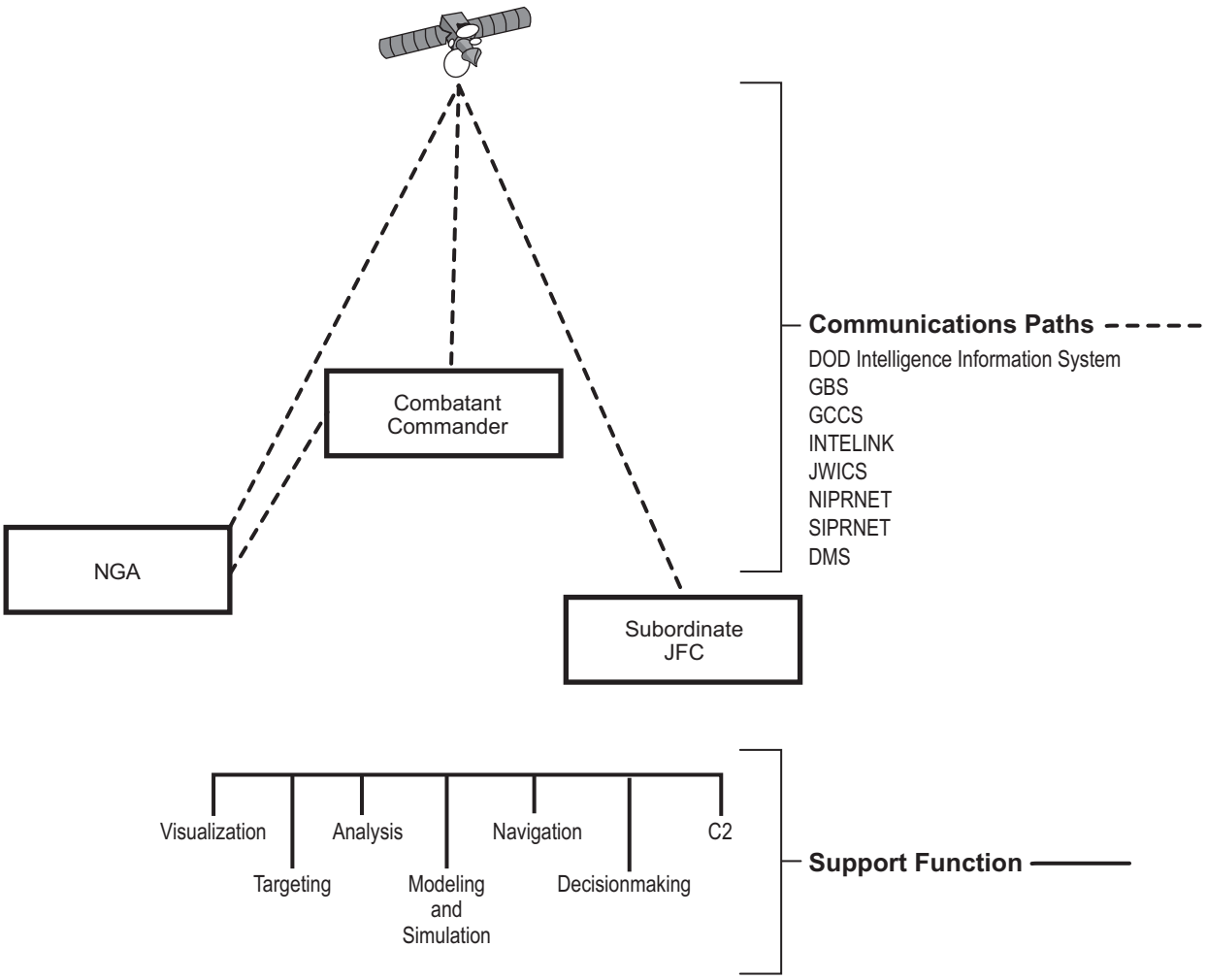


Figure 6-7. Joint Counterintelligence and Security Communications Architecture.

The MAGTF GI&I and CIS staffs and intelligence battalion must carefully plan and then coordinate CIS architecture requirements with the intelligence and CIS officers from the CCDRs and other Services; JTF, NGA, and other CONUS-based GI&I support activities; and the G-2, G-3, and G-6 of subordinate units.

Prepositioned geospatial databases reduce MAGTF TDN bandwidth requirements for the transmission of GI&I throughout the MAGTF; therefore, units should deploy with the most current GI&I on electronic media.

The ISC, in coordination with the MEF G-2, G-6, and GEOINT section, must develop, acquire, and establish adequate GI&I CIS support for higher, adjacent, and subordinate commands prior to operational deployment.

System Planning

Marine air-ground task force communications links include satellite, microwave, radio, landline, LANs, and WANs. After the G-2/S-2 and ISC identify and coordinate intelligence CIS operational requirements with the G-6/S-6, the system planning and engineering process is used to determine the type and number of circuits required, circuit routes, and frequency and bandwidth management communications protocols, such as bit rate and parity. The process also determines network protocols and security, management requirements, and other considerations required to make the MAGTF CIS architecture function effectively. Concurrently, the ISC/intelligence battalion's systems administrator must design/modify intelligence databases to meet mission-specific requirements. They must also ensure all echelons of the MAGTF can understand and access these databases. The MAGTF will need CIS connectivity with the following staffs, units, and organizations:

- Subordinate commanders.
- JTF headquarters.
- Other Service components headquarters and key subordinate units.
- NGA.
- Marine Corps GILs.
- Other national assets with geospatial database holdings.
- Coalition geospatial databases.

The MAGTF G-6/S-6 may request Defense Information Systems Agency leased or nonorganic theater communications resources. The G-6/S-6 requires the following detailed information from the ISC for formal request documentation:

- Type(s) of telecommunications support.
- Planned location(s).
- Operational activation and duration times.
- CIS equipment to be used at all locations.
- Estimated digital geospatial traffic volumes, precedence, and security levels.
- Recommended establishment and restoration priorities.
- Funding.

Planning Considerations

Client and Servers

Geospatial information and intelligence operations are moving toward more effective push/pull capabilities. The pull function allows forces to browse through geospatial data files and acquire relevant information based upon their specific needs. Data may reside on a distributed network that remains virtually transparent to users; however, the data is accessible to many global servers. The push function requires that national- and/or theater-level producers of GI&I automatically send updated data or data required for navigation safety to either every node in the force or to a special distribution list of known users.

Database Management

The ISC, assisted by the MEF GEOINT section, must identify the database management requirements for each particular operation. All users should be able to add value to and update the geospatial database. Updated data must be

disseminated quickly to all pertinent users in the area of operations, to the theater database, and to NGA for inclusion in the DOD GI warehouse. The GEOINT officer (in coordination with subordinate command GI&I representatives), the ISC, and the CM/DO should identify a single POC for all MAGTF in-theater database management actions. This database manager reviews and validates any value-added data before it is disseminated. Normally, this POC resides with the intelligence battalion CM/DO, P&A OIC, or the topographic platoon commander.

Alternate Methods of Dissemination

The ISC and CM/DO must identify and evaluate alternate methods (e.g., hard drive, CD-ROM [compact disc read-only memory], tape, or disk) to distribute GI&I to subordinate units without sufficient bandwidth connectivity to receive electronic products. Distribution of such products via courier must be coordinated with the G-1/S-1 and the receiving unit's intelligence officers. Dissemination of bulk GI&I products, such as maps, must be coordinated with the G-4/S-4 supply officer to ensure that standard supply distribution support is available. See MCWP 3-40.3 for additional information regarding MAGTF CIS planning and operations.

United States Imagery and Geospatial Information System

The USIGS is an NGA-developed architecture compatible with the Joint Technical Architecture and defense information infrastructure-common operating environment. The USIGS provides a client and server capability for the storage and dissemination of imagery, IMINT, GI, and GEOINT. File servers or GILs will exist at different command echelons and intelligence agencies to support mission needs. The National Information Library—the largest of the national GILs—stores national imagery, selected tactical imagery, and thematic layers of GI and GEOINT. The GIL CCDR maintains theater-specific data to support his/her particular missions.

Connectivity between national, theater, and tactical GILs affords the MAGTF the ability to leverage the collaborative and distributed production capability inherent in the design of the USIGS architecture.

Marine Corps Planning Factors Database

The Marine Corps PFDB provides a digital process by which the GEOINT section and intelligence battalion staff can identify and prioritize MAGTF GI&I requirements. The PFDB can be used to develop and submit digital and hard copy area requirements in support of the deliberate and crisis planning processes. The PFDB uses selectable user profiles, system databases, quantity matrices, and mission profiles to establish required features and attributes to support current or future operations.

Each user and mission profile, with associated requirements list, can be forwarded to the Imagery and Geospatial Intelligence Branch, HQMC, for updating the Marine Corps PFDB. Submissions on geographic area requirements should be forwarded to the appropriate combatant command through the operational chain of command.

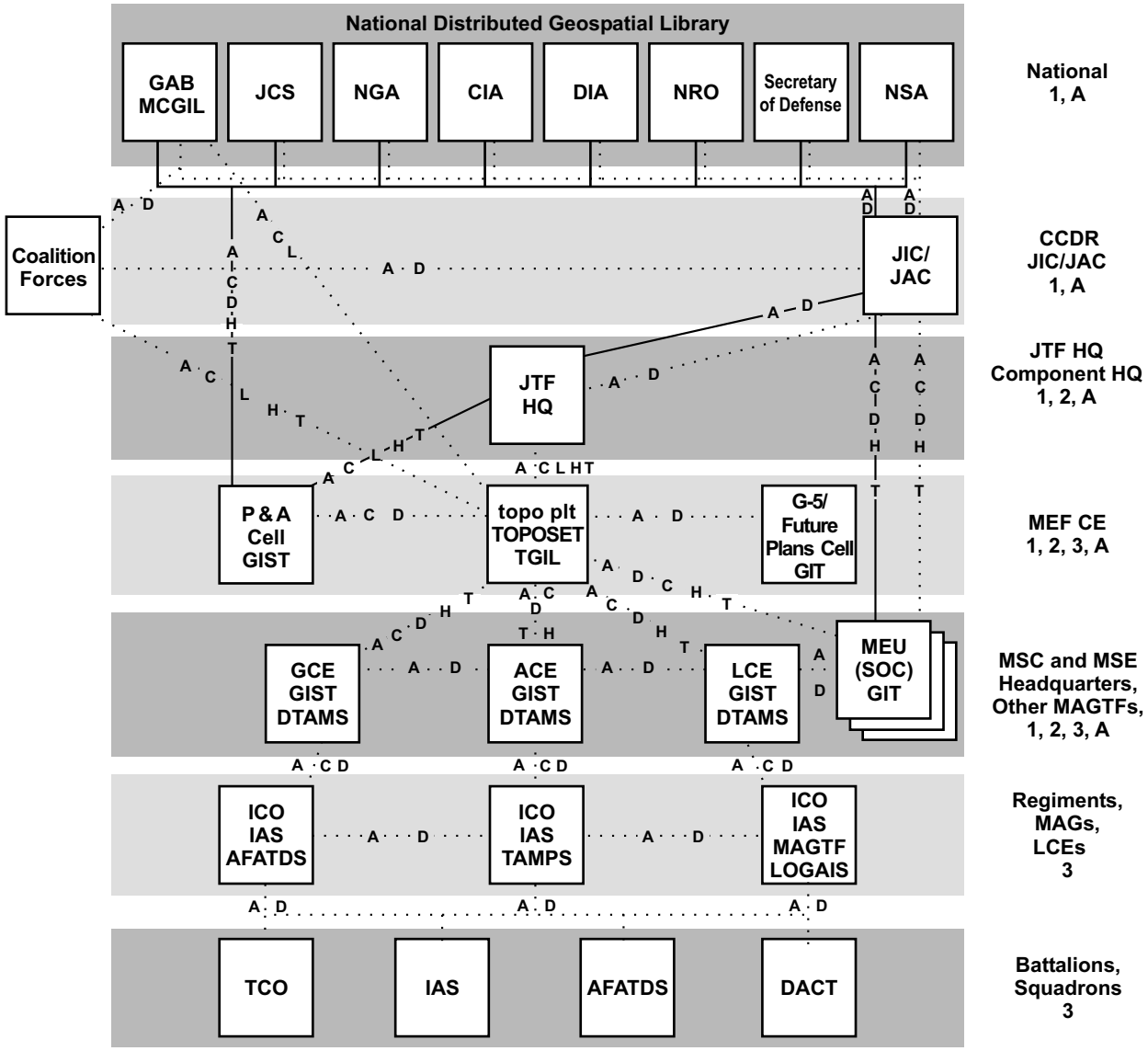
The PFDB incorporates Marine Corps common hardware and software and is interoperable with both national and theater requirements analysis systems. The PFDB uses standard LAN and WAN networks to access NIPRNET, SIPRNET, and JWICS architecture via the MAGTF TDN.

Operations and Supporting Communications and Information Systems

Specific task organization, command relationships, and CIS supporting MAGTF GEOINT operations is specified within annexes B, C, and K of the OPORD or in a subsequent

fragmentary order. Figure 6-8, on page 6-16, depicts the scope of interrelated GI&I operations. It notionally describes five key aspects of MAGTF GI&I operations:

- The task organization and command and support relationships of MAGTF GEOINT units. The topographic platoon is collocated with the MEF command element G-2/S-2 and other elements of the intelligence battalion. The topographic platoon operates in general support of the MAGTF, with GISTs and GITs either attached to or in direct support of MSC/major subordinate element headquarters as required.
- The principal GI&I systems, such as TGIL, DGIL, DTAMS, and DTAMS-L, employed both within and in support of the MAGTF.
- The communications connectivity, communications pathways, means, and level of security classification.
- The key information systems, such as tactical combat operations and IAS, supported by GI&I.
- The principal GI&I activities and product reports to be disseminated by communications pathways.



KEY

Communications Connectivity

L = Dedicated Data Link
D = Data
C = CD-ROM
T = Tape
H = Hard Copy

Classification

GENSER ·····
SCI ———

Intelligence Dissemination

A = All Source
1 = GEOINT Product Report
2 = Tactical Value-adding
3 = Tactical Reporting

LEGEND

AFATDS	Advanced Field Artillery Tactical Data System
CE	command element
DACT	data automated communications terminal
GAB	geospatial analysis branch
GENSER	general service (message)
HQ	headquarters
JCS	joint chiefs of staff
LOGAIS	logistics automated information system
MAG	Marine aircraft group
MEU (SOC)	Marine expeditionary unit (special operations capable)
NRO	National Reconnaissance Office
NSA	National Security Agency
SCI	sensitive compartmented information
TAMPS	tactical aviation mission planning system
TCO	tactical combat operations
topo plt	topographic platoon
TOPOSET	topographic set

Figure 6-8. MAGTF Geospatial Intelligence Operations and Supporting Communications and Information Systems.

CHAPTER 7
SECURITY

This chapter provides guidance governing security classification, disclosure, release, and destruction of GI, GEOINT, and related data.

Responsibilities

The DOD and NGA are responsible for DOD GI&S activities, to include security. Marine Corps personnel preparing, storing, distributing, and using GI&I and related data are responsible for ensuring security, classification, and proper release in compliance with DODD 5200.1.

Unit security managers are responsible for administering the GI&I classification management program through its classified material control center. All personnel are responsible for safeguarding GI&I and related data at a security classification level commensurate with its sensitivity.

Classification

National Geospatial-Intelligence Agency GEOINT products and related data should be classified to the degree needed to assure adequate protection against unauthorized disclosure. Security classification and control marking requirements for GEOINT products and data are based on the same criteria used for other military intelligence products and data. However, the following unique security requirements should be considered when handling NGA products and data:

- Requirements established by other governments as spelled out in bilateral agreements must be honored. Some bilateral agreements specify that the GI&I products prepared or obtained under the agreement shall be classified. However, NGA prefers to publish unclassified GI&I products whenever possible to facilitate their storage, handling, and distribution.
- Most NGA medium-scale and large-scale products of foreign areas are normally not releasable outside the US Government without prior approval, even though they are unclassified. Maps in this category are marked with both for official use only and limited distribution statements. Likewise, most products either prepared or obtained under bilateral agreements are restricted from release outside the US Government without prior approval from NGA.
- The release of GI&I products of foreign areas may be governed by both international agreements and international policy considerations.
- National security policy may direct that certain GI&I products covering areas of strategic or tactical importance and prepared from sensitive source materials be classified commensurate with the security classification guidance of the primary sources used in their preparation.
- The source having the lowest classification and/or least restrictive requirements should be used as the cover source when several sources, which may have different classification and release restrictions, are equally available for production.

Classification Guidance for New Geospatial Information and Intelligence

The topographic platoon commander, subject to the direction of the intelligence battalion commander and the P&A company commander, is responsible for assigning both the classification level and the duration the classification must remain in force for all MAGTF-generated GI&I products and databases. The topographic platoon commander shall follow the classification

guidance established by MEF, JTF, or other authority. Additionally, the topographic platoon must develop local security procedures for preparing and monitoring production and dissemination plans and for project specifications based on guidance from the MEF AC/S G-2, intelligence battalion commander, and command security manager.

Geospatial Information and Intelligence Products and Databases

The following factors must be considered when maintaining GI&I products and databases within the MAGTF:

- Maintenance, recompilation, value adding, intensification, or revision of planimetric and relief features previously compiled will require review of security classification based on the new sources used.
- Products and databases must be classified with the same classification as the revision sources if classified features are added/identified.
- Information depicted in the margins of GI&I products and databases cannot reveal by date or other pertinent recorded information that classified sources were used.

Guide Preparation Considerations

The factors discussed in the following subparagraphs must be considered when preparing a security classification guide or before providing final security classification guidance for new or revised GI&I products and databases.

Bilateral Agreements

These agreements provide for classification of GI&I products and databases. Some bilateral agreements stipulate that products and databases resulting from sources subject to the terms of the agreements must be classified. Consequently, large-scale and medium-scale GI&I products and databases covering certain countries must be classified to protect US relations with those nations.

International

Security classification requirements for an international organization, such as NATO, must be considered in the production of GI&I products and databases related to that particular International Pact Organization.

Military Installations

A large-scale GI&I product or database that identifies military installations must be classified unless public knowledge of the installation and its location is readily available in the news media or other open sources. The minimum level of classification required to protect sensitive installations is **CONFIDENTIAL**. If the source information is classified at a higher level and there is no requirement for sanitizing, then the product must be classified commensurate with the source. The following criteria should be considered in determining the classification of GI&I products and databases related to installations:

- An installation is considered sensitive if it serves a critical military function and if the knowledge of its existence/location would make it a primary target during wartime.
- For products prepared under cooperative agreements, the security classification indicated by the country involved will be honored and all sensitive installations so indicated will be appropriately protected.

International Boundaries

Security classification and control of GI&I products and databases portraying international boundaries should conform to the following criteria:

- If one of the portrayed nations participates with the United States in a bilateral agreement that requires security classification of products and databases prepared under that agreement, then the security classification must be honored unless the nation waives the requirement for similarly protected border sheets.

- If the security classification on any of the previously prepared GI&I products or databases was based on either sensitive sources or sensitive installations, then these products should be examined for the current sensitivities and declassified when appropriate.

Disclosure and Release of National Geospatial-Intelligence Agency Classified Products and Databases

Only NGA or the CCDR can disclose and release classified NGA products, databases, and/or related data to requesters not affiliated with the Marine Corps or DOD. The ISC must provide detailed justification to support all decisions to disclose/release classified NGA products.

National Geospatial-Intelligence Agency Policy

Disclosure may be made only with the approval of NGA. Classified NGA products and databases may be shared with foreign countries and international organizations only when there is a clearly defined advantage to the United States. Disclosure of classified GI&I products and databases comply with the guidance set forth in the JTF's published security guidance.

Disclosure Procedures

Handling a request for disclosure should be done expeditiously so as to maintain good relations and to ensure good treatment for pending or subsequent US disclosure requests. All requests for GI&I products/databases to support war plans and combat operations should be forwarded thorough the appropriate GI&I channels to the theater or CCDR geospatial officer for action. The ISC or unit G-2/S-2 is responsible for this process within MAGTF units. Requests for release of NGA GI&I products and databases may be approved if they meet the criteria outlined in appropriate NGA directives. An authorized NGA disclosure official must approve all disclosures and denials. Requests that do not meet the stated criteria will be denied unless an exception to National Defense Policy is granted.

Release of National Geospatial-Intelligence Agency Classified Material

Only the Director, NGA can authorize the physical release of NGA classified material to a representative of a foreign country. Physical release must conform to the policies set forth in DODD 5230.11, *Disclosure of Classified Military Information to Foreign Governments and International Organizations*.

Release of National Geospatial-Intelligence Agency Unclassified Products and Databases

It is the policy of NGA to provide unclassified GI&I products and databases to US Government agencies, the general public, and domestic commercial firms whenever possible. These products and databases are provided without compromising DOD plans, programs, and operations that require protection in the interest of national security. All NGA products and databases are the property of the DOD and are to be used in the best interest of the US Government.

Release Categories

Release of unclassified NGA GI&I products and databases is divided into three categories: fully releasable, releasable at NGA's option, and not releasable.

Fully Releasable

The products and databases in this category are normally offered for public sale as listed in pertinent NGA directives and catalogs.

Releasable at the Option of NGA

Certain NGA products and databases, including medium scale (1:250,000) and large scale (1:100,000, 1:50,000, and larger) materials covering foreign territories, are releasable at the option of NGA. Consequently, they may carry cautionary notes/handling warnings as set forth in DODD 5230.24, *Distribution Statements on Technical Documents*.

Not Releasable

Certain unclassified NGA products and databases may not be releasable to requesters outside of the DOD because of existing bilateral agreements that preclude further dissemination or distribution. These products or databases will normally carry cautionary notes/release warnings reflecting the specific restrictions.

Release Guidance

Geospatial information and intelligence products and databases are technical information packages prepared to meet DOD requirements. The release of this information depends on National Security Policy considerations. When possible, NGA products and databases are produced, stored, and distributed on an unclassified basis to facilitate their use by military forces. However, their release to either private or international users is subject to review by a designated NGA official. This review ensures that National Security Policy considerations and/or certain provisions of bilateral and international agreements are not compromised.

In general, small-scale (1:500,000 resolution or smaller) NGA products and databases are releasable to the general public. Exceptional circumstances preclude some special or specific products from being released. Requests for releasing GI&I products/databases must be confirmed through appropriate GI&I channels with either the CCDR or the Imagery and Geospatial Intelligence Branch prior to release.

Disposal of Geospatial Information and Intelligence Products and Databases

In time, the NGA GI&I products will become obsolete, be declared surplus, or be superseded by other products. Each of these eventualities require disposal of the affected product. The appropriate manner for disposing of these products is determined by the security classification level or affixed handling warnings.

Disposal of Classified Products and Databases

Classified GI&I products and related data must be destroyed per the regulations governing the destruction of classified materials described in SECNAVINST M5510.36, *Department of the Navy Information Security Program*, and appropriate NGA directives.

Disposal of Unclassified Products and Databases

The NGA policy for disposing of superseded and obsolete products and databases that are not authorized for public sale contains the following provisions:

- Disposal of unclassified GI&I products and databases at scale densities of 1:500,000 equivalent and smaller may be used for pulping, reclamation, destruction, or any ecologically compatible manner that precludes resale. The products may be reused as memo pads, forms, calendars, or for any requirements of the US or local Government.
- Disposal of unclassified GI&I products and databases at scale densities of 1:250,000 equivalent and larger (such as 1:50,000 or city graphics [CGs]) must be destroyed by pulping, shredding, burning, destruction, or other ecological compatible manner that precludes the reuse of that product. These products cannot be reused as memo pads, forms, or calendars.

- Recycling process requires excess stock be cut and bound for use as memo pads, calendars, scratch pads, and similar use items.
- Recycling process (cutting and intermixing) of excess stock must be done within a US Government or military facility by personnel assigned to the respective agency or facility.
- Recycling must be accomplished in such a manner so that users cannot easily reconstruct the original product.
- Recycled products may only be made available to personnel assigned to such facilities with specific instructions that will preclude further distribution.
- Recycled products are not to be made available for public sale.
- Maximum pad size produced from excess limited-distribution stock must not exceed one-fourth the size of the original product.

The MEF GI&I section must be notified to coordinate the movement of the excess stock to the nearest Defense Property Disposal Office for disposition when unclassified excess stock cannot be recycled for use within a command or properly destroyed. At the Defense Property Disposal Office, the product will be destroyed using the appropriate process, such as shredding, pulverizing, or burning.

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CHAPTER 8
TRAINING

Headquarters, Marine Corps IPI, in conjunction with the Training and Education Command, the National Geospatial Intelligence College (NGC), and Marine Corps Intelligence Schools is responsible for designing, implementing, and maintaining a GEOINT training and education program. Local training plans should reflect GI&I training. Topics should cover datums, coordinate conversions, requisition procedures, support capabilities, geodesy, computer operating systems, geodetic control and coordinate computations, surveying operations, synthesis of GI, remote sensing concepts and applications, and GIS concepts and applications.

Organic Topographic Training

The topographic platoon commander and topographic platoon chief are responsible to the intelligence battalion commander for implementing training requirements, including the following:

- Database management training.
- MOS proficiency sustainment.
- Unit SOPs for production.
- Equipment operation and maintenance.

Requirements

Initial training for all geographic intelligence specialists (MOS 0261) and intelligence officers assigned to GI&I billets is conducted at NGC, located at Ft. Belvoir, Virginia. The occupational field sponsor for the geographic intelligence specialist community at HQMC, Intelligence Operations and Personnel, manages the assignment to follow-on and advanced training.

Each topographic platoon is responsible for developing an annual training plan (see app. L) to support and maintain the skills critical to mission success. The intelligence battalion S-3 and the MEF GI&S section maintain copies of all training plans. Alternative training, such as interactive courseware, mobile training teams, and local civilian schools, can be used to enhance skill levels in all functional areas of the platoon.

Training Objectives

Training for MAGTF geographic intelligence specialists should include the following:

- Geodetic survey planning and employment.
- Topographic production planning and employment.
- Topographic and airfield survey.
- Geodetic survey orientation and familiarization.
- Terrain analysis.
- Hydrographic analysis.
- System administration.
- Geospatial database management.
- IPB application.
- METOC utilization.

Training for MAGTF intelligence officers assigned to GI&I billets should include the following:

- Overview of Marine Corps GEOINT capabilities.
- Orientation and familiarization of topographic production.
- MAGTF mission profiles and typical GI&I products.
- NGA standard products and services.

Planning and Employment Training

Geographic information and intelligence planning and employment training is provided as part of the formal training for MAGTF intelligence officers (MOS 0202), ground intelligence officers (MOS 0203), air intelligence officers (MOS 0207), MAGTF intelligence chiefs (MOS 0231), and geographic intelligence specialists (MOS 0261). Training for GI&I planning and employment is taught at a GIS staff officers' course. Planning and employment is also addressed in specialized courses on intelligence collection, processing, production, and mapping taught at the NGC. The topics discussed in the following subparagraphs are addressed during planning and employment training.

System Administration Training

Geographic intelligence specialists attend the Basic Geospatial Intelligence Specialist (BGIS) course. Upon completion of this course, graduates receive six additional months of intensive on-the-job training with one of the topographic platoons. Each topographic platoon establishes its own training cycle to develop and enhance system administration proficiency.

Maintenance Training

First-echelon equipment maintenance is included as part of the BGIS course. Students are taught the fundamentals of how to set up and use the TPC FoS, including basic troubleshooting, during the introductory portion of the geospatial analysis training. They then learn advanced troubleshooting and establishment of DGIL clusters and TGILs at the individual units. Supplemental maintenance training is completed within the topographic platoons.

Database Management Training

Initial database management training is included as part of the BGIS course. Follow-on training is conducted during the intermediate geospatial intelligence specialist course and is supplemented by other courses taught at NGC.

MAGTF Training

Geospatial information and intelligence production is incorporated into all MAGTF training. During training exercises GI&I operations are conducted using a variety of C2 support relationships to improve flexibility concerning organization and employment. Repeated exposure to GI&I capabilities and employment strategies enhances the MAGTF's ability to use GI&I effectively to increase situational awareness and shape operations.

Command Post Exercise and Staff Exercise

The production and use of GI&I should be included in all exercises. Training exercises should emphasize the planning of GI&I support requirements and production procedures, the dissemination of GI&I within MAGTF MCEN systems, and the use of GI&I within the MCPP. During an exercise, the unit intelligence officer should use the planning cycle and develop a realistic GI&I production plan. Geographic intelligence specialists that are provided to the exercise control group validate the planning and production plan and demonstrate how to simulate the dissemination of mission-specific data from national and theater production facilities.

Field Training Exercise

Field training exercises may be used to practice geophysical data collection (GDC) methods, such as geodetic surveys, topographic surveys, data collection, and terrain analysis. They also provide operational context to integrate, intensify, produce, and disseminate tailored mission-specific data in support of command and control, intelligence, fire support, aviation, logistics, and maneuver operations.

The topographic platoon coordinates with staffs and units at all echelons of command. Interaction helps to increase the supported organization's understanding of GI&I in general and the capabilities afforded by topographic platoon. Topographic detachments can be used in exercises at the regimental and Marine aircraft group levels.

Training Courses

Basic and advanced level GI&I training programs are available at NGC, Ft. Belvoir, Virginia. Alternative GI&I programs include correspondence courses and contractor- and vendor-supported training. Changes in operational concepts, individual training standards, and new technologies may cause significant changes in course offerings and curricula.

Basic Level Courses

Basic Geospatial Intelligence Specialist Course

The BGIS course, which lasts 130 training days, teaches the fundamentals of geodetic survey and geospatial analysis to entry-level Marines (private through sergeant). The course is taught in two phases. The first is the geodetic survey phase, which covers the basics of survey mathematics and computations, advanced map reading, GPS, total-station operations, and digital-level operations. The geodetic survey phase ends with a comprehensive phase completion exercise during which students employ all of the skills that were taught. The second is the geospatial analysis phase, which addresses intelligence fundamentals; introduction to data types and formats; and familiarization of geodatabase functionality, GIS, and fundamentals of remotely sensed imagery (RSI). This phase concludes with an extensive cumulative course exercise during which the students must perform to standards with a geospatial support team.

Fundamentals of Spectral Exploitation and Analysis I

Fundamentals of Spectral Exploitation and Analysis I is a one-week course taught at NGC on RSI fundamentals based on high resolution imagery and terrain products. This course employs a combination of lecture and hands-on training. Students learn about basic multispectral satellite orbital concepts and commercial, civil, and military multispectral sensors; imagery import and digital enhancements; multispectral image interpretation; image terrain perspective views; and image map product generation. This course addresses the needs of entry level geographic intelligence specialists, MAGTF intelligence officers, and tactical intelligence officers assuming GI&I billets.

Fundamentals of Spectral Exploitation and Analysis II

Fundamentals of Spectral Exploitation and Analysis II is a one-week course taught at NGC. It is a follow-on to Fundamentals of Spectral Exploitation and Analysis I and employs a combination of lecture and hands-on training. The course provides students with a more advanced education on spectral imagery processing and literal and nonliteral spectral imagery analysis techniques. The course builds on the multispectral interpretation/manipulation techniques and processes previously taught and adds advanced digital image enhancement techniques, display and exploitation of hyperspectral imagery, terrain categorization, and fly-through techniques, emphasizing multiple image fusion. This course addresses the needs of entry-level geographic intelligence specialists, MAGTF intelligence officers, and tactical intelligence officers assuming GI&I billets.

Geospatial Digital Data Users Course

The GIS 2150 is an introductory-level course taught at NGC that provides instruction on exploiting the four data types using basic GIS software loads. Lessons introduce geospatial fundamentals and geographic translation software (GEOTRANS) and cover ordering NGA products using the Defense Logistics Agency map catalog. The course is taught using a combination of direct instruction followed by practical exercises that center on military scenarios. This course addresses the needs of entry-level geographic intelligence specialists, MAGTF intelligence officers, and tactical intelligence officers assuming GI&I billets.

Fundamentals of Geographic Information Systems

The GIS 2101 is taught at NGC and is designed for the beginner GIS user. It provides a working foundation in GIS to exploit NGA digital data and solve GEOINT problems. This course is recommended for MAGTF intelligence officers and tactical intelligence officers assuming GI&I duties.

Intermediate Level Courses

Intermediate Geospatial Intelligence Specialist Course

The second phase of the geographic intelligence specialist's technical and professional development within the 0261 MOS is Intermediate Geospatial Intelligence Specialist course. It is an intensive, 65-day training course that builds on the following key areas of technical proficiency introduced in the BGIS course:

- Planning geodetic survey operations.
- Conducting quality control of geodetic survey data.
- Importing and postprocessing geodetic data.
- Synthesizing GI.
- Creating and using geospatial databases.
- Developing a production strategy.
- Electronically disseminating products.
- Conducting predictive site selection.
- Conducting hydrographic analysis.
- Developing understanding and competence with advanced remote sensing concepts and applications.
- Understanding cultural analysis.

The course concludes with a comprehensive exercise covering the three levels of operations.

The target population for this course is corporal through staff sergeant.

Intermediate Geospatial Information Systems for Analysis

The Intermediate GIS for Analysis (GIS 3201) course is taught at the NGC and builds on the fundamentals in introductory level GIS courses. Students focus on using GIS to conduct geospatial analysis in a homeland security setting. Topics covered include geodesy, geodatabases, geocoding, geostatistical analysis, network analysis, spatial analysis, and 3-D analysis as well as building geoprocessing models. Students are evaluated with a comprehensive capstone project that encompasses the various concepts and techniques taught throughout the course. This course is intended for intermediate geographic intelligence specialists within the ranks of corporal through staff sergeant.

Intermediate Spectral Exploitation and Analysis I

The Intermediate Spectral Exploitation and Analysis I course is taught at NGC and covers the basics of exploiting and analyzing multispectral imagery (MSI). This course is taught using a combination of lecture and hands-on training focused on the concepts and principles of RSI and GIS. Students learn about more advanced tactical and strategic sensors that allow analysts to perform common and advanced image processing routines more efficiently. This course is intended for intermediate geographic intelligence specialists within the ranks of corporal through staff sergeant.

Intermediate Spectral Exploitation and Analysis II

The Intermediate Spectral Exploitation and Analysis II course is taught at NGC and introduces the extraction and literal and nonliteral exploitation and analysis of spectral signatures using commercial and military hyperspectral data. This course combines lecture and hands-on training and covers more advanced hyperspectral sensors, atmospheric correction, anomaly and target detection, and the use of spectral libraries. This course is intended for intermediate geographic intelligence specialists within the ranks of corporal through staff sergeant.

Geodatabase Design and Maintenance

The Geodatabase Design and Maintenance course, taught at NGC, introduces students to the

structure and capabilities of the geodatabase. Students learn how to create, manage, edit, and maintain data within the geodatabase framework. The course investigates several advanced concepts including building and managing networks in a geodatabase, creating and managing subtypes and domains, topological relationships, and schemas. Courseware is designed around the file geodatabase. This course is intended for intermediate geographic intelligence specialists in the ranks of corporal through staff sergeant.

Intelligence Writing

The Intelligence Writing course, taught at NGC, is designed to improve communications and give participants career-enhancing intelligence writing skills. The course includes a discussion of NGA style and community standards to be applied while planning, writing, and revising a variety of NGA products. Core NGA intelligence products are used as the foundation of and examples for this course. The course focuses on defining the topic, significance, and outlook (what, so what, and then what) of intelligence issues; extracting information from collateral information to support a product; synthesizing data into clear, concise statements; and communicating well-organized, written information to defined customers. Students identify and apply aspects of critical thinking throughout the course. This course is intended for intermediate geographic intelligence specialists and advanced geospatial intelligence specialists (AGISs) within the ranks of corporal through master sergeant.

Advanced Level Courses

Advanced Geospatial Intelligence Specialist Course

The AGIS course, taught at NGC, is an intensive course of study (approximately 25 training days) that develops students' ability to manage and supervise geographic intelligence production. The course addresses several advanced topics and skill sets, including production management, advanced theories of geospatial information, advanced theories of RSI, and geographic intelligence volumetrics. The target population for the AGIS course is gunnery sergeant through master sergeant.

Geospatial Intelligence for the Staff Officer Course

The Geospatial Intelligence for the Staff Officer course (formerly known as GI&S JSOC) is taught at NGC and provides an overview of key concepts, systems, procedures, and organizations involved in producing GEOINT. The course emphasizes the knowledge and skills that the staff officer needs to leverage NGA's capabilities to support military/civil plans and operations. This course is intended for AGISs in the ranks of gunnery sergeant through master sergeant.

Measurement and Signature Intelligence Introductory Courses

Introduction to Commercial Remotely Sensed Imagery

Introduction to Commercial RSI is a 1-day course at NGC that teaches students the basics of commercial RSI. Due to the nature of the required course content, the course is delivered as a basic-level primer. It ensures students can identify foundational commercial RSI facts and terms and can understand general commercial RSI principles, including fundamental commercial RSI knowledge and theory and commercial RSI imagery systems and products, and how to obtain commercial RSI products. Students learn basic facts regarding appropriate processes for acquiring and distributing commercial RSI data, products, and services in addition to the security and protection requirements necessary for the operation of commercial RSI space systems and handling of commercial RSI-derived products. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Airborne Imagery

Introduction to Airborne Imagery is taught at NGC. It is a one-day primer designed to provide

basic instruction on airborne imagery principles, concepts, and processes. It includes key terminology; airborne imagery fundamentals; imagery sensing; the airborne imagery tasking, collection, production, exploitation, dissemination (TCPED) process; capabilities and limitations of airborne imagery sensors; and the application of airborne imagery as a GEOINT tool. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Motion Imagery

Introduction to Motion Imagery, taught at NGC, is a one-day primer designed to provide basic instruction on motion imagery principles, concepts, and processes. It includes key terminology, motion imagery fundamentals, remote sensing, TCPED process, capabilities and limitations of motion imagery sensors, and the application of motion imagery systems. Students see demonstrations on the uses and applications of motion imagery as a GEOINT tool. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Photogrammetry

Introduction to Photogrammetry is a one-day primer taught at NGC. It introduces basic definitions, concepts, and methods of photogrammetry; is lecture-based; and does not involve exploitation using software. The course includes both NGA and commercial photogrammetry applications and provides an overview of photogrammetry image acquisition issues, products, services, and software tools. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Spectral Imagery

Introduction to Spectral Imagery is taught at NGC and provides basic instruction on the spectral subdiscipline of technically-derived intelligence. Students are introduced to the capabilities and limitations of using multispectral/hyperspectral imagery. Students also learn how to request products and perform rudimentary interpretation of products derived from technically-derived intelligence. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Spectral Systems

Introduction to Spectral Systems is taught at NGC and provides basic instruction on the spectral subdiscipline of technically-derived intelligence. Students learn the capabilities and limitations of using multispectral/hyperspectral imagery and spectral imagery collection systems. Students also learn how to request products and perform rudimentary interpretation of products from technically-derived intelligence. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Synthetic Aperture Radar

Introduction to Synthetic Aperture Radar (SAR) is taught at NGC and introduces intelligence analysts and managers to SAR and how it is exploited in order to assist in solving GEOINT problems. The course addresses SAR platforms and provides awareness-level training regarding SAR and SAR advanded geospatial intelligence (AGI) (AGI or SAR MASINT) work. Discussed in the course are the most prevalent SAR products exploited by analysts today and an overview of product applications. Finally, the course introduces SAR TCPED so that analysts have a basic understanding of how to initiate the process to leverage SAR capabilities against their intelligence problems. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Thermal Infrared Imagery

Introduction to Thermal Infrared (TIR) Imagery is taught at NGC and provides a basic level of training for the TIR imagery subdiscipline of technically-derived intelligence. Students learn the capabilities and limitations of using TIR imagery. Students also learn how to request products and perform basic interpretation of products from technically-derived intelligence. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Introduction to Overhead Persistent Infrared

Introduction to Overhead Persistent Infrared (OPIR) is taught at NGC and addresses OPIR fundamentals, including phenomenology, sensors, applications, and the intelligence cycle. Students learn the capabilities, limitations, and application of OPIR systems. Additionally, students are trained on OPIR products and the OPIR specific TCPED process. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Measurement and Signature Intelligence Fundamentals and Analysis Courses

Fundamentals of Synthetic Aperture Radar Exploitation

The Fundamentals of SAR Exploitation course, taught at NGC, provides students sufficient knowledge regarding the architecture, geometry, resolution, and phenomenology of SAR imagery to allow accurate interpretation of standard SAR imagery. Students also receive an overview of the SAR AGI products and how they apply to intelligence problem sets. This course is recommended for intermediate geospatial intelligence specialists, AGISs, and MAGTF intelligence officers and tactical intelligence officers assuming GI&I billets.

Intermediate Synthetic Aperture Radar Exploitation

The Intermediate SAR Exploitation course is taught at NGC and provides students with the detailed knowledge necessary to exploit the primary SAR-tailored products used within the intelligence community. The course focuses on exploiting products, such as dynamic images, two-color multiview, and other change detection products. Finally, the course covers the intermediate techniques and specialized tools used to order, retrieve, and assist in the exploitation of these tailored products. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Advanced Synthetic Aperture Radar Analysis

The Advanced SAR Analysis course, taught at NGC, is offered through a partnership with the United States Naval Research Laboratory. This intensive hands-on course is designed to provide highly-experienced SAR analysts and image scientists with tailored training on advanced analytical techniques and the SAR tools used to solve intelligence problems of interest in their own work roles. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Intermediate Synthetic Aperture Radar Processing

Intermediate SAR Processing is taught at NGC and provides students with the detailed knowledge needed to process the primary SAR products used within the intelligence community. The course focuses on building products, such as dynamic images, two-color multiviews, digital elevation models, and other unique products. The course covers methods of searching for data and ordering products using different processing options, as well as hands on applications using the tools to research, order, and produce products. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Fundamentals of Thermal Infrared Exploitation and Analysis I

Fundamentals of TIR Exploitation and Analysis I is taught at NGC and provides introductory literal exploitation education and training for imagery geographic intelligence specialists and scientists. Students learn literal TIR exploitation methods and techniques and apply them to help solve intelligence problems. Students are also introduced to the idea of nonliteral exploitation. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Fundamentals of Thermal Infrared Exploitation and Analysis II

Fundamentals of TIR Exploitation and Analysis II is taught at NGC and provides introductory nonliteral TIR exploitation education and training. Students learn nonliteral TIR exploitation methods and techniques and apply them to solve intelligence problems. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Fundamentals of Overhead Persistent Infrared I—Physics and Phenomenology

Fundamentals of OPIR I—Physics and Phenomenology is taught at NGC and addresses OPIR contributions to national security, the physics related to OPIR, the interaction of energy with matter, the phenomenology of OPIR sources, atmospheric effects, types and characteristics of OPIR orbits and their advantages/disadvantages, phenomenology of OPIR detectors, and existing and future OPIR systems. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Fundamentals of Overhead Persistent Infrared II

Fundamentals of OPIR II is taught at NGC and provides the fundamentals of the OPIR TCPED. Participants learn how to submit a requirement and the process for collecting on a target. They are introduced to processing and exploiting OPIR data to answer the essential elements of information. Participants learn the methods of disseminating OPIR intelligence and correlating other intelligence with OPIR data. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Fundamentals of Polarimetric Imagery

Fundamentals of Polarimetric Imagery at NGC teaches students the fundamentals of the science analytic techniques of polarimetric imagery. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

Intermediate Polarimetric Imagery

Intermediate Polarimetric Imagery is taught at NGC and is the follow-on to the fundamentals course. It provides students with a fundamental understanding of polarimetric imagery processing techniques using ENVI [environment for visualizing images] and the NPTK [NGA Polarimetric Tool Kit]. This course is recommended for intermediate and advanced level geographic intelligence specialists requiring knowledge of AGI and specific training in MASINT techniques.

APPENDIX A
GEOSPATIAL INFORMATION AND INTELLIGENCE STANDARD PRODUCTS AND RESOURCES

This appendix describes the different types of GI&I and the key all-source intelligence resources and products that are prepared within the intelligence community.

Standard Products

Beach Studies

Beach studies provide detailed information on beaches and other points along the coastline that could support amphibious operations. See appendix H for an example format for a beach study.

Helicopter Landing Zone and Drop Zone Studies

These all-source intelligence studies identify potential HLZs and DZs based on terrain factors. These factors include vegetation, slope, surface materials, and obstacles. The analysis also identifies approach patterns, potential exits, total area, as well as major and minor axes of the HLZ and DZ. Imagery and intelligence personnel provide commanders and planners with additional detailed intelligence analysis of potential HLZs and DZs. See appendix I for an example of a HLZ/DZ study format.

Hydrographic Studies

Hydrographic studies focus on the ocean, river/stream, and littoral environments within the area of operations to support transportation and other requirements. These studies identify potential obstacles and their impact on maneuvering forces.

Cover from Flat Trajectory Weapons Study

Cover analysis is a study identifying the key areas that offer cover. The study considers surface roughness and vegetation.

Concealment from Aerial Detection

Concealment is protection from observation. This overlay is important for judging where the enemy might be located. It is especially important in areas where guerilla forces might be operating because it helps the commander predict attacks. Concealment may be provided by woods, underbrush, snowdrifts, tall grass, cultivated vegetation, roof coverage, or any other feature that denies observation.

Lines of Communications Study

All-source LOC intelligence studies provide detailed information on the transportation infrastructure within the area of operations. Studies regarding LOCs include textual and graphical information on the roads, railroads, bridges, tunnels, airfields, and by-passes. Imagery and intelligence personnel conduct detailed intelligence analysis of the transportation infrastructure to support logistics and operational forces.

Tactical Study of the Terrain

The topographic platoon prepares studies of the terrain by using NGA baseline data sets to analyze the terrain within an area of operations. These studies focus on the military aspects of the terrain, referred to as KOCOA.

Initially, the analysis is completed using foundation data that supports the IPB. Then, the analysis

is intensified to provide MSDS and is fused with operational all-source intelligence to provide detailed information on mission objective and target areas. See appendix G for an example format of the tactical study of the terrain.

Urban Studies

Urban studies are high resolution, specialized studies of the urban environment to support MOUT. The analysis is completed initially using foundation data in support of IPB. It also provides 2-D and 3-D battlespace views to support planning and rehearsal. Intensification of the analysis within defined objective and target areas and fusing with other intelligence provides tailored information in MSDS and other intelligence products.

Cross-Country Movement Studies

Cross-country movement studies identify severely restricted, restricted, and unrestricted terrain (terrain that is free of restrictions to movement) that is not improved specifically for vehicular traffic. It also identifies the types of vehicles that may travel across that terrain. Analysis includes factors, such as vehicle and vegetation types as well as terrain slope, surface, and subsurface materials. The CCM analysis does not imply that a particular vehicle or group of vehicles cannot be operated in a severely restricted area; it identifies that maneuver may require modification to tactics and procedures. Normally, CCM databases are developed on enemy and friendly forces traveling in main battle tanks, medium-track vehicles, medium-wheeled vehicles, and light-wheeled vehicles. The CCM information is not developed to reflect foot mobile forces because such forces are normally not restricted by any type of terrain environment.

Modified Combined Obstacle Overlays

A MCOO is an intelligence product used to depict the effects of the battlespace on military operations. It is a graphic terrain analysis on which significant IPB products and analysis are based. The MCOO may be portrayed using either actual maps and overlays or basic digital databases of the battlespace area evaluation, terrain analysis, and weather analysis phases of the IPB process. Modified combined obstacle overlays are fused products of GEOINT (i.e., GI&I, METOC, IMINT, and intelligence analysis). Normally, MCOOs depict all obstacles to mobility and consist of the following:

- CCM.
- Transportation infrastructure.
- Built-up areas.
- Rivers and water obstacles.
- Key terrain.
- Natural and constructed obstacles.
- AAs.
- Axes of advance.
- Mobility corridors.
- Friendly and enemy objectives.
- Contaminated areas.
- Air AAs.

Modified combined obstacle overlays are produced during the IPB cycle, with significant collaboration between geographic intelligence specialists and MAGTF intelligence analysts.

Land Cover Analysis

Land cover analysis, often mistakenly called terrain categorization, is a study conducted from MSI or hyperspectral imagery. The primary purpose of this study is to identify key vegetation and materials on the Earth's surface that would aid in mobility, cover, concealment, and vegetation analysis.

Terrain Categorization

A terrain categorization study is primarily a land cover analysis amplified by infusing surface roughness effects on the terrain. They are primarily derived from MSI or hyperspectral imagery analysis and fused with digital elevation information.

Three-Dimensional Visualization

Visualizations products in 3-D are broken down into three primary categories as follows:

- *Static*. A static 3-D product is one that statically depicts terrain in three dimensions. It is computer generated from screen captures using various software packages (e.g., ArcGIS 3-D Analysts, Erdas VGIS). It can contain views from different perspectives and is typically printed using a standard printer. Product subtypes differentiate between different types of overlays draped on the terrain, such as imagery, maps, and/or vector data.
- *Dynamic*. A dynamic 3-D product, more commonly known as a fly through, is a product that depicts a fixed-path animation over 3-D representation of terrain. Fly throughs are typically delivered in standard digital movie formats (MPG [moving picture experts group] or AVI [audio visual interleave]). Product subtypes differentiate between the types of overlays draped on the terrain, such as imagery, maps, and/or vector data.
- *Interactive*. An interactive fly through is a product that shows a 3-D representation of terrain and allows the user to interact with the environment and change perspective on the computer. Products may include multiple intelligence sources related to the terrain and are typically distributed as VRML [virtual reality modeling language] data sets or Skyline TerraExplorer kits. Product subtypes differentiate between the types of overlays draped on the terrain, such as imagery, maps, and/or vector data.

Relief Products

Relief products can be produced from the series of digital elevation models that are currently in use by the GEOINT community, including the following:

- DTED.
- Digital elevation models from the United States Geological Survey.
- Shuttle radar topography mission.
- Light detection and ranging.

Product subtypes differentiate between the types of overlays draped on the terrain (e.g., aspect, slope, elevation tint, shaded relief).

Terrain Analysis Graphic

A terrain analysis graphic is a custom product that fuses together tailored analysis, depictions of a specific area, or hand-held photos in an effort to explain the terrain environment. Products may include many standard products, all depicted in one product over the same area. Product subtypes include standard terrain analysis graphics, beach analysis graphics, riverine analysis graphics, and terrain factor studies.

Tailored Map

A tailored map is a product made to augment or replace a standard NGA mapping product that does not exist, is not a suitable scale, is not current, or does not contain desired features. Product subtypes include imagery, vector, relief and vector data, scanned map derived, and radar. Imagery maps are differentiated by medium/high (at or greater than 5 megapixels) resolution and type of imagery (multispectral/panchromatic).

Databases

Controlled Image Base Database

A CIB database is an unclassified seamless data set of orthophotos made from rectified grayscale aerial images. It supports various weapons, command and control, CIS, mission planning, digital moving map, terrain analysis, simulation, and intelligence systems. This database provides the following:

- Rapid overview of areas of operations.
- Map substitute for emergencies and crises.
- Metric foundation for anchoring other data in systems or image exploitation.

- Positionally correct images for draping in terrain visualization.
- Image background for mission planning and rehearsal.

Digital Aeronautical Flight Information File Database

This is a flight information database containing airports, heliports, navigational aids, airspace, and low en route structures worldwide. The information from this database is used in automated flight planning systems, flight simulators, GIS, and flight management computer systems.

Digital Bathymetric Database

The DBDB was developed by the naval oceanographic office and contains gridded bathymetric data. Depths are given in uncorrected meters for the post spacing of the given database. Available post spacing includes DBDB 5 minute (DBDB5), DBDB 0.5 minute (DBDB.5), and DBDB 0.1 minute (DBDB.1) of latitude and longitude. The database information is used to develop small- and large-scale bathymetric contour charts, planning graphics, and digital displays. The Navy controls distribution of these products.

Digital Nautical Chart Database

The digital nautical chart database is a vector-based digital database containing selected maritime physical features that are collected from harbor, approach, coastal, and general charts. This information is formatted for computerized Marine navigation and GIS applications. A digital nautical chart is used for chart displays, CIS, and GIS.

Digital Point Positioning Database

The DPPDB is a deployable set of geographically controlled imagery with associated support data. The DPPDB can help quickly and accurately identify positional data for any area feature that may be stored in the database. This includes accurate geodetic latitude, longitude, and elevation.

The DPPDB is a data-only product. The exploitation of the data is defined by each user's hardware and software capabilities. The primary purpose of the DPPDB is to provide operational and tactical forces with a database that can be used in the field. It enables trained personnel to derive accurate coordinates for any feature within the database area. This is a classified product, releasable to DOD customers based upon valid requirements.

Digital Terrain Elevation Database

Digital terrain elevation database is a uniform matrix of terrain elevation values. It provides a basic quantitative database for all military systems that require terrain elevation, slope, and/or surface roughness information. To support operations, this data is produced in the following resolutions:

- Level 1 post spacing is 3 arc seconds or approximately 100 meters.
- Level 2 post spacing is 1 arc second or approximately 30 meters.
- Levels 3 through 5 post spacing have not been formalized yet, but will be approximately 10 to 1 meter resolution ratio.

Foundation Database

A foundation database is a seamless, integrated geospatial database consisting primarily of imagery, elevation data, and map feature information. The primary focus of foundation data is to support initial planning and establish the framework for intensification of data within the area of operations necessary to support planning and decisionmaking. Predominantly, foundation data is at a medium-scale resolution (similar to a 1:250,000 scale chart).

Foundation data forms the base of a geospatial framework from which all additional data is referenced. It is one of the principal components of the DOD readiness strategy designed to meet MAGTF

requirements. Foundation data is relatively stable background information that is mission and force independent, specification compliant, and geopositioned to the WGS-84 datum.

Foundation Feature Database

A foundation feature database is selected feature data with some attribution that has been arranged in relational thematic layers. Feature density depends on the specific geographic region, though it will generally approximate that of a traditional TLM. A foundation feature database includes transportation and drainage networks, geodetic control points, populated places, boundaries, vegetation, and natural and cultural features of high interest or visibility.

Mission-Specific Data Sets Database

An MSDS database is any user-defined enhancement of foundation data that is required to conduct a mission. It supports the DOD readiness strategy designed to meet MAGTF requirements. The MSDS is developed by enhancing the information contained in the foundation data set. It includes higher resolution controlled imagery, elevation, and/or bathymetric depth information and vector features that are needed to meet a defined mission. An MSDS is focused on a specific area, type of force, and mission.

Legacy National Geospatial Agency Digital Products

Compressed Equal Arc Second Raster Chart/Map Digitized Raster Graphics

A compressed equal arc second raster chart/map is a coordinated common compression of the equal arc second raster chart/map digitized raster graphic (ADRG) for use in any application requiring rapid display of a map image or manipulation of a map image in raster form. A compressed ADRG achieves a nominal compression ratio of 55:1. The compressed ADRG is intended for use in a variety of systems requiring map backgrounds, coordinate selection, and perspective view generation, such as mission planning systems, theater battle management systems, or intelligence systems.

Interim Terrain Data and Planning Interim Terrain Data

Interim terrain data (ITD) and planning interim terrain data (PITD) are designed to provide digital terrain analysis data for systems being fielded prior to NGA's full-scale production of digital topographic data. It consists of contiguous digital data sets that cover specified geographic areas. These data sets are composed of attributed and unsymbolized feature information with enhanced transportation files. The ITD and PITD are built in the standard linear format to support Army mobility models.

They are used by the Army's Digital Topographic Support System to provide terrain analysis information that assists operations, intelligence, and logistic planners in the performance of the following automated tasks:

- Terrain visualization.
- Route and site selection.
- Mobility and countermobility planning.
- Communications planning.
- Navigation.
- Fire support planning and execution.

Urban Vector Map Program

The urban vector map (VMap) program is designed to provide vector-based geospatial data with city graphic (CG) content. The VMap program separates data into 10 thematic layers, with each layer containing thematically consistent data. Data is collected at a density of detail that approximates the detail of NGA CG and military city map products. Data coverages are boundaries, elevation, hydrography, industry, physiography, population, transportation, utilities, vegetation, and data quality.

The urban VMap is designed to support GIS. It is used as a database for various situations and map background displays as well as a core database for the spatial indexing of other information. The urban VMap will support MOUT and noncombatant evacuation operations.

Vector Map: Level 1

Vector map level 1 (VMapL1) is designed to provide vector-based geospatial data at medium resolution (e.g., JOG equivalent information content and density). The VMapL1 program separates data into 10 thematic layers, with each layer containing thematically consistent data. Data coverages are boundaries, elevation, hydrography, industry, physiography, population, transportation, utilities, vegetation, and data quality. Designed to support GIS, VMapL1 is used as a database for various situation and map background displays.

Vector Map: Level 2

Vector map level 2 (VMapL2) is designed to provide vector-based geospatial data at high resolution (e.g., TLM equivalent information content and density). The VMapL2 program separates data into 10 thematic layers, with each layer containing thematically consistent data. Data coverages are boundaries, elevation, hydrography, industry, physiography, population, transportation, utilities, vegetation, and data quality. Designed to support GIS, VMapL2 may be used as both a database for various situations and map background displays and a core database for the spatial indexing of other information.

Vector Product Interim Terrain Data

Vector interim terrain data is designed to provide digital terrain analysis data for systems requiring CD-ROM. It consists of contiguous digital data sets covering specified geographic areas. These data sets are composed of attributed and unsymbolized feature information with enhanced transportation files. Vector interim terrain data is used by the topographic platoons to provide terrain analysis information that assists maneuver, fires, intelligence, and logistic planners in the performance of the following automated tasks:

- Terrain visualization.
- Route and site selection.
- Mobility and countermobility planning.
- Communications planning.
- Navigation.
- Fire support planning and execution.

Legacy National Geospatial-Intelligence Agency Hard Copy Products

City Graphic

A CG map is a large-scale (1:12,500) lithographic map made up of populated places and environs portraying streets and route information. Features of a CG map include important buildings, airfields, military installations, industrial complexes, embassies, government buildings, hospitals, schools, utilities, and places of worship as well as militarily significant relief. A city graphic map is used to support administrative and tactical planning for urban area operations.

Evasion Chart

An evasion chart is composed of 8 to 10 JOG charts that are printed on both sides of waterproof, tear-resistant material.

> *Note: Joint operations graphics ground charts are the preferred source when composing evasion charts; however, JOG air charts are used when ground charts are not available.*

An evasion chart's border and open water areas contain supplemental survival information, such

as plant identification, land navigation aids, survival techniques, ocean currents, time zones, winds, and weather. An evasion chart is designed to assist aircrews downed in hostile areas to survive, escape, and evade the enemy. It is distributed to aircrew members as part of standard survival equipment and it folds to accommodate stowage in a flight suit or survival vest.

Harbor, Approach, and Coastal Charts

Harbor, approach, and coastal charts provide detailed navigational information that supports ships maneuvering in close-quarter areas. These charts assist in berthing and anchoring, keeping in the channel while entering and exiting port or navigating in close proximity to dangers associated with close shore and harbor approach areas.

Joint Operations Graphic (Air)

The joint operational graphic-air (JOG-A) is the standard DOD medium-scale (1:250,000) map that displays topographic data, such as relief, drainage, vegetation, populated places, cultural features, and coastal hydrography. The JOG-A supports tactical and other air activities, including low-altitude visual navigation. The JOG-A includes an aeronautical overprint depicting obstructions, aerodromes, special-use airspace, navigational aids, and related data. The contour line elevation values on a JOG-A are reflected in feet.

Operational Navigation Chart

The operational navigation chart (ONC) is the standard worldwide, small-scale (1:1,000,000) aeronautical chart series. It contains cartographic data with an aeronautical overprint depicting obstructions, aerodromes, special-use airspace, navigational aids, maximum elevation figures, and related data.

The ONC is designed for medium-altitude, high-speed, visual, and radar navigation. In the absence of tactical pilotage charts, the ONC also satisfies en route visual and radar navigation requirements for low-altitude operations. It is used for mission planning and analysis and intelligence briefings. The ONC is also used as a source for navigational filmstrips and cockpit and visual display products.

Special Aeronautical Information Request

A special aeronautical information request satisfies the requirement for the latest information on airfields by using airfield photography and automated air facilities information file data.

Tactical Pilotage Chart

The tactical pilotage chart is the standard worldwide medium-scale (1:500,000) aeronautical chart series. The tactical pilotage chart provides essential cartographic data. It is overprinted with stable aeronautical information, such as obstructions, aerodromes, special-use airspace, navigational aids, maximum elevation figures, and related data. Because of the scale, some features are generalized (e.g., only the highest obstruction within an urban quadrant is shown). A military grid is overprinted on the chart for interoperability, especially in regions without JOG coverage.

The tactical pilotage chart is designed for very low-altitude through medium-altitude, high-speed, visual, and radar navigation. It is used for mission planning and analysis and intelligence briefings and in navigational filmstrips and cockpit and visual display products.

Topographic Line Map

The TLM is a lithographic map that portrays topographic and cultural information in two scales: 1:50,000 and 1:100,000. Relief is shown by contours and spot elevations, with values in meters. The map is a true representation of terrain detail, depicting drainage, vegetation, populated places,

cultural features, roads, railroads, and coastal hydrography. Primarily, TLMs are used by land and air forces in support of ground operations for planning and tactical operations.

Software Products

Digital Point Positional Database Point Drop Program

The NGA has developed the DPPDB point drop program software to use geographic point measurements from the NGA's DPPDB product. This software provides the capability to access, roam, zoom, and measure NGA DPPDB image geographic point readings in both monoscopic and stereoscopic modes.

Geographic Transformation Software

Geographic translation software is an application program that easily converts geographic coordinates among a wide variety of coordinate systems, map projections, and datums. Geographic translation software runs in Microsoft Windows and UNIX Motif environments. The user interface of GEOTRANS is similar to that of a calculator. To convert a set of coordinates—

- Select the coordinate system or map projection and the datum where the coordinates are defined.
- Enter the source coordinates.
- Elect the coordinate system or map projection and the datum where the coordinates are to be converted.
- Click on the CONVERT button. The converted coordinates will be displayed.

  Note: Because the GEOTRANS application stores previous selections, additional coordinate sets can be converted from the same source by entering the new coordinates and clicking the CONVERT *button. The coordinate system, map projection, or datum selections can be changed at any time. Currently, GEOTRANS software supports twenty-five different coordinate systems, map projections, grids, coding schemas, and more than 200 different datums.*

Geographic translation software can also be used to efficiently convert large numbers of coordinates contained in text files. The file format is very simple. A multiline file header defines the coordinate system or map projection and datum of the coordinates that are contained in the file. Following the header, each line contains a single set of coordinates, separated by commas. Using the GEOTRANS file processing interface, the user selects an existing file of coordinates to be converted, defines the coordinate system or map projection and the datum to convert the coordinates, and specifies the name and location of the output file that is to be created. Geographic translation software then converts the input file and creates the output file as a single operation.

APPENDIX B
GEOSPATIAL INFORMATION AND INTELLIGENCE TASKS

No.	Tasks	GI&S					GEOINT			
		IPI	MARFOR	MEF G-2	MSC G-2	MEU S-2	Topo plt Intel BN	GIST	GIT	GAB/ MCIA
1	Coordinate and assist in the recruitment and organization of Marine Corps GI&S assets to conduct two (nearly) simultaneous major regional conflicts	X								
2	Determine GI&S support requirements for development; test and evaluation; and training of emerging forces, weapons, and systems in accordance with DODI 5000.56, *Programming Geospatial-Intelligence (GEOINT), Geospatial Information and Services (GI&S), and Geodesy Requirements for Developing Systems*	X								
3	Provide professional and technical advice and assistance to the DIRINT, DC CD&I, MARCORSYSCOM, Marine Corps University, Marine Corps Warfighting Laboratory, and MCIA on matters pertaining to GI&S and the production and usage of GEOINT	X								
4	Coordinate doctrine for employment of Marine Corps GI&S assets	X	X							
5	Assist Marine Corps forces with identification of procedures and responsibilities for intratheater distribution operations required to support deploying and deployed forces	X	X	X						
6	Develop and implement a Marine Corps GI&S strategic plan to build, manage, and disseminate a dynamic master geospatial database	X	X							
7	Continually evaluate command GI&I requirements	X	X	X	X	X	X			
8	Develop a plan for receiving support from NGA, the theater database manager, other Services, host nation, allied forces, and assigned and supporting topographic assets	X	X	X	X	X				
9	Coordinate GI&S support plans with the intelligence collection, production, and dissemination plans to facilitate GI&S access to national, theater, and organic imagery systems as well as other external intelligence assets	X	X	X	X	X	X			
10	Assign responsibility for management of the MCGIL. State how often the database is updated, how the media will be used, and how the dissemination will occur	X	X	X		X				
11	Coordinate information flow to theater, Marine Corps forces, MEUs, and the NGA national library	X	X	X		X	X			
12	Coordinate MAGTF's user evaluations of digital and hard copy maps, charts, and related products. Provide response to the geospatial analysis branch (MCIA) for consolidation	X	X	X			X			

No.	Tasks	GI&S					GEOINT			
		IPI	MARFOR	MEF G-2	MSC G-2	MEU S-2	Topo plt Intel BN	GIST	GIT	GAB/ MCIA
13	Coordinate with higher, adjacent, and subordinate commands for GI&S production requirements to reduce duplication of effort and to coordinate the establishment of the geospatial framework for the COP and CTP	X	X	X		X	X			
14	Coordinate with GAB (MCIA) to identify requirements of GEOINT products in support of the IPB process and file structure architecture	X	X	X		X	X			
15	Ensure availability of GI&S products to support the command element and subordinate elements during an operation	X	X	X	X	X	X			
16	Receive, validate, and task requirements for cartographic, geodetic, and terrain analysis products from the intelligence operation officer or collection manager	X	X	X	X	X	X			
17	Coordinate the development and dissemination of GI&I and GEOINT products with intelligence battalion and topo plt			X		X	X			
18	Coordinate with NGA, other Services, GAB (MCIA), and subordinate topo plts and P&A cell for GI&S to establish production requirements, to reduce duplication of effort, and to coordinate the establishment of the geospatial framework for the COP and CTP	X	X	X			X			
19	Coordinate with higher, adjacent, and subordinate commands for GI&S production requirements to reduce duplication of effort and to coordinate the establishment of the geospatial framework for the COP and CTP		X	X	X	X	X			
20	Determine Marine Corps-specific training, Marine Corps new systems research and development, and Marine Corps intelligence GI&S requirements in accordance with CJCS and NGA directives and instructions. Assist Marine operating forces with identification of operational requirements for GI&S support	X	X	X	X	X				
21	Coordinate with HQMC, I&L, to define procurement and storage and to disseminate hard copy GI&S products, in accordance with NGA and DLA instructions	X	X	X		X				
22	Propose selected GI&S programming issues for evaluation in the Marine Corps and DOD program assessments	X	X							
23	Coordinate with MARCORSYSCOM for the development and fielding of GI&S systems and software	X	X	X						
24	Assist data collection programs by clearly prioritizing support needs and deconflicting source requirements with the responsible agency or Service when NGA identifies GI&S shortfalls in data sources resulting from competition for source (e.g., imagery, ship surveys)	X	X	X						
25	Task the P&A cell and topo plt with development of Tab A (Tactical Study of Weather and Terrain), Tab B (Beach Studies), and Tab E (HLZs), of Appendix 11 (Intelligence Estimate)			X			X			
26	Maintain a PFDB to identify and track Marine Corps forces, systems, and weapons that require GI&I/GEOINT	X	X	X			X			

No.	Tasks	GI&S					GEOINT			
		IPI	MARFOR	MEF G-2	MSC G-2	MEU S-2	Topo plt Intel BN	GIST	GIT	GAB/ MCIA
27	Coordinate with HQMC to define and establish communications network requirements for electronic dissemination of GI&I and GEOINT throughout the MAGTF	X	X	X			X			
28	Coordinate with DC CD&I for the development and integration of Marine Corps GI&S architectures in support of national, DOD, theater, multi-Service, naval, and MAGTF interoperability	X	X	X						
29	Define common GI&S standards for the direct transmission and maintenance of GI&I and GEOINT to ensure interoperability between MAGTFs, DOD, federal agencies, and other joint or coalition forces	X	X	X			X			
30	Coordinate and forward the Marine Corps recommendations on GI&S product specifications and standardization agreements to NGA	X								
31	Coordinate and submit consolidated Marine Corps evaluations of prototype digital and hard copy maps, charts, and related products to NGA	X								
32	Review and comment on GI&S product specifications and standardization agreements		X	X			X			
33	Identify and validate WRS requirements for the command element and subordinate commands		X	X						
34	Identify, validate, and maintain the WRS planning allowance for the command element		X	X						
35	Coordinate with G-2, G-3, G-4, G-5, and G-6 to identify requirements of GEOINT products in support of the IPB process		X	X						
36	Coordinate and task all production to appropriate JIC and JAC or MCIA in accordance with Marine Corps procedures identified in chapter 5 of this publication		X							
37	Coordinate with the G-6/S-6 to establish communication and information systems network requirements for electronic dissemination of GI&I and GEOINT throughout all levels of the MAGTF			X			X			
38	Assist G-4/S-4 in the identification of procedures and responsibilities for intratheater distribution operations required to support deploying and deployed forces		X							
39	Coordinate with the G-4/S-4 for procurement, storage, and dissemination of hard copy GI&S products, in accordance with NGA and DLA instructions			X			X			
40	Submit and coordinate with the GEOINT section (MEF G-2) for review and completion of appendices 11 and 15 of annex B, and annex M for each OPLAN and contingency plan		X				X			
41	Draft Appendix 11 to Annex B (Intelligence) and Annex M (Geospatial Information and Services) to an OPORD		X							

No.	Tasks	GI&S					GEOINT			
		IPI	MARFOR	MEF G-2	MSC G-2	MEU S-2	Topo plt Intel BN	GIST	GIT	GAB/ MCIA
42	Coordinate Marine Corps forces GI&S activities with the appropriate combatant commands. This coordination includes, but is not limited to, determining and developing GI&S area requirements; implementing GI&S plans, policies, procedures, and programs; and maintaining liaison with NGA		X							
43	Coordinate MEF GI&S activities with the appropriate combatant commands. This coordination includes, but is not limited to, determining and developing GI&S area requirements; implementing GI&S plans, policies, procedures, and programs; and maintaining liaison with NGA		X	X						
44	Determine operational GI&S requirements in accordance with Chairman of the Joint Chiefs of Staff and NGA directives and instructions for all OPLANs and contingency plans. Forward requirements to Marine Corps forces for submission to appropriate combatant commands		X	X						
45	Provide recommendations to NGA and Marine Corps forces concerning GI&S planning required to ensure that MAGTFs can support operations	X	X	X						
46	Provide recommendations to the I&M section concerning GI&S planning and training required to ensure that MAGTFs can support operations	X	X							
47	Develop and implement a command GI&S OPLAN to build, manage, and disseminate a dynamic geospatial database. The plan should include receiving support from the MEF topo plt, NGA, JIC/JAC, theater database manager, MCIA, host nation, allied forces, as well as assigned and supporting topographic assets. Assign responsibility for management of the MSC GI&S database. State how often the database will be updated, how the media will be used, and how the dissemination will occur. Address information flow back to theater, NGA, and MCIA	X	X	X			X			
48	Provide management oversight for the production of GI&I, covering the Marine Corps global database based on the Marine Corps midrange threat estimate (current year) and priorities input by the Marine Corps forces and MEF intelligence divisions	X	X	X		X				X
49	Collect, integrate, analyze, synthesize, and disseminate terrain information as GI&I to support MAGTF commanders						X	X	X	X
50	Validate requirements for GI&I and GEOINT production, as well as geodetic and topographic surveys. Coordinate and task all production to appropriate topo plt, P&A cell, JIC/JAC, or MCIA in accordance with Marine Corps procedures identified in chapter 5 of this publication		X	X		X	X			
51	Manage the MAGTF TGIL database under the authority of the MEF commander and in accordance with direction and guidance from the MEF GEOINT section			X			X			
52	Manage MCGIL under the authority of the DIRINT and in accordance with direction and guidance from geospatial analysis branch (MCIA)	X								X
53	Conduct topographic surveys in conjunction with geodetic surveys to accurately collect and produce GI&I						X			

No.	Tasks	GI&S					GEOINT			
		IPI	MARFOR	MEF G-2	MSC G-2	MEU S-2	Topo plt Intel BN	GIST	GIT	GAB/ MCIA
54	Conduct high-order, ground-control surveys in support of geospatial collection, weapons delivery systems, LOS communications, and inertial navigation systems						X			
55	Conduct intensification, scale changes, enlargements, or reductions of an existing digital (or hard copy) product						X	X	X	X
56	Produce terrain analysis products, such as beach studies, port and harbor studies, CCM studies, and transportation studies, to provide GEOINT to the commander						X	X	X	X
57	Produce a quick map substitute to fill a need where no acceptable product exists, using NGA databases (CIB and DTED) to generate an interim product. This may require external reproduction support						X	X	X	X
58	Develop special beach penetration charts that include hydrographic approach and topographic data						X	X	X	X
59	Analyze port and harbor data to support the maritime prepositioned force pierside and instream unloading operations						X	X	X	X
60	Intensify and analyze riverine data to create products using identification of bridging, ferrying, and fording sites and using the river as an LOC						X	X	X	X
61	Intensify and analyze coastal hydrographic data to support the MAGTF's OPLAN and objectives for ship-to-objective maneuver. Integration of terrain, coastal, and environmental data provides a seamless, deconflicted database to support amphibious operations within the littorals						X	X	X	X
62	Provide rapid updated products and information for dissemination to deploying forces						X	X	X	X
63	Produce, analyze, and integrate port and harbor, coastal, beach, and riverine survey data in support of imminent and future amphibious landings and subsequent operations ashore						X			X
64	Integrate information from topo plt high-order, ground-control surveys in support of geospatial collection, weapon delivery systems, LOS communications, and inertial navigation systems						X	X	X	X
65	Manipulate, analyze, supplement, and compliment NGA GI to create special products for the Marine Corps with tailored, mission-specific views of the area of operations						X	X	X	X
66	Analyze multispectral and hyperspectral data to collect GEOINT features and attributes for intensification and updating NGA standard products to support a specific mission as an interim or to substitute products when standard geospatial data is unavailable						X	X	X	X
67	Provide analysis of the littoral zones to reduce the uncertainties regarding the effects of natural and constructed features on military operations						X			X
68	Collect, integrate, analyze, synthesize, and disseminate terrain information as GI&I to support the MAGTF's requirements within the littorals						X	X	X	X

No.	Tasks	GI&S					GEOINT			
		IPI	MARFOR	MEF G-2	MSC G-2	MEU S-2	Topo plt Intel BN	GIST	GIT	GAB/ MCIA
69	Manipulate and analyze NGA geospatial databases to tailor special products for the MAGTF commander						X	X	X	X
70	Provide initial reference points on airfields for Marine aircraft to initialize ACE on board inertial navigation systems						X			
71	Provide initial baseline survey control within the theater of operations with azimuth for MAGTF GCE or ACE weapon delivery systems						X			
72	Provide initial survey control points with azimuth for Marine air support squadrons to position ACE radar						X			
73	Provide LOS survey support for command element, GCE, ACE, and LCE ground communication equipment						X			
74	Coordinate and assist in the training of Marine Corps GI&S support forces to conduct two nearly simultaneous major regional conflicts	X	X	X						
75	Receive and validate standard GI&S products requirements for exercises and consolidate a single requisition to NGA not later than 3 months prior to required delivery date		X	X		X	X			
76	Receive and validate nonstandard GI&S production requirements for exercises. Those products not listed in NGA catalog, such as special exercise products, must be submitted to the I&M section 6 months prior to the required delivery date	X	X	X		X	X			
77	Provide airfield surveys to support GPS approach requirements for ACE aircraft						X			
78	Assess NGA responsiveness to Marine Corps needs	X	X	X	X	X	X	X	X	X
79	Continually evaluate and improve the Marine Corps GI&S and GI&I requirements and supporting plans and operations	X	X	X	X	X	X	X	X	X
80	Notify the MEF G-2 GEOINT section and intel BN of all GI&I requirements (i.e., electronic, digital, hard copy) necessary to support combat analysis simulations and exercises	X	X	X	X	X	X	X	X	X
81	Notify the MEF G-2 GEOINT section and intel BN of all GI&I requirements (i.e., electronic, digital, hard copy) necessary to support combat analysis planning and operations	X	X	X	X	X	X	X	X	X
82	Coordinate with the MEF G-2 GEOINT section and intel BN to establish prioritization for collection, production, and dissemination of GI&I and GEOINT products, databases, and services for exercises	X	X	X	X	X	X	X	X	X
83	Coordinate with the MEF G-2 GEOINT section and intel BN when involved with the procurement, development, or use of GI&S systems or databases	X	X	X	X	X	X	X	X	X
84	Provide professional and technical advice and assistance to the command element/supported headquarters and subordinate commands on matters pertaining to GI&S and GI&I	X	X	X			X	X	X	X

No.	Tasks	GI&S					GEOINT			
		IPI	MARFOR	MEF G-2	MSC G-2	MEU S-2	Topo plt Intel BN	GIST	GIT	GAB/ MCIA
85	Coordinate with the MEF G-2 GEOINT section when involved with the procurement, development, or use of GI&S systems or databases to support simulations and other analysis	X	X	X	X	X	X			X
86	Request standard NGA GI&S products and digital GI&S data for local unit training via local units' supply office	X	X	X	X	X	X	X	X	X

Legend

CJCS	Chairman of the Joint Chiefs of Staff
DLA	Defense Logistics Agency
DODI	Department of Defense Instruction
GAB	geospatial analysis branch
I&M	imagery and mapping
intel BN	intelligence battalion
IPI	Imagery and Geospatial Intelligence Branch
MARCORSYSCOM	Marine Corps Systems Command
MARFOR	Marine Corps forces
topo plt	topographical platoon

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APPENDIX C
TOPOGRAPHIC PRODUCTION CAPABILITY

Topographic production capability provides the MAGTF with integrated, intensified, deconflicted, and seamless GI&I. Geospatial information and intelligence is needed to provide the framework for the COP and CTP required by a wide variety of missions, systems, and weapons.

Topographic production capability is a network of GIS that enables the MAGTF to receive, process, exploit, analyze, produce, disseminate, store, and retrieve GI&I. Topographic production capability uses state-of-the-art hardware, software, and input and output devices to provide automated access to the geospatial database and other geospatial products. It is employed in command posts, CICs, and the IOC. Topographic production capability can be connected to the MAGTF TDN, the USIGS, and the GCCS.

Topographic production capability significantly reduces the physical size and logistical footprint of the existing topographic platoon equipment suite. The hardware components are modular and Marine-portable. This capability enables the topographic platoon to scale up or down, depending on the type of mission, size of the force, and/or specified geospatial requirements.

The equipment suite includes robust communications software. It is compatible with all military communications requirements and provides access to multispectrum data communications. The processing and display modules use hardware from the Marine Corps common hardware suite and software that is compliant with the defense information infrastructure-common operating environment.

Marine Corps emerging operational concepts require an integrated, deconflicted, and seamless view of the battlespace and topographic assets that can be operated from a variety of ships and austere bases ashore. Under these concepts, some C2 nodes and elements may remain sea based, while others go ashore to support MAGTF elements. Topographic production capability enables the G-2/S-2 to task-organize to perform a variety of missions while remaining fully integrated with naval systems, forces afloat, and joint and allied forces throughout the joint operating area.

Topographic production capability can be employed by accessing existing communications media, such as radio, wire, fiber optic cable, LANs, WANs, and circuit and voice switching systems that form a MAGTF-wide TDN and information grid.

The modularized nature of TPC equipment supports the following employment options:

- *Topographic set*. The entire topographic set (also known as topo set) can be deployed by the intelligence battalion to support the MEF command element. It is connected to the CCDR JIOC/JAC, MCIA, or other GI&I and intelligence elements using the GCCS and MAGTF TDN.
- *DTAMS*. Generally, a DTAMS is organic to a GEOINT support team. The team may be attached to or placed in direct support of the GCE, aviation combat element (ACE), and LCE intelligence sections. Connectivity is similar to topographic set.
- *DGIL*. Generally a DGIL is organic to the GIST. The team is attached to a MEB command element or a SPMAGTF. Connectivity is similar to topographic set and DTAMS.

Topographic production capability increases the MAGTF's abilities to accomplish critical tasks as follows:

- Receive, exploit, analyze, and disseminate a common, near-real time, integrated environmental view of the battlespace with the

timeliness and accuracy necessary to facilitate command and control, intelligence, maneuver, fires, and logistics.

- Access theater and national GI sources to support both a COP and CTP that are tailored to MAGTF missions.
- Increase interoperability by using an open architecture and defense information infrastructure-common operating environment compliant systems.
- Increase operational flexibility by using common hardware and software that supports the task organization and distributed production of all GI for the MAGTF.
- Participate in a joint, fused GI&I production network with multilevel security and accurate data.
- Enhance mobility of the TPC nodes and improve support for the operational maneuver from the sea concept by reducing the physical size and increasing the modularity of the TPC equipment.

Topographic production capacity can be broken down into two functional roles to provide the MAGTF with battlespace visualization and the framework needed to plan future tactical operations. First, GI&I direction is accomplished through the deliberate planning process. Topographic production capability helps identify geospatial requirements, access and review existing data holdings, identify information shortfalls, and define the AOR and interest. Second, geospatial information collection begins with the requisition of EETI and hydrographic information. The TPC database networks can be queried for potential solutions, source materials, and request for information for tactical collection. The TPC can access multisource intelligence reports (e.g., IMINT, SIGINT, and HUMINT) and tactical reconnaissance reports (e.g., route reconnaissance, bridge studies, and engineering reports). In addition, the TPC can store and manipulate tactical geodetic, topographic, and oceanographic surveys as well as terrain reconnaissance and photo reconnaissance imagery that includes video.

APPENDIX D
GEOSPATIAL INFORMATION AND INTELLIGENCE ESTIMATE APPENDIX 15 TO ANNEX B TO OPERATION PLAN/OPERATION ORDER

The GI&I estimate is a major part of the intelligence estimate and a key foundation for the MAGTF's selection of a COA and follow-on planning. The MEF G-2 future plans section, GEOINT staff, and intelligence battalion complete an appraisal of the available GI&I for a specific situation or mission and include that analysis in the OPLAN or OPORD. This GEOINT is used to determine the supportability of COAs. Course of action wargaming and selection depends on the MAGTF's GI&I requirements for planning and execution.

The GI&I estimate also provides a detailed format to support development of the collection, production, and dissemination plans for GI and MAGTF GEOINT operations. This appendix addresses the key points that are emphasized for GI&I estimate development.

Analysis of Course of Action

The intelligence officer uses the GI&I estimate to evaluate various COAs and to identify critical shortfalls within the scope of the operation. The estimate addresses EETIs and IRs that could negatively affect planned operations. It also identifies GI&I personnel; equipment shortfalls; and unique geospatial collection, production, and dissemination requirements to meet mission objectives.

Intelligence Preparation of the Battlespace Process

The GI&I estimate supports initial intelligence estimates and collections, production, and dissemination planning for the IPB process during initial planning. Identification of the area of operations and AOI is critical for prioritizing, intensifying, and value adding to meet mission-specific requirements. The IPB process analysis and production timelines require that the estimate identify potential objectives, IR, and specific EETIs. This ensures that tailored products are available to support all MAGTF planning and decision-making requirements.

Distributive and Collaborative Production Network

The GI&I estimate provides critical intelligence to support the development of the GI infrastructure supporting the MAGTF. This estimate enables the MAGTF plans staff and intelligence battalion to identify key MAGTF CIS requirements and to coordinate collaborative support from other geospatial assets, such as MCIA GID, and the National Production Network.

Risk Mitigation and Assessment

Within the joint GI&I community, risk mitigation encompasses activities accomplished early in deliberate planning. Only when an OPLAN is activated will the NGA conduct a risk assessment to apprise the supported CCDR of the pertinent GI&I production plans and activities status.

A GI&I estimate provides a process for the MAGTF G-2 staff and intelligence battalion to perform a risk assessment for each COA based on available GEOINT. Mission success or failure depends on the types of data available for specific missions and systems used in the MAGTF. Availability of GI&I products is evaluated based on the following priorities and readiness levels.

Priorities

This process is used to determine the appropriate level of readiness required for the plan based on the likelihood of execution, calculation of preparation times, MAGTF IRs, indications, and warnings. Levels of readiness are determined using the following priorities:

- Priority 1: Geospatial data and product unavailability will prevent performance of the mission.
- Priority 2: Geospatial data and product unavailability will significantly impact performance of the mission.
- Priority 3: Geospatial data and product unavailability will have minor impact on performance of the mission.

Readiness Levels

The GI&I estimate is a planning tool that the MEF G-2 and intelligence battalion use to determine how much effort is required for a particular OPLAN to meet MAGTF requirements. This information is articulated to the JTF, CCDR GI&I officer, and/or other intelligence personnel, using the following GI&I readiness levels:

- C-1: All required products and information must exist as standard or substitute products and information. All products can be made adequate and delivered within the time required for the plan.
- C-2: All priority 1 and 2 products and information must exist as standard, substitute, or interim products and information that can be generated and delivered within the command's required time line. 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 timeline based on each plan. Existing priority 3 products and information cannot be made adequate within the required time for each plan.
- C-3: All priority 1 products and information must exist as either standard or substitute products and information, as acceptable interim products and information, or as products and information that 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.
- C-4: Major deficiencies may exist in priority 1, 2 and/or 3 products.

The following sample GEOINT estimate format is provided to support MAGTF intelligence estimate and follow-on planning and decisionmaking.

CLASSIFICATION

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PLACE OF ISSUE
Date-time group
Message reference number

APPENDIX 15 TO ANNEX B TO OPERATION ORDER (Number) (U)
GEOGRAPHIC INTELLIGENCE (U)

(U) REFERENCES:

(a) Unit SOPs for intelligence and counterintelligence.
(b) List those NGA maps, charts, related products, and other forms of GI&S data references that are required for an understanding of this appendix.
(c) List other documents that provide guidance required for the planning functions relevant to GI&S and supporting operations.

1. (U) Situation

a. (U) Definition of the Area of Operations and AOI. Describe the limits of the area of operations and AOI in terms of natural or cultural features and/or latitude and longitude coordinates. If the area of operations limits are difficult to describe, a map with the appropriate boundaries should be appended.

b. (U) Assigned MAGTF Organic and Supporting GI&S Assets. Identify those organic and supporting forces that perform the following GI&S functions. A unit may perform more than one function.

(1) (U) Map and chart distribution.

(2) (U) Digital dissemination of data.

(3) (U) Battlespace analysis.

(4) (U) Paper map or chart production.

(5) (U) Digital data production.

(6) (U) Geodetic surveying.

(7) (U) Command and control of GI&I assets.

(8) (U) Geospatial database management.

(9) (U) Value adding to GI&S data sets.

(10) (U)Construction of modeling and simulation databases.

CLASSIFICATION

c. (U) Facts and Assumptions. State facts and assumptions generated during the problem framing process. These may include items pertaining to release and disclosure of GI&I products to multinational forces, transportation availability, and available digital communications.

d. (U) GI&I Considerations

(1) (U) Datum determination.

(2) (U) Standard GI&I product and data availability.

(3) (U) Data currency.

(4) (U) Availability of national source imagery and commercial imagery.

(5) (U) GI&I support to and from multinational forces.

(6) (U) Existing GI&I agreements between foreign countries.

(7) (U) WRS and basic load considerations.

(8) (U) Sustainment of geospatial data.

(9) (U) Sustainment of GI&I assets and personnel.

(10) (U)Creation and staffing of forward map depots.

(11) (U)Other considerations that impact this OPLAN or OPORD.

2. (U) Mission and Concept of Intelligence Operations

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

b. (U) Concept of Intelligence Operations

3. (U) Analysis of Course of Action. List factors that the intelligence officer and his/her three key subordinate officers—the G-2 plans officer, G-2 operations officer, and the ISC—can use to weight COAs for a given OPLAN or OPORD. Develop a separate analysis for each COA being considered.

a. (U) GI&I Forces and Functions. Discuss employment of forces to cover the GI&I functions.

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b. (U) Datums and Interoperability. Compare forces and systems to the actual geographic footprint of the area of operations and its associated data.

c. (U) Allied and Coalition Operations

(1) (U) Discuss allied/coalition operations.

(2) (U) State the release authority.

(3) (U) Discuss reduced system capability.

(4) (U) List datum differences.

(5) (U) Identify GPS capability.

d. (U) Geospatial Information Coverage. List the available geospatial data for the area of operations.

e. (U) NGA Surge and Crisis Production Supportability. Discuss NGA's surge print ability and production operations to support MAGTF requirements within the COA.

f. (U) MCIA Surge and Crisis P&A Supportability. Discuss MCIA's surge analysis ability and production operations to support MAGTF requirements within the COA.

g. (U) GI&I Distribution and Digital Dissemination. Discuss the alternatives for distributing paper products, digital media, and electronic dissemination for each COA.

h. (U) Command and Control of GI&I Assets. Discuss the following aspects of the plan from the C2 perspective.

(1) (U) Integration and synchronization of the theater P&A plan across all forces in support of MAGTF requirements.

(2) (U) Distributive and collaborative production support.

(3) (U) Tasking and prioritization authority.

i. (U) Unit Basic Loads and WRS. Discuss operational forces' requirements for paper and digital geospatial data and available stocks.

4. (U) Comparison Courses of Action. Using the stated factors and other information, either the G-2 plans officer or the ISC compares the COAs to advise the G-2/S-2 and commander if GI&I capability will support execution of the OPLAN or OPORD.

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5. (U) Conclusion. Once the analysis is complete, the G-2 plans officer or the ISC either recommends to the G-2/S-2 a single COA or states that none of the COAs are impacted by the current GI&I situation.

6. (U) Planning Requirements. Provide a clear, concise statement of the GI&I planning requirements to support the plan.

7. (U) Execution Requirements. Provide a clear, concise statement of the GI&I operations execution requirements to support the plan.

ACKNOWLEDGE RECEIPT

Name
Rank and Service
Title

TABS: (As appropriate)

OFFICIAL:
/s/
Name
Rank and Service
Title

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APPENDIX E
GEOSPATIAL INFORMATION AND INTELLIGENCE PLANNING ACTIVITIES

The table in this appendix identifies key actions of the MAGTF command element and GI&S actions taken by the G-2 GEOINT staff, the GI&S section, and the intelligence battalion during each phase of the MCPP. Actions listed in the following table are associated with the column headings; there is no one-to-one linkage between items in the first column with the ones across from them in the second column. All actions are interrelated as influenced by METT-T.

Problem Framing	
MAGTF Command Element Actions	GI&S Actions
Identify the HHQ and supported headquarters intent Identify tasks Determine the area of operations and AOI Review available assets and identify personnel and equipment resource shortfalls Determine constraints and restraints Determine the commander's recommended critical information requirements, such as PIRs, friendly force information requirements, and EEFIs Identify requests for information Determine assumptions Draft the mission statement Present a problem framing brief Draft the warning order Begin staff estimates Refine the commander's intent Develop the commander's planning guidance	Review HHQ and MAGTF standing intelligence plans (e.g., annex B to the OPLAN), GI&S plan (e.g., annex M to the OPLAN), and pertinent memoranda of understanding Help determine the MAGTF area of operations and AOI Assess NGA, CCDR, and other external organizations' geospatial coverage of the area of operations and AOI Provide maps, charts, digital data, and other GI&I products to ensure subordinate commanders' initial planning support needs are met Determine specified, implied, and essential GI&S tasks Develop proposed GI&S mission statement, coordinate with intelligence battalion, and obtain G-2/S-2 approval Identify organic and supporting GEOINT elements and subordinate units' GI&S representatives; acquire an operational status report from each representative; determine personnel and equipment deficiencies, paying special attention to data management, value adding, production, and distribution Determine if datum issues exist and provide recommendations Identify JTF and multinational GI&S interoperability issues and provide recommendations Establish, review, and/or update the MAGTF TGIL to— Assess foundation data availability and deficiencies Determine mission-specific data requirements Determine initial GI&S information requirements and coordinate with intelligence battalion's CM/DO officer Identify other GEOINT product substitutes Identify external organizations' GEOINT production plans and assess against MAGTF's initial requirements, determine deficiencies, and initiate augmentation requests Coordinate with support coordinator and the P&A cell OIC Assign and task-organize organic GEOINT elements (e.g., GI&I support teams to major subordinate elements and GI&I team to the MAGTF future plans team) and stipulate C2 relationships Validate and update JTF GI&S TTP and MAGTF GI&S SOPs; coordinate with HHQ and subordinate units

Problem Framing (Cont'd)	
MAGTF Command Element Actions (Cont'd)	GI&S Actions (Cont'd)
	Validate and prioritize GI&S and GEOINT requirements, focusing on requirements for developing COA and wargaming Begin development of GEOINT estimate, issue orders to GI&I production elements, and coordinate with P&A cell OIC Coordinate preparation of initial MCOO and coordinate with P&A cell OIC Determine initial GEOINT CIS requirements and dissemination plan, identify deficiencies, coordinate with CM/DO and G-6/S-6 Validate GI&S database management procedures and coordinate with JTF Ensure subordinate units' GI&S representatives are kept advised of pertinent actions and developments
Course of Action Development	
MAGTF Staff Actions	GI&S Actions
Continue IPB throughout all steps of the planning process Array friendly forces Assess relative combat power Analyze centers of gravity and critical vulnerabilities Brainstorm possibilities Develop rough COAs Review the commander's input Refine COA(s) Validate COA(s) Develop graphic and narrative COA(s) Prepare and present COA(s) briefing Select and/or modify COA(s) (commander's action) Conduct COA analysis wargaming Refine staff estimates and estimates of supportability Develop concepts based on warfighting functions Prepare COA analysis brief	Develop and continue to update the intelligence estimate (appendix 11 to annex B) and emphasize the following GEOINT and all-source intelligence products: Tactical study of the terrain Hydrographic, beach, HLZ, DZ, port and harbor, airfield, and LOC studies MCOO Assist the MAGTF command element intelligence section, other staff sections, and the ISC/IOC with COA development Develop a GI&S CONOPS for each COA; continue to prepare and update the following documents: Appendix 15 (Geographic Intelligence) to Annex B (Intelligence) Annex M (Geospatial Information and Services) Help the intelligence section develop other portions of annex B Determine the need and plan for the establishment of map depots within the joint operations area, determine the use of WRS, and coordinate with JTF and other Service and functional components Actions for each COA include the following: Determine GI&S capabilities that are required Identify limitations Coordinate production of the necessary GEOINT products Continue development of GI&S estimate of supportability Ensure that subordinate units' GI&S representatives are kept advised of pertinent actions and developments Complete GI&S estimates of supportability Help the G-2/S-2 and ISC complete the intelligence estimate and the friendly intelligence estimate of supportability Continue to monitor and update GI&I collections, production, and dissemination operations

Course of Action Development (Cont'd)	
MAGTF Staff Actions (Cont'd)	GI&S Actions (Cont'd)
	Ensure that the subordinate units receive the necessary GEOINT products, verify understanding, and identify and update subordinates concerning current and new GI&I IRs Validate, update, and prioritize GI&S and GI&I IRs Ensure that the subordinate units' GI&S representatives are kept advised of pertinent actions and developments
Course of Action Comparison and Decision	
MAGTF Staff Actions	GI&S Actions
Evaluate each COA Compare COAs Decide on COA (commander's action) Issue the warning order Refine the commander's intent Convert CONOPS into an OPORD or a fragmentary order Update and convert staff estimates and other planning documents into OPORD annexes and appendices Approve the OPORD (commander's action)	Help the IOC and the MAGTF command element intelligence section evaluate and compare each COA Continue development of annex M and appendix 15 to annex B consistent with the selected COA Validate, update, and prioritize GI&S IRs and GI&I collection, production, and dissemination requirements for the selected COA and issue the appropriate orders to GEOINT elements Coordinate GEOINT element task organization and command and control based on the selected COA Continue coordination with the G-6/S-6 regarding GI&S CIS requirements and coordinate with G-1/S-1 for delivery of GEOINT products to subordinate units Continue coordination with the G-4/S-4 regarding GI&S supply and transportation requirements Review actions for satisfying GI&S personnel and equipment deficiencies that are associated with the selected COA Ensure that subordinate units receive pertinent GEOINT products, verify understanding, and identify and update subordinates' current GI&I IRs Validate and prioritize MAGTF GI&S and GI&I IRs Ensure that subordinate units' GI&S representatives are kept advised of pertinent actions and developments Complete development of annex M and appendix 15 to annex B, provide copies to subordinate units, and ensure units understand the order Update, validate, and prioritize GI&S IRs and associated collection operations Monitor ongoing GI&I production operations and update and issue orders to GEOINT elements Ensure that the pertinent GEOINT products are disseminated to all subordinate units Complete actions that are associated with map depots, WRS, personnel and equipment augmentation, datum interoperability issues, and multinational dissemination Complete GI&S-related CIS, transportation, and supply actions Maintain coordination with external GI&S elements

Transition	
MAGTF Staff Actions	GI&S Actions
Give the transition brief Conduct drills Plan required refinements	Assist the MAGTF command element intelligence section and the IOC with the transition brief Modify GI&S plans Monitor ongoing GI&I collection and production operations and update and issue orders to GEOINT elements Ensure that subordinate units' GI&S representatives and GI&S officers in JTF and other components understand plans and standing requirements and ensure that they receive the necessary GEOINT products Participate in drills Remain engaged in MAGTF future plans activities

APPENDIX F
GEOSPATIAL INFORMATION AND SERVICES
ANNEX TO OPERATION PLANS AND ORDERS

The following sample format provides notional information and guidance for the development of annex M to either an OPLAN or an OPORD. The annex format will be used by all Marine Corps operating forces to ensure commonality and interoperability during deliberate action planning and CAP.

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Copy no. ___ of ___ copies
OFFICIAL DESIGNATION OF COMMAND
PLACE OF ISSUE
Date-time group
Message reference number

ANNEX M TO OPERATION ORDER (Number) (U)
GEOSPATIAL INFORMATION AND SERVICES (U)

(U) REFERENCES

(a) List unit SOPs for intelligence and counterintelligence.
(b) List JTF, naval task force, other components, theater and national intelligence and counterintelligence plans, orders, TTP, and multinational agreements pertinent to MAGTF intelligence operations.
(c) List those NGA maps, charts, related products, and other forms of GI&S data references required for an understanding of this annex.
(d) List other relevant documents that provide guidance required for the necessary planning functions relevant to GI&S and supporting operations.
(e) Appendix 15 (Geographic Intelligence) to Annex B (Intelligence).

1. (U) Situation

a. (U) Geospatial Information and Intelligence Requirements. List the types of hard copy and digital GI&I products that are required to support this OPORD.

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Number	Nomenclature	Abbreviation	Scale
(1) (U) Aerospace Products			
A	Global navigation chart	GNC	1:5,000,000
B	Jet navigation chart	JNC	1:2,000,000
C	Operational navigation chart	ONC	1:1,000,000
D	Tactical pilotage chart	TPC	1:500,000
E	Joint operations graphic-air	JOG-A	1:250,000
F	Flight information publications	FLIP	Documents
G	Escape and evasion charts	EVC	Various
(2) (U) Hydrographic Products			
A	General nautical charts	NC	Various small
B	Coastal nautical charts	CC	Various medium
C	Harbor and approach charts	HAC	Various large
D	Sailing directions	SD	Publications
E	Combat charts	Cmbt	1:50,000
F	Tide tables	TT	Publications
G	Miscellaneous	____	Publications
(3) (U) Topographic Products			
A	Topographic line map	TLM1	1:100,000
B	Topographic line map	TLM5	1:50,000
C	City graphic	CG	Various
D	Tactical terrain analysis database	TTADB	1:50,000
E	Road map	RD	Various
F	Landsat image map (interim)	LIM	Various
G	Water resource overlay	WRO	1:50,000
(4) (U) Target Material Products			
A	Joint operations graphic-radar	JOG-R	1:250,000
B	Gridded airfield photo	GAP	Various
C	Gridded installation photos	GIP	Various
(5) (U) Digital Data			
A	Vector interim terrain data	VITD	1:50,000 density
B	Digital point positioning database	DPPDB	Digital imagery (classified)
C	Vector map-level 2	VMap2	1:250,000 density
D	Vector map-level 3	VMap3	1:50,000 density
E	Digital topographic data	DTOP	1:50,000 density
F	Littoral warfare data	LWD	1:5,000 density
G	Digital nautical chart	DNC	Various densities

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b. (U) Enemy GI&I Capabilities. Refer to Annex B (Intelligence) of this OPORD for the basic enemy situation. List enemy GI&I capabilities and limitations, including distribution points, production capabilities, accuracy of products, data collection capabilities, and deception capabilities.

(1) (U) Enemy distribution capabilities and points.

(2) (U) Enemy GI&I production capability.

(3) (U) Accuracy of enemy GI&I products.

(4) (U) Enemy data collection capabilities.

(a) (U) Satellite collection.

(b) (U) Aerial photography collection.

(5) (U) Enemy deception capabilities.

c. (U) Friendly Support. Refer to Annex C (Operations) of this OPORD. List the GI&I forces or agencies that are not assigned or attached to the unit, but that will be required to provide GI&I support for the implementation of this order. Specify the type of command relationship desired for each agency or command and the type and duration of support required.

(1) (U) National Geospatial-Intelligence Agency.

(2) (U) Marine Corps Intelligence Activity.

(3) (U) Combatant Command's Joint Intelligence Center/Joint Analysis Center.

d. (U) Assumptions. List any assumptions on which this annex is based. State expected conditions pertinent to GI&I support over which the commander has no control. Describe planning and early deployment assumptions concerning the availability of basic loads and NGA's ability to meet crisis demand.

(1) (U) GI&I requirements represent available classified and unclassified aeronautical, hydrographic, topographic, and air target materials. These include, but are not limited to, digital data, standard maps and charts, and other data in both graphic and textual formats. Requirements must be specified as hard copy or digital. Digital requirements should identify formats required if different than NGA standard formats.

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(2) (U) The combatant command's GEOINT officer will coordinate all requirements for out-of-theater support, including generation of precise points for targeting support. Within the MAGTF, this task will be handled by the ISC, who is assisted by the MEF G-2 future plans officer and the geospatial information and intelligence officer.

(3) (U) The combatant command's GI&I officer will appoint the theater database manager and will publish requirements for reports generation, information requests, and tasking authority. The ISC will do the same for the MAGTF.

(4) (U) Component commanders and planning staffs will have required operational quantities of maps, charts, and digital data to conduct operational-level planning; MAGTF commanders and staffs will have required quantities of operational and tactical maps, charts, and digital products.

(5) (U) Rapidly generated maps, charts, and digital data at the tactical scales will be available within 72 hours for a 90 km by 90 km area and within 12 days for a 300 km by 300 km area.

(6) (U) Sufficient warning prior to execution will allow NGA to meet increased requirements through crisis support systems.

e. (U) Available GI&I Products. Provide a general statement regarding the availability and adequacy of the listed GI&I data, products, and related material required to support the OPORD. Refer to the GI&I WRS plan for detailed accounting regarding GI&I product availability and adequacy. Refer to Appendix 1 (GI&I Requirements List) of this annex. Complete coverage consisting of topographic, hydrographic, and aeronautical products exists to support this OPORD. In some areas, 1:100,000 scale imagery may be used to support operations.

Mission	Products Available	Product Types	Product Datum	Coverage Adequate	Currency Date
Command and control	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Intelligence	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Command and control of aircraft	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973

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Mission	Products Available	Product Types	Product Datum	Coverage Adequate	Currency Date
Antiair warfare	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Direct fire and maneuver	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Fire support	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Amphibious landing	No	Combat chart	TOKYO	No	May 1958
Close air support	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Supply and maintenance	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Engineering	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Electronic warfare	Yes	ONC JOG-A TLM CG	WGS84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Transportation	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Health services	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973
Urban operations	Yes	ONC JOG-A TLM CG	WGS-84	Yes	Jun 1989 Feb 1992 Jan 1994 Aug 1973

f. (U) Available Services. Describe any special geospatial services that will be provided for the operation (e.g., precise point production, data transformations, commercial imagery purchase and orthorectification, and surveying). Identify those GI&I units that are assigned or attached in theater. List information concerning other forces or agencies outside the theater that may affect the provision of GI&I products.

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Type Service	Unit Tasked	Type Support	Tasking Chain
(1) (U) Geospatial Services (in theater)			
Precise points	NGA technical representative	Direct	MEF G-2/GI&S
Datum transformation	NGA technical representative	Direct	MEF G-2/GI&S
Hard copy replication	Topographic platoon	Direct	MEF G-2/GI&S
Terrain studies	Topographic platoon	Direct	MEF G-2/GI&S
Surveying	320th Engineer Company (US)	Direct	MEF G-2/GI&S
(2) (U) Special Geospatial Services (outside theater)			
Datum transformation	NGA contingency support team	General	Marine Corps forces G-2
Commercial imagery	MCIA GID	General	Marine Corps forces G-2
Orthorectification	MCIA GID	General	Marine Corps forces G-2
Printing	NGA	General	Marine Corps forces G-2

g. (U) Capabilities

(1) (U) List those GI&I forces organic, assigned, or attached to the unit. Show the latest arrival date at point of departure for each GI&I unit contained in the TPFDD and list information concerning other forces or agencies that may affect the provisions of GI&I products required to support the OPORD.

Geospatial Information and Intelligence Forces	Point of Departure	Latest Arrival Date	Assigned or Attached Unit
MEF GI&I (MEF command element lead echelon)	Norton AFB, CA	30 Mar XX	MEF staff G-2
MEF GI&I (complete)	Norton AFB, CA	15 Apr XX	MEF staff G-2
Topographical platoon (MEF command element lead echelon)	Norton AFB, CA	30 Mar XX	MEF staff G-2
Topographical platoon (2d cluster)	Norton AFB, CA	9 Apr XX	MEF staff G-2
Topographical platoon (3d cluster)	Norton AFB, CA	15 Apr XX	MEF staff G-2
Topographical platoon (complete)	Norton AFB, CA	30 Apr XX	MEF staff G-2
GIST (GCE)	Norton AFB, CA	5 Apr XX	Division staff G-2
GIST (ACE)	Norton AFB, CA	10 Apr XX	Wing staff G-2
GIST (LCE)	Norton AFB, CA	20 Apr XX	MLG staff G-2
GIST (G-3)	Norton AFB, CA	5 Apr XX	MEF staff G-3 (future operations)
NGA technical representative	Norton AFB, CA	15 Apr XX	MEF staff G-2
MCIA detachment	McGuire AFB, NJ	30 Mar XX	Marine Corps forces staff G-2

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(2) (U) Commander, Marine Corps forces (COMMARFOR) will advise and support the JTF commander concerning requirements for GI&I products and support for all Marine Corps forces. Coordination between Service and functional components and other supporting organizations will be conducted through the Marine Corps forces G-2 section and/or the IOC at MEF G-2/S-2.

(3) (U) COMMARFOR/MEF G-2 or ISC will coordinate with NGA in conjunction with the JTF to provide the full range of GI&I products to support intelligence and operational requirements.

(4) (U) Coastal hydrographic survey ships and deep ocean bathymetric survey ships are expected to be transferred to the combatant command for use by operating forces under conditions of national emergency. At such time this OPORD is implemented, the survey ships will be used in assignments involving hydrographic data collection and chart production as appropriate to the operation or to the overall mission of the command.

2. (U) Mission. Provide a clear, concise statement of the GI&I mission in support of the OPORD. The COMMARFOR and/or MEF will direct, coordinate, validate, and provide GI&I products and services as required in support of this OPORD.

3. (U) Execution

a. (U) Concept of GI&I Operations

(1) (U) General. Provide a broad statement of how the command will provide the GI&I support necessary to meet the commander's overall mission requirement. Include the organic topographic and supporting units involved; the time-phasing of operations; the general nature and purpose of GI&I operations to be conducted; the interrelated or cross-Service support; and support provided by agreements, coordination, and cooperation necessary for the successful implementation of this OPORD. Describe the scope and extent of host nation support available to enhance MAGTF GI&I operations in support of the OPORD.

(a) (U) Forces deploying in support of this OPORD are required to arrive with a 30-day (or as directed) basic load of GI&I products.

(b) (U) Resupply or sustainment stocks and follow-on supplies of maps and charts will be provided via normal supply channels.

(c) (U) Substitute products and quick response products may be provided by NGA and other Service agencies to supplement available coverage.

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(d) (U) Subordinate units with GI&I assets retain primary responsibility for their own quick response products.

(e) (U) Marine expeditionary units are required to deploy with 100 percent of their topographic requirements.

(f) (U) Follow-on requirements will be coordinated with COMMARFOR and/or MEF ISC, with information copies to the JTF and combatant command intelligence section.

(g) (U) Supporting plans will specify the required maps, charts (including series, sheet number, and total quantities), and digital databases; geographic intelligence and terrain analysis requirements; cartographic and geodetic survey requirements; procedures for requesting standard and/or nonstandard topographic production support; and guidance for hard copy and electronic distribution. Requirements for special products and materials will also be included in supporting plans.

(h) (U) A full-time, GI&I POC will be established at each MSC that is responsible for requirements and capabilities. The POC name, SIPRNET and NIPRNET e-mail address(es), and telephone number(s) will be provided in writing to the MEF command element (G-2/S-2) and the IOC (attn: ISC). Provide updates when changes occur or within 30 days of receipt of this OPORD and its updates.

(2) (U) Deployment. Summarize the requirements for deploying organic GI&I forces and necessary depot activities from their normal peacetime locations to the area of operations. Pay particular attention to the time-phasing of these deployments in order to affect an orderly transition from current to planned organizational configurations.

(a) (U) Intelligence battalion's topographic platoon will integrate and develop the MAGTF TGIL for the MAGTF AOR and AOI.

(b) (U) Subordinate units will ensure communications connectivity for attached GIST and GITs to support GEOINT operations.

(c) (U) Subordinate units will maintain and deploy with a 15-day basic load of GI&I stocks.

(d) (U) Automatic distribution change requests and updates for validation will be forwarded to the MEF G-2 (attn: ISC).

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(e) (U) All subordinate units will update the list of deployment and GI&I basic load requirements and submit them to the MEF G-2 (attn: ISC).

(f) (U) Basic load airlift or sealift transportation from CONUS to the port of entry will be arranged per established TPFDL procedures and transportation priorities established by the MEF G-3.

(g) (U) Transportation and movement of WRS or sustainment stocks to subordinate units will be coordinated with the MEF G-4 supply.

(3) (U) Employment. Describe in general terms how MAGTF and supporting GI&I forces are to be employed in the conduct of GI&I operations.

(a) (U) The intelligence battalion topographic platoon will maintain the MAGTF GIL within the joint operating area, MAGTF area of operations, and AOI according to ISC direction.

(b) (U) Establishment and operation of a forward map depot to distribute hard copy and digital media products will be coordinated with MEF G-4 supply.

(4) (U) Interoperability. Provide specific technical guidance and procedures to ensure interoperability of GI&I operations and materials, particularly the proper sources, datum documentation, and use of coordinates derived from GI&I products. Provide guidance to ensure that MAGTF sources, methods, and procedures deliver the required accuracy.

b. (U) Tasks. In separate numbered subparagraphs, list the GI&I tasks assigned to each element of the MAGTF and to those supporting external units or agencies. For each of the tasks, provide a concise mission statement to be performed in further planning or execution of the OPORD. Provide sufficient details in these task assignments to ensure that essential elements to the concept of the operation are described properly.

(1) (U) Marine Corps forces G-2 GI&I Branch

(a) (U) Act as the POC for all Marine component GI&I issues.

(b) (U) Coordinate all validated GI&I collection, production, and dissemination requirements with the JTF, combatant command, and other external organizations.

(c) (U) Coordinate all production requirements tasked by HHQ affecting Marine Corps forces topographic assets.

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(2) (U) MEF GI&I Branch

(a) (U) Identify specific GI&S needs that are not included in appendix 1 of this annex.

(b) (U) Identify specific services required from MAGTF topographic units, NGA, MCIA, or other organizations that support the MAGTF mission.

(c) (U) Identify the distribution of the GI&I basic load to all MAGTF units.

(d) (U) Identify distribution, storage, and management of GI&I depot stocks.

(e) (U) Identify the priorities for GI&I collection, production, and dissemination.

(f) (U) Identify procedures for the transmission of geographic coordinates.

(g) (U) Identify responsibilities for GI&I database systems administration, management, and replication.

(h) (U) Identify command and control, administration, and maintenance of the GI&I depot.

(i) (U) Identify releasability of GI&I products and information to host nation, media, and multinational forces.

(j) (U) Maintain an updated, prioritized list of required GI&I products and databases. Provide this list to COMMARFOR/MEF (G-2/GI&S) within __ days of receipt of this OPORD and its updates.

(k) (U) Identify prioritized GI&I requirements for maps, charts, and digital databases currently not in production to COMMARFOR/MEF (G-2/GI&S) annually or within 60 days of receipt of this OPORD and its updates.

(3) (U) Intelligence Battalion. Plan and direct, collect, process, produce and disseminate intelligence and provide counterintelligence support to the MEF, MEF MSCs, subordinate MAGTFs, and other commands as directed.

(a) (U) Intelligence Battalion Commander/Intelligence Support Coordinator

1 Plan and, upon AC/S G-2 approval, implement a concept of intelligence operations based upon the mission, threat, commander's intent, guidance, and CONOPS. This concept of intelligence operations will include a supporting GEOINT CONOPS.

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2 Establish and supervise operation of the MEF IOC, which includes the support cell, the SARC, and the P&A cell. Task-organize and integrate GI&I elements within the IOC and other elements of the MEF command element's CIC as appropriate; collocate the IOC with the MEF command element's main command post.

3 Develop, consolidate, validate, and prioritize recommended PIRs and IRs to support MAGTF planning and operations for AC/S G-2 approval.

4 Plan, develop, integrate, and coordinate MEF intelligence collection, production, and dissemination plans, including the effective organic and external integration and employment of MAGTF GI&I and MEF IMINT, SIGINT, counterintelligence, human resources intelligence, ground remote sensors, ground reconnaissance, and tactical air reconnaissance operations.

5 Plan, develop, coordinate and maintain intelligence CIS architecture, to include its integration with and support of MEF GI&I requirements.

6 Coordinate and integrate MEF GI&I operations with the Marine Corps forces headquarters, other Service components, JTF, theater, national intelligence operations, and all aspects of reachback support.

7 Monitor the flow of GI&I throughout the MAGTF and ensure that it is delivered to intended recipients in a timely fashion and satisfactorily meets their needs.

8 Evaluate the effectiveness of MEF and supporting GI&I operations and support; initiate and/or recommend to the AC/S G-2 necessary corrective actions and improvements.

(b) (U) Support Cell OIC

1 Develop and coordinate GI&I and all-source intelligence collection plans, coordinating and integrating these with MEF, other components, JTF, theater, and national intelligence production operations.

2 Identify and prepare GI&I requests for intelligence that are beyond organic capabilities and prepare submissions to HHQ and external agencies for support.

3 Plan, coordinate, conduct, and supervise geodetic and topographic surveys as required.

4 Plan, coordinate, conduct, and supervise collection of coastal data regarding trafficability, routes of egress, inland water bodies, and similar information as required to support MAGTF operations.

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5 Develop, coordinate, and maintain GI&I dissemination priorities, intelligence reporting criteria, and dissemination means.

6 Develop and coordinate GI&I dissemination OPLANs and supporting architectures for voice and data network communications, coordinating and integrating these architectures with MEF, other components, JTF, theater, and national GI&I and intelligence CIS and dissemination operations.

7 Disseminate terrain information and intelligence and other GI&I products throughout the MAGTF to support requirements.

(c) (U) P&A Cell OIC

1 Develop, administer, and maintain the geospatial framework to support MEF planning, intelligence, command and control, maneuver, fires, logistics, and other operations and processes.

2 Maintain all-source automated GI&I and intelligence databases, files, workbooks, country studies, and other intelligence studies to support MAGTF requirements.

3 Analyze, synthesize, and produce terrain information and intelligence and other GI&I products to support MAGTF requirements.

4 Prepare GI&I and all-source intelligence products to support MAGTF requirements, to include MCOOs, terrain models (3-D models), LOS studies, range fan studies, terrain factor overlays, hydrographic charts, landing zone studies, and similar cartographic and digital products.

5 Prepare map substitutes, such as overlays, overprints, photomask, map revisions, and multicolor charts.

6 Revise and reproduce in limited quantities combat charts, coastal charts, port charts, and harbor charts. Products may include terrain models (3-D models), LOS studies, range fan studies, terrain factor overlays, hydrographic charts, landing zone studies, and similar products.

(4) (U) Major Subordinate Commands. Establish full-time, GI&I POC at each MSC to be responsible for requirements and capabilities. Provide the POC's name and phone number in writing to MEF G-2/GI&S and the ISC/IOC as changes occur or within __ days of receipt of this OPORD and its updates.

c. (U) Coordinating Instructions. Reference Appendix 15 (Geographic Intelligence) to Annex B (Intelligence) of the OPORD. List, in separate numbered subparagraphs, the instructions that are applicable to two or more elements of the MAGTF and supporting units/agencies that are necessary for proper coordination of the GI&I

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support. Specify the points of contact within the command that can authorize the release of WRS held or that can resolve command GI&I problems. Also, include a brief description of the time sequencing of notifications and how forces and agencies will be notified.

(1) (U) The US MGRS will be used for operations involving or in support of ground forces. Ensure that the map, chart, or digital database datum information is included when passing coordinates.

(2) (U) The MGRS prescribed for use by ground forces in the area will become the standard when aviation forces are providing close air support.

(3) (U) Geographic coordinates may be used in operations that do not directly involve ground forces.

(4) (U) The WGS-84 is the datum of preference for all US operations. The CCDR or JTF commander will designate another datum only when necessary to support multinational operations.

4. (U) Administration and Logistics

a. (U) Supply and Storage. Provide instructions regarding GI&I supply and storage procedures and responsibilities. Include the planned locations of command and noncommand storage sites and facilities. Refer to the command GI&I WRS plan to define detailed packaging and activation instructions at storage facilities. Specify the types and quantities of products or timeframe required (e.g., 15 days of maps and charts) to be held by the supporting command's units or agencies. Outline the intratheater distribution plan to be implemented by unit logistic organizations.

(1) (U) Maps and charts for bulk distribution to MEF units are stored at (identify location).

(2) (U) City graphic MEF will requisition planning stock and the 15-day basic load (unit-held WRS) directly from NGA.

(3) (U) The ISC will coordinate with the MEF G-4 to establish quantity requirements and storage location for bulk resupply.

b. (U) Transportation. Provide general instructions regarding GI&I material transportation requirements. Use a separate appendix to list detailed transportation requirements and procedures.

(1) (U) The ISC will coordinate with the MEF G-4 to establish transportation requirements for bulk and individual unit resupply.

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(2) (U) Detailed transportation information is included in appendix 2.

c. (U) Support. Provide instructions and procedures for obtaining logistics in support of the OPLAN. Identify priorities, times required, and other necessary information.

(1) (U) Requests for bulk-map stock replenishment will be forwarded through normal supply channels to MEF G-2/ISC for validation of quantities.

(2) (U) Request for theater resupply will be forwarded through normal supply channels to MEF G-2/ISC for validation and submission.

(3) (U) Requests for GI&I products and services (other than requisitions of stocked products) that exceed the MEF's capabilities will be submitted to the ISC for validation, prioritization, and submission to COMMARFOR (or JTF) for follow-on action.

5. (U) Command and Control

a. (U) Priorities. Provide guidance for establishing command GI&I support priorities.

b. (U) Command Relationships. Include primary and alternate locations of organic GI&I units and specify the C2 relationships among the MAGTF GI&I support structure and external GI&I units or agencies if not previously addressed. Refer to Annex B (Intelligence) and Annex J (Command Relationships) of this OPORD. All requests for GI&I support and production will be coordinated through the MEF G-2 and the ISC.

c. (U) Communications and Information Systems. Refer to Annex K (Combat Information Systems). Identify CIS requirements, priorities, and other pertinent information to support unit GI&I operations.

d. (U) Reports. Specify organizations and elements responsible for GI&I reports. Include the format for preparation and times, methods, and classification of submission. Add necessary instructions for updating maps, charts, and digital databases. This information can be added here or in Appendix 3 (Geospatial Information and Services Reports) of this annex.

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APPENDICES:

1–Geospatial Information and Intelligence Requirements List
2–Geospatial Information and Intelligence Transportation Requirements
3–Geospatial Information and Intelligence Reports

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APPENDIX 1 TO ANNEX M TO OPERATION ORDER (Number) (U)
GEOSPATIAL INFORMATION AND INTELLIGENCE REQUIREMENTS LIST (U)

(U) Requirements List. Identify the known-to-date GI&I products required for the execution of this order. Include the scale, national stock number, quantity on hand, and status. The lists of series and sheet numbers encompass the total number of requirements submitted by the MEF and validated by Commander, United States Marine Corps Forces, Pacific; the JTF; and CCDRs.

(U) Command Element Requirements			
Product Scale	National Stock Number	Quantity On Hand	Status
(U) GCE Requirements			
Product Scale	National Stock Number	Quantity On Hand	Status
(U) ACE Requirements			
Product Scale	National Stock Number	Quantity On Hand	Status
(U) LCE Requirements			
Product Scale	National Stock Number	Quantity On Hand	Status

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APPENDIX 2 TO ANNEX M TO OPERATION ORDER (Number) (U)
GEOSPATIAL INFORMATION AND INTELLIGENCE TRANSPORTATION REQUIREMENTS (U)

1. (U) General. Provide general transportation requirements that pertain to deploying forces, which may include a listing of transportation shortfalls (e.g., reduced stock requirements) in required support of GI&I operations if full transportation requirements cannot be provided.

a. (U) The DLA provides transportation of GI&I products and data from NGA depots to the points of embarkation or other CONUS locations designated by Service component commanders.

b. (U) Units will deploy with a 30-day (or as directed) basic load of GI&I products.

c. (U) GI&I products are a Class IIE supply items. The United States Transportation Command provides assets per the TPFDD to push additional GI&I products to deployed forces. Shipping priority is the same as Class VIII (medical) unless prioritized higher by the MEF G-3.

2. (U) Personnel. List movement requirements of GI&I personnel in the TPFDD, including in place GI&I personnel and shortfalls. List any transportation shortfalls in required support of GI&I operations if full transportation requirements cannot be provided.

3. (U) Equipment. List movement requirements of GI&I equipment in the TPFDD, including in place GI&I equipment and shortfalls. List any transportation shortfalls in required support of GI&I operations if full transportation requirements cannot be provided.

4. (U) Map Stocks. List movement requirements for both map stocks held and WRS GI&I holdings in the TPFDD. Include future transportation requirements for GI&I sustainment. List any transportation shortfalls in required support of GI&I operations if full transportation requirements cannot be provided.

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APPENDIX 3 TO ANNEX M TO OPERATION ORDER (Number) (U)
GEOSPATIAL INFORMATION AND INTELLIGENCE REPORTS (U)

Provide a detailed description and format for each report. Identify transmission methods and POC to receive each report.

1. (U) Safety of Navigation Reports
2. (U) Marine Information Reports
3. (U) Port Information Reports
4. (U) Product Discrepancy Reports
5. (U) Beach Reports
6. (U) Low Stock Reports
7. (U) Request for GI&S and/or GEOINT Support

APPENDIX G
TACTICAL STUDY OF THE TERRAIN

A tactical study of the terrain determines the effects of the terrain on enemy and friendly operations within the area of operations. It includes an analysis of weather, terrain, and other factors, such as economy, sociology, and religion, throughout the commander's AOI. The study serves as a basis for developing specific, friendly COAs and determining enemy capabilities in commander and staff estimates. Thorough terrain analysis allows the commander and staff to see and assess the battlespace in width, depth, height (airspace), and time dimensions.

The intelligence officer has staff responsibility for initiating, coordinating, completing, and disseminating the analysis of the area of operations. A key product resulting from this process is Tab A (Tactical Study of the Terrain) to Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) of an OPLAN. Other staff sections contribute within their respective fields so the final analysis represents a coordinated effort. Typical contributions include the following:

- The topographic platoon's terrain and infrastructure studies.
- The P&A cell's all-source intelligence estimates on sociological, political, economic, technological, and related conditions.
- The staff METOC officer's operational weather forecasts and other weather and climatic information, including meteorological effects decision aids. For additional information, see Annex H (Meteorological and Oceanographic Services) to the OPLAN or OPORD.
- The engineer's analysis of route reconnaissance information and other information on rear area activities.
- The military information support operations officer's information on the psychological environment.

Graphic representations of weather and terrain data developed during the IPB process are included as part of this tab. An abbreviated analysis will usually be included as part of the intelligence estimate. The latter is more common at lower levels of command when a previously prepared analysis is updated in conjunction with an ongoing operation, or when time does not permit preparation of a detailed study.

When preparing the analysis of the area of operations, the intelligence officer uses other sources of information and intelligence, including national intelligence surveys and locally-produced studies and periodicals. When possible, the intelligence officer prepares a tactical study of the terrain and an analysis of the area of operations based upon an anticipated mission before the actual mission has been received. Upon receipt of the mission, the intelligence officer re-evaluates the analysis in terms of the AOI, the area of operations, the commander's initial problem framing, initial planning guidance, and IRs. As the operation progresses, changes in operational factors require analysts to update their initial findings.

The following sample format of Tab A (Tactical Study of the Terrain) to Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) to an OPORD provides instructions and notional information to support the development of this analysis.

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TAB A TO APPENDIX 11 TO ANNEX B TO OPERATION ORDER (Number) (U)
TACTICAL STUDY OF THE TERRAIN (U)

(U) REFERENCES:

(a) List unit SOPs for intelligence and counterintelligence.
(b) List maps, documents, and other forms of GI&I data or sources that provide guidance relevant to the construction of this tab.
(c) List those NGA products and databases and other forms of GI&I data references required for an understanding of this tab.
(d) List other documents that provide guidance required for the necessary planning functions relevant to GI&I and supporting operations.

1. (U) Purpose. State the assigned task and its purpose (e.g., to analyze the terrain within the I MEF's area of operations for OPORD [number]).

2. (U) Mission. The mission of the command is taken from the commander's problem framing, planning guidance, or other statement (e.g., defend in sector west of the Columbia River; be prepared to attack/counterattack enemy forces within the MEF area of operations.

3. (U) General Description of the Area

a. (U) Climatic Weather Conditions. Provide a general description of the area of operation's climatic weather conditions for a defined timeframe.

(1) (U) Timeframe. For example, weather forecast for period 1-30 April 2000.

(2) (U) Climatic Summary. The following are example entries for aspects of the climatic summary.

(a) (U) Precipitation. Precipitation is sparse during the month of April, averaging less than ½ inch. The absolute maximum is only 1½ inches. Almost all precipitation falls in the form of rain. Thunderstorms occur on fewer than one day per month; while snow, if it occurs at all, is only a trace.

(b) (U) Temperature. During the month of April, temperatures are usually moderate. The mean monthly maximum is 64 °F with the mean monthly low temperature of 34 °F. Temperatures can be expected to dip below freezing 13 days of the month.

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(c) (U) Wind. During the month of April, prevailing winds are westerly throughout the area of operations. Wind speeds of 5-12 mph are normal, occurring an average of 16 days throughout the month. Wind speeds of greater than 20 mph can be expected on 6 days during the month.

(d) (U) Ceiling and Visibility. If present, clouds are generally high, thin cirrus. Visibility is generally greater than 5 miles. During the month of April, visibility is greater than 3 miles with ceilings greater than 1,000 feet on an average of 24 days. Visibility of less than ½ mile occurs on an average of only 1½ days during April and is usually associated with blowing dust or an isolated thunderstorm. Lowest visibility usually occurs between the hours of midnight and 0900.

(e) (U) Illumination. Use local standard time to list beginning of morning nautical time, end of evening nautical time, sunrise, sunset, moonrise, and moon set.

(f) (U) Moon Phases

(3) (U) Atmospheric Pressure. Average pressure is _____.

b. (U) Terrain. The following are examples of general descriptions of the terrain within the area of operations

	BMNT	EENT	SR	SS	MR	MS
1 April	0435	1938	0542	1831	2130	1000
11 April	0413	1954	0522	1844	0243	1722
21 April	0352	2010	0504	1858	1115	2145
1 May	0332	2027	0447	1911	1750	0315

Legend
BMNT beginning of morning nautical time
EENT end of evening nautical time
MR moonrise
MS moon set
SR sunrise
SS sunset

.

Moon Phases	
New Moon	4 April
First quarter	11 April
Full moon	19 April
Last quarter	27 April

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(1) (U) Relief and Drainage Systems. The area of operations is drained by two major north-south flowing rivers—the Yakima River to the west and the Columbia River to the east. Drainage within the MEF's area of operations consists primarily of east-west flowing streams and canals. Most drainage systems within the area of operations have high, steep banks with slopes greater than 30 percent. The area is dominated by numerous parallel ridges running principally from the northwest to the southeast. This area is heavily eroded and dissected by steep valleys, canyons, and wadis.

(2) (U) Vegetation. Natural vegetation within the area of operations consists of arid and semiarid rangeland. Grasses and shrubs are the primary vegetative cover, with some scattered trees found along stream bottoms. Cultivated vegetation in the area consists primarily of food crops, such as short grain and vegetables, in the northwestern corner of the MEF's area of operations and orchards, vineyards, and short grain crops in the southwestern corner of the MEF's area of operations.

(3) (U) Surface Materials. Surface materials within the low and high plains consist primarily of alkaline silty loam, with small, scattered deposits of sandy loam along larger streams. Surface materials within hills, mountains, and ridges consist of shallow, stony soils mixed with silt. Soils are less than 1 m thick, with multiple layers of basalt in the bedrock.

(4) (U) Constructed Features. The two principle east-west roads through the area are Interstate 90 (a four-lane divided highway) in the north and Highway 24 (a two-lane paved road) in the south. Two principal north-south roads are located in the MEF's rear: Interstate 82 (a four-lane divided highway) and Highway 821 along the east bank of the Yakima River. Two single-track, standard-gauge railroads are located within the area of operations. One runs east-west in the north and one runs north-south in the MEF's rear. The major built-up areas are Yakima, population of 45,588 (FG9164), and Ellensburg, population unknown (FH8607). There are two major airfields: one located 2 km west of Yakima and the other located 3 km north of Ellensburg. Numerous smaller paved and unpaved airstrips and landing strips are located within the area of operations.

4. (U) Military Aspects of the Area. Provide a general description of terrain effects on military operations within the area of operations. Focus on the MAGTF mission and address KOCOA. The following subparagraphs are examples.

a. (U) Key Terrain

(1) (U) Ryegrass Mountain (Vicinity GH272014). This terrain feature is located in the center of mobility corridor 1a and controls movement along the major east-west road in the MEF's area of operations.

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(2) (U) Saddle Mountain (Vicinity GG261930). This terrain feature controls movement along mobility corridor 1b and the east-west railroad lying therein.

(3) (U) Hill 530 (Vicinity GG258825). This hill controls movement along mobility corridor 3.

(4) (U) Hill 811 (Vicinity GG197856). This hill is located between mobility corridors 2 and 3 and provides excellent observation and fields of fire.

(5) (U) Hill 952 (Vicinity GG253682) and 949 (Vicinity GG251659). These hills are located in mobility corridor 4 and control the east-west movement along the secondary road network.

(6) (U) Hill 739 (Vicinity GG230573). This hill mass controls movement on mobility corridor 5 and Highway 24.

(7) (U) Vanderbilt Gap (Vicinity FG962950). Controls movement along Interstate 82 in the MEF's rear area.

(8) (U) Interstate 82 Bridges

(a) (U) Over Squaw Creek (vicinity GH015683).

(b) (U) Over Selah Creek (vicinity FG956747).

(9) (U) Bridges Over Yakima River (Railroad). Vicinity FH907971, FG936801, FG920730, and FG923653.

(10) (U)Bridges Over Yakima River (Vehicle). Vicinity FG919724, FG934643, FG940559, and FG955532.

Note: Interstate 82 and Highway 821 bridge cross Yakima River off existing maps at approximately FG900675.

b. (U) Observation and Fields of Fire

(1) (U) Weather Conditions. Limited restrictions to visibility are most likely to occur between the hours of midnight and 0900 because of blowing dust and haze. Prevailing winds favor friendly use of smoke and chemicals.

(2) (U) Relief. Good to excellent observation, as well as excellent long-range fields of fire, exist from the dominant ridges and hills. High ground along the west bank of the Columbia River provides excellent observation and fields of fire at all possible crossing sites. Observation and fields of fire within mobility corridors will be fair to good with numerous features providing most of the cover and concealment.

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(3) (U) Vegetation. Isolated orchards and vineyards are prominent east of Yakima. Other vegetation will not significantly limit observation and fields of fire.

(4) (U) Constructed Features. Constructed features will not be a limiting factor, except in the built-up areas of Yakima and Ellensburg.

c. (U) Cover and Concealment

(1) (U) Relief. The rolling, dissected terrain within the area of operations will provide good to fair cover from direct fire weapons and good to fair concealment from ground observation. Cover from indirect fires and concealment from aerial observation will be poor throughout the entire sector.

(2) (U) Vegetation. No cover or concealment will be provided within the area of operations because of the lack of significant vegetation.

(3) (U) Constructed Features. With the exception of the built-up areas around Yakima, there are no significant constructed features that will afford cover or concealment.

d. (U) Obstacles

(1) (U) Relief. Terrain favors the defense because of the numerous microrelief features, such as gullies, canyons, and steep stream banks. Most microrelief features will not stop vehicle off-road movement, but these features will significantly slow or impede vehicle advance. Very little engineer effort will be required to make these linear obstacles impassable. Both the Columbia and Yakima Rivers are major natural obstacles and are not fordable. Major engineering efforts will be required to cross at sites where bridges do not exist.

(2) (U) Vegetation. Vegetation is not a significant limiting factor except in the vicinity of Yakima, where vineyards and orchards will restrict the movement of wheeled vehicles.

(3) (U) Surface Materials. The surface materials within the area of operations are extremely stable in the existing arid climate. Within the valleys, shallow excavation is possible with the use of hand tools. Soils may permit easy ditching and expansion of existing natural obstacles. Soils on the ridgelines are shallow and course and can be used as minefields.

(4) (U) Constructed Features. Numerous cuts and fills are located on the major roads and railroads within the area. Most of the bridges across the Yakima River are located in the vicinity of the built-up area, which will force most traffic into or

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near the city of Yakima. Movement through Yakima will be restricted to the existing road network.

e. (U) Avenues of Approach. Provide a general description of terrain effects on available AAs and mobility corridors within the area of operations. There are five AAs from the Columbia River into and through the MEF's sector.

(1) (U) Corridors available to friendly forces for movement into our position:

(a) (U) Axis GH280027 to GH910047 (Interstate 90).

(b) (U) Axis GG280840 to GG960990.

(c) (U) Axis GG280820 to GG000790.

(d) (U) Axis GG290660 to FG940700.

(e) (U) Axis GG290550 to FG950610.

(2) (U) Corridors available to friendly forces for movement into the enemy's position:

(a) (U) Axis GG080030 to GG100963 (Boylston Mountain) to GG084916 (Badger Gap) to GG040670 (Yakima Ridge).

(b) (U) Axis FG910990 to FG920700 (Interstate 82).

f. (U) Combat Service Support Aspects. The following subparagraphs would be completed under the intelligence officer's direction as a coordinated effort between the GI&I analyst; intelligence analysts; weather analysts; and other combat, combat support, and combat service support staff members.

(1) (U) Personnel.

(2) (U) Logistics.

(3) (U) Civilian-military operations.

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5. (U) Effects of Area Characteristics

a. (U) On enemy courses of action.

(1) (U) Enemy defense.

(2) (U) Enemy attack.

(3) (U) Enemy air.

(4) (U) Enemy use of weapons of mass destruction.

b. (U) On friendly course of action.

(1) (U) Friendly defense.

(2) (U) Friendly attack.

(3) (U) Friendly air.

(4) (U) Friendly use of weapons of mass destruction.

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APPENDIX H
BEACH STUDIES

The geographic specialist within the intelligence section/battalion often has staff responsibility for initiating, coordinating, and ensuring the completion and dissemination of analysis for beaches within the area of operations. Other staff sections contribute within their respective fields so that the final analysis provides a coordinated, fused intelligence product. Typical contributions include the following:

- Imagery.
- Reports from ground and air reconnaissance.
- Reports from SEAL [sea-air-land] teams.
- All-source intelligence analysis.
- Intelligence databases.

High resolution graphic views developed during the IPB process are attached to this study. An abbreviated analysis may be prepared as part of the intelligence estimate. More common at lower levels of command, the abbreviated analysis is used when a previously prepared analysis is updated in conjunction with an ongoing operation or when time does not permit preparation of a detailed study.

The intelligence battalion's P&A cell within the IOC uses a variety of sources, such as national intelligence surveys, locally-produced studies, and periodicals, to prepare the analysis of the area of operations. Analyses prepared by other headquarters are also valuable sources of information and intelligence.

When possible, an analysis of the beaches within the area of operations is prepared before the actual mission has been received. Upon receipt of the mission, the G-2 GI&I officer and the intelligence battalion ISC re-evaluate the analysis in terms of the commander's AOI, area of operations, and IRs. As the operation progresses, changes in the mission and the commander's requirements drive revision of the analysis.

The following sample format of Tab B (Beach Studies) to Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) of an OPORD supports the development of this analysis.

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TAB B TO APPENDIX 11 TO ANNEX B TO OPERATION ORDER (Number) (U)
BEACH STUDIES (U)

(U) REFERENCES:

(a) List unit SOPs for intelligence and counterintelligence.
(b) List those NGA products, databases, and other forms of GI&I data references that are required for an understanding of this tab.
(c) Marine Corps Reference Publication (MCRP) 2-3A, *Intelligence Preparation of the Battlefield/Battlespace* and Army Tactics, Techniques, and Procedures 3-34.80, *Geospatial Engineering*. List any other relevant documents that provide guidance required for the necessary planning functions relevant to GI&I and supporting operations, including pertinent maps.

1. (U) BEACH 1. Provide the information indicated in the attached form. Where appropriate, reference should be made to associated graphic views generated to support visualization of specified beaches, landing areas, and landing sites.

2. (U) BEACHES 2 through X, as required.

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APPENDIX I
HELICOPTER LANDING ZONE AND DROP ZONE STUDIES

Helicopter landing zone and DZ studies are detailed intelligence studies that are used to determine the environmental effects of potential HLZ and DZ sites. These studies include critical information and intelligence that affect mobility, exits, vegetation, gradients, obstacles, surface materials, urban proximity, and the military aspect of the terrain to support the mission. The analysis provides the commander and staff with critical GI&I that affects the width, depth, height (airspace), and time dimensions of the battlespace to support the decisionmaking process and final site selection by the commander.

The P&A cell, intelligence battalion, and IOC have principal MEF responsibility for the preparation of HLZ and DZ studies. Normally, the topographic platoon leads the development of these studies with key support from the IIP and all-source intelligence analysts. The intelligence battalion commander/ISC has staff responsibility for initiating, coordinating, completing, and disseminating HLZ/DZ studies of the area of operations. Other staff sections may contribute within their respective fields so that the final analysis represents a coordinated effort. Typical contributions include the following:

- Imagery.
- Reports from air and ground reconnaissance.
- Engineer reports
- Intelligence databases.

High resolution graphic views developed during the IPB process are attached to this study. An abbreviated analysis may be prepared as part of the intelligence estimate. The abbreviated analysis is more common at lower levels of command. It is used when a previously prepared analysis is updated in conjunction with an ongoing operation or when time does not permit preparation of a detailed study.

Production and analysis cell analysts use a variety of sources (e.g., national intelligence imagery, surveys, locally-produced studies, periodicals) to prepare HLZ and DZ studies. When possible, an analysis of the HLZ and DZs within the area of operations is prepared before the actual mission has been received. Upon receipt of the mission, the ISC re-evaluates the analysis in terms of the commander's area of operations, AOI, and IRs. As the operation progresses, changes in the mission, the commander's intent and guidance, and IRs will require revision of the analysis.

The following sample format of Tab E (Helicopter Landing Zone/Drop Zone Studies) to Appendix 11 (Intelligence Estimate) to Annex B (Intelligence) to an OPORD is provided to support the development of this analysis.

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TAB E TO APPENDIX 11 TO ANNEX B TO OPERATION ORDER (Number) (U)
HELICOPTER LANDING ZONE/DROP ZONE STUDIES

(U) REFERENCES:

(a) Unit SOP for intelligence and counterintelligence.
(b) List NGA products, databases, and other forms of GI&I data references required for an understanding of this tab.
(c) List other relevant documents that provide guidance required for GI&I and supporting operations planning functions.

1. (U) Helicopter Landing Zone/Drop Zone. Identify the information indicated in the attached report form (i.e., the standard HLZ/DZ reporting form). Where appropriate, reference should be made to associated graphic views generated to support visualization of each HLZ and DZ.

2. (U) Helicopter Landing Zone/Drop Zone 2. Provide the information indicated in the following form (i.e., the standard HLZ/DZ reporting form).

CLASSIFICATION

HELICOPTER LANDING ZONE/DROP ZONE

Designation _____
Date _____
Longitude and latitude _____
Military grid coordinates _____
Charts/Maps reference _____

1. Terrain Description
Usage _____
Suitability _____
Landing obstructions _____
Shape _____
Size _____
Remarks _____
_____
Slope _____
Elevation _____

2. Surface Description
Materials _____
Trafficability _____
Condition _____
Compression bearing ration _____
Exits _____
Cover and concealment _____
Landmarks remarks _____

3. Vegetation
Location (Point of Origin) _____
Type _____
Density _____
Direction from point of origin _____
Distance from point of origin _____

CLASSIFICATION

4. HLZ/DZ orientation photograph/sketch

Show principal features and, if available, provide annotated photographs.

_____

_____

_____

ACKNOWLEDGE RECEIPT

Name
Rank and Service
Title

EXHIBITS:

OFFICIAL:
s/
Name
Rank and Service
Title

APPENDIX J
GEOSPATIAL INFORMATION AND INTELLIGENCE PRODUCTION REPORT SAMPLE FORMAT

The sample format contained in this appendix defines the critical elements of a GI&I production report. During peacetime and garrison operations, a monthly production report should be compiled by the topographic platoon and forwarded via the intelligence battalion commander to the MEF G-2 GI&I section to ensure that GEOINT production timelines and resources are being adequately identified, prioritized, and employed. During tactical operations, the topographic platoon/detachment provide this report to the MAGTF command element intelligence officer via the intelligence battalion commander/ISC.

CLASSIFICATION

Copy no. ___ of ___ copies
OFFICIAL DESIGNATION OF COMMAND
PLACE OF ISSUE
Date-time group
Message reference number

GEOSPATIAL INFORMATION AND INTELLIGENCE PRODUCTION REPORT

1. (U) Current Production Tasks. Provide a listing of current production tasks. Include completed tasks for one cycle to identify final production status.

Task Number	Date Received	Priority	Description	Requesting Unit(s)	POC(s)	Due Date

2. (U) Total Labor Hours Expended. Detail total number of labor hours used during this reporting period.

3. (U) Equipment Issues. Describe equipment issues or malfunctions identified during this reporting period.

4. (U) Personnel Issues. Describe personnel issues identified during this reporting period.

5. (U) Communications and Information Systems Issues. Describe issues dealing with CIS, electronic dissemination, or related queries identified during the reporting period.

CLASSIFICATION

6. (U) Anticipated GI&I Production Delays. Describe anticipated production delays for identified tasks; give the reason for each delay (e.g., equipment, personnel, communication, source).

7. (U) Remarks. Provide additional remarks or comments.

ACKNOWLEDGE RECEIPT

Name
Rank and Service
Title

EXHIBITS:

OFFICIAL:
s/
Name
Rank and Service
Title

APPENDIX K
MARINE CORPS SYSTEMS REQUIRING GEOSPATIAL INFORMATION AND INTELLIGENCE SUPPORT

This appendix lists fielded and emerging command and control, intelligence, maneuver, fires, logistics, and CIS within the operating forces that require GI&I support. The PFDB will be continuously updated to reflect all systems with GI&I requirements.

System	Acronym
active laser countermeasure system	ALCS
amphibious assault vehicle	AAV
advanced countermine system	ACS
advanced demolitions kit	ADK
advanced field artillery tactical data system	AFATDS
advanced low altitude air defense weapon	ALAAD
advanced rocket system	ARS
advanced towed cannon system	ATCS
agile ground laser eye protection system	AGLEPS
air defense communications platform	ADCP
amphibious assault vehicle 7a1	AAV-7A1
amphibious vehicle mine neutralization system	AVMNS
antenna tower system	ATS
antipersonnel obstacle breaching system	APOBS
assault countermine warfare capability	ACWC
asset tracking logistics and supply system	ATLASS
automated chemical, biological, radiological, and nuclear hazard information and warning system	CBRN HAZWARN
battlefield combat identification system	BCIS
biological and chemical decontaminates	B&CD
biological detection and warning system	BDWS
close quarter battle weapon	CQBW
closed loop artillery simulation system	CLASS
coastal battlefield reconnaissance and analysis	COBRA
combat breacher vehicle	CBV
combat mobility vehicle	CMV
combat vehicle appended trainer	CVAT
commercial satellite communications terminals	CSCT
common aviation command and control system	CAC2S
communications and special signals analysis capability	COSSAC
counterintelligence/human resources intelligence equipment program	CIHEP
data automated communications terminal	DACT
deployable capability for information dissemination and exchange	DECIDE

System	Acronym
deployable forward observer training capability simulation system	DFOTCSS
digital technical control	DTC
digital terrain analysis mapping system	DTAMS
digital wideband transmission system	DWTS
direct air support center	DASC
direct air support center-hybrid mobile	DASC-HYBRID
future light combat vehicle	FLCV
gap assault crossing system	GACS
global broadcast system	GBS
global command and control system	GCCS
Global Positioning System-precision lightweight GPS receiver (or plugger)	GPS-PLGR
Global Positioning System-survey	GPS-Survey
ground-based air defense fire unit command and control system	GBADFUC2S
ground-based air defense integrated command and control and early warning	GBADIC2&EW
ground marking system	GMS
hydrographic survey capability	HYDRO SURVEY
improved assault support-combat utility capability	IAS-CUC
improved direct air support central	IDASC
improved maritime prepositioning force capability	IMPFC
improved rigid raiding craft	IRRC
indoor simulated marksmanship trainer	ISMT
infantry squad trainer simulator	ISTS
initial fire support automation system	IFSAS
integrated infantry combat system	IICS
intelligence analysis system	IAS
intelligence broadcast receiver	IBR
joint biological point detection system	JBPDS
joint maritime command information system-unified build	JMCIS-UB
joint chemical, biological, radiological, and nuclear reconnaissance system-lightweight	JCBRNRS-LWT
joint service imagery processing system	JSIPS
joint surveillance target attack radar system	JSTARS
joint tactical information distribution system	JTIDS
light armored personnel carrier	LAPC
light armored vehicle	LAV
light strike vehicle	LSV
lightweight standoff chemical aerial detector	LSCAD
Marine air-ground task force tactical warfare simulation system	MTWS
Marine airborne command and control console	MAC2C
Marine combat service support command and control	MCSSC2
Marine Corps airborne early warning system	MCAWES
Marine Corps aviation computer-based training instructor systems development	MCACBTISD
Marine Corps conflict simulation system	MCCSS

System	Acronym
Marine Corps modeling and simulation centers	MCMSC
Marine flexible fire support system	FIREFLEX
medium tactical vehicle replacement	MTVR
meteorological data system	MDS
meteorological measuring set	MMS
mobile electronic warfare support system	MEWSS
modeling and simulation concepts analysis and design	M&SCA&D
modeling and simulation tools in support of operations	M&STSO
chemical, biological, radiological, and nuclear, reconnaissance system	CBRNRS
position location reporting system (product improvement program)	PLRS (PIP)
precise lightweight Global Positioning System receiver	PLGR
Radio Reconnaissance Equipment Program	RREP
Replacement Air-Mobile Direct Air Support Center	RAMDASC
secondary imagery dissemination system	SIDS
systems planning, engineering, and evaluation device	SPEED
tactical air command center	TACC
tactical air operations center	TAOC
tactical air operations module	TAOM
tactical aviation mission planning system	TAMPS
tactical combat operations	TCO
tactical exploitation group (FoS)	TEG
tactical electronic reconnaissance processing and evaluation system	TERPES
tactical high energy laser-air defense	THEL-AD
tactical remote sensor system	TRSS
team target engagement simulator	TTES
Technical Control and Analysis Center (Product Improvement Program)	TCAC-PIP
theater missile defense	TMD
3-D long range radar	TDLRR
topographic production capability (FoS)	TPC
TROJAN Special Purpose Integrated Remote Intelligence Terminal II	TROJAN SPIRIT II or TS-II
unmanned aircraft system	UAS

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APPENDIX L
SECTION'S GEOGRAPHIC INTELLIGENCE ANNUAL TRAINING PLAN/GEOSPATIAL INTELLIGENCE UNIT ANNUAL TRAINING PLAN

This appendix identifies recommended training and provides sample annual plan formats for the MEF command element G-2 Geospatial Intelligence and Imagery Section and the intelligence battalion topographic platoon. The MEF-level plan identifies training criteria for other headquarters' staff personnel and more detailed requirement for headquarters staff and MEF intelligence personnel, including the planning and use of GI&I. The topographic platoon training program addresses collection, exploitation, and production of GEOINT using standard equipment suites. Tables L-1 and L-2 show annual training plan formats.

Table L-1. Sample Command Element Imagery and Mapping Section Annual Training Plan.

Subject	References	Responsible Unit/Section	Participating Unit/Section	Total Hours	Monthly Hours											
					Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Datums, grids, and ellipsoids																
NGA production capabilities																
Limitations of FD																
MSDS requirements definitions																
Accessing the TGIL																
Terrain support to the IPB process																

Legend
FD foundation data
topo plt topographic platoon

Table L-2. Sample Topographic Platoon Annual Training Plan.

Subject	References	Responsible Unit/Section	Participating Unit/Section	Total Hours	Monthly Hours											
					Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Datums, grids, and ellipsoids																
Topo plt capabilities																
Topo plt limitations																
NGA production capabilities																
Limitations of FD																
MSDS requirements definitions																
Accessing the TGIL																
Terrain support to the IPB process																
Develop GEOINT estimate (appendix 11 to annex B of OPLAN/OPORD)																
Develop annex M to the OPLAN																
Develop terrain factor databases																
Develop the MCOO																
Develop MSDS																
Identify MSDS information																
Develop HLZ/HDZ studies																
Develop transportation studies																
Develop urban studies																
Develop beach studies																

Legend
FD foundation data
HDZ helicopter drop zone
topo plt topographic platoon

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APPENDIX M
GEOGRAPHIC INTELLIGENCE SPECIALIST CORE TASKS

This appendix defines the core tasks that are performed by the geographic intelligence specialist.

Conduct a Combined Obstacle Overlay Analysis

The COO analysis is conducted by collecting, exploiting, and synthesizing multiple GI products. These products are incorporated into a COO of an area of operations in support of the commander's PIRs and CCIRs. Supporting products of this analysis include the CCM overlay, which considers the environmental effects of terrain; LOC overlay, which depicts road infrastructure; and an obstacles overlay, which includes constructed and natural features.

Conduct a Concealment Analysis

Concealment is protection from enemy air, ground, and space observation and is vital to an operation's security and deception. Concealment is critical in the rear area. The concealment analysis must ensure that vulnerable rear area command and control facilities, support units, and logistic facilities are protected from enemy air and ground observation. The concealment overlay depicts best, good, fair, or poor concealment for summer or winter seasons within the area of operations.

Conduct a Cover Analysis

Cover, such as rocks, riverbanks, vegetation, quarries, walls, and buildings, is protection from the effects of direct fire weapons and is a vital part of military operations. When conducting the cover analysis, cover overlays will depict good, fair, and poor cover conditions, considering the effects of terrain features within the given area of operations.

Conduct a Cross-Country Movement Analysis

A CCM analysis is depicted by a graphic or series of graphics with supporting text/tables portraying off-road movement conditions for a specific vehicle or a group of vehicles and considering the effects of terrain features and weather conditions within the given area of operations. It is usually overprinted on a medium- or large-scale topographic map. When conducting a CCM analysis, multiple GI products are collected, exploited, and synthesized to be incorporated into a CCM overlay of a given area of operations in support of the commander's PIRs and CCIRs.

Conduct a Line of Sight Analysis

The terrain within the target area heavily influences the effectiveness of direct fire weapons. An LOS analysis will determine how terrain affects optical and electronic LOS. The LOS views can graphically portray the relative capabilities of direct fire weapons, communications, collection, and target acquisition systems. An LOS analysis will also assist in identifying key terrain with greater precision.

Conduct a Line of Communications Analysis

Line of communications intelligence studies provide detailed information on the transportation infrastructure within the area of operations. Such studies include textual and graphical information on the roads, railroads, bridges, tunnels, and airfields.

Conduct a Constructed Features Analysis

A constructed feature analysis considers the effect of unnatural geographic features on military operations. These features can be annotated on GEOINT products to help visualize the battlespace. These GEOINT products can also be used to value add to existing GI.

Conduct a Multispectral Imagery Analysis

An MSI analysis is used to extract features and categorize terrain. Information extracted from MSI can also be used to value add to existing GI.

Conduct an Obstacles Analysis

Conducting an obstacles analysis provides detailed information on any obstructions that are designed or employed to disrupt, fix, turn, or block the movement of forces and to impose additional losses in personnel, time, and equipment. Obstacles can be natural, constructed, or a combination of both.

Conduct a Site Selection Analysis

A site selection analysis depicts a graphic or series of graphics portraying specific sites, based on a set of requirements for the mission and the commander's intent. This analysis can be used to identify potential HLZ, zones of entry, and river crossing sites to enhance the mobility of forces.

Conduct a Surface Configuration Analysis

Commanders must have accurate intelligence on the surface configuration of the terrain, so they conduct a surface configuration analysis. Ravines, embankments, ditches, plowed fields, boulder fields, and rice field dikes are typical configurations that influence military activities. Elevations, depressions, slope, landform type, and surface roughness are some of the terrain factors that affect movement of troops, equipment, and materials. These products can be incorporated in the COO and CCM for specific information of the battlespace. These products can also be used to value add to existing GI.

Conduct a Surface Drainage Analysis

A surface drainage analysis focuses on rivers, streams, and open bodies of water within the area of operations to support movement and other requirements. These studies identify potential water obstacles and their impact on maneuvering forces. These products can be incorporated in the COO and CCM for specific information of the battlespace. These products can also be used to value add to existing GI.

Conduct a Surface Materials Analysis

Military planners rely heavily on soil analysis because soils vary in their ability to bear weight and withstand vehicle passes, as well as in their ease of digging. The surface material analysis breaks down soil types, characteristics, and distribution. These products can be incorporated in the COO and CCM for specific information of the

battlespace. These products can also be used to value add to existing GI.

Conduct an Urban Area Analysis

An urban area analysis is a graphic or series of graphics portraying building types, building heights, points of interest, and building utilization. These features can be annotated on urban analysis products to help visualize the battlespace.

Conduct a Vegetation Analysis

Vegetation analysis shows natural and cultivated vegetated areas, with information about type, size, and density. These products are used to determine CCM, cover and concealment, and LOS; they can also be used to value add to existing GI.

Conduct Oral Presentations and Briefs

Oral presentations or briefs are vital to inform target audiences of the analytical procedures that went into the GEOINT products. These presentations or briefs will ensure that products are fully understood and used properly.

Disseminate Geospatial Intelligence Products

Geospatial intelligence products must be disseminated in a timely, appropriate form by any suitable means to the requesting body. Such products must be effectively disseminated to the MAGTF commander, planners, and other forces and organizations in time for decisionmakers to assess and use it to affect COA development, analysis, and other planning and decisionmaking activities. Geospatial intelligence products include GDC and specially tailored mapping products or information.

Produce a Tactical Study of the Terrain

The geographic intelligence specialist is required to produce a Tab A (Tactical Study of the Terrain) to appendix 11 to annex B (see app. G). Analysis of the area of operations is a comprehensive study to determine the effects of the terrain on enemy and friendly operations. It includes an analysis of such factors as weather, terrain, economy, sociology, and religion throughout the commander's AOI. It serves as a basis for developing specific friendly COAs and for determining enemy capabilities and in commander and staff estimates.

Use a Geospatial Database

A geospatial database can be used to store and manipulate GI and GEOINT data in an organized and logical format to conduct analysis and production. Proper use includes following set data parameters and data relationships.

Conduct Map Reading

The most basic form of terrain analysis is done using a standard hard copy map. Marines should know basic map reading principles, such as standard scales and types of maps, identifying marginal information, terrain recognition, datums and grid reference systems, plotting points, and measuring distances.

Import Geospatial Information

Geographic intelligence specialists must import raw data into the GIS in order to use GI for analysis, manipulation, and production. Geospatial information that can be imported includes vector, raster, and matrix data.

Conduct Quality Control of Geospatial Information

Geospatial information must be verified using current sources; current imagery is used to compare the information visually. Geographic intelligence specialists verify data accuracy by using raster data (i.e., overhead imagery) to identify cultural changes that have not been annotated/updated in vector data. Vector data is the primary source for GI synthesis to provide analysis to the commander on such products as CCM and COO. Quality control of vector data ensures the most accurate data is used during the analysis.

Produce Geospatial Intelligence Products

A GEOINT product is the fusion of geophysical or analytical data into a synthesized format for dissemination as hard or soft copy. These products can be produced from a user-defined basic map template and include required data/analysis and marginal information or metadata to describe the product to the end user. The GEOINT product will be used to assist commanders in their decisionmaking process.

Provide Geophysical Data Collection Information

Geophysical data is vital for value-adding features and collecting information on new features. This information can be used to create mission-specific tailored products. A GDC must be provided in usable formats for exploitation in geophysical data processing.

Conduct Geophysical Data Collection Field Reconnaissance

In areas where control is to be extended or established, there may be control stations from earlier surveys that must be recovered and verified. These stations should have been identified and annotated on overlays during the office reconnaissance phase and will serve as starting points for proposed GPS networks, traverse, or level lines. The existing stations should be located, described, and verified for accuracy before using them for extending control.

Conduct Global Positioning System Survey

A GPS receiver is a simple range measurement device. Distances are measured between the receiver antenna and the satellites and the position is determined from the intersections of the range vectors. These distances are determined by a GPS receiver, which precisely measures the time it takes a signal to travel from the satellite to the station. The GPS is capable of determining accurate positional, velocity, and timing information. Global Positioning System survey operations include static, fast static, kinematic, real time kinematic, postprocess kinematic, and absolute.

Conduct Quality Assurance Checks of Geophysical Data

Quality assurance of collected geophysical data is vital to ensure accuracy of GDC points. Following standards and specifications, procedures, and quality checks of geophysical data eliminates field errors and ensures accuracy. Individual instrument operators and recorders will perform quality assurance.

Conduct a Level Line Survey

Leveling is the operation of determining differences of elevation by measuring vertical distances directly on a graduated rod with the use of a leveling instrument. The difference in elevation between two points can also be determined

trigonometrically using vertical angles and horizontal or inclined distances. An elevation is a vertical distance above or below a referenced datum. In surveying, the referenced datum is typically mean sea level.

Conduct a Topographic Survey

A topographic survey is conducted to determine the relative location of features on the Earth's surface by measuring horizontal distances and differences in elevation and direction. Topographic survey data is used to produce maps and plans that are true to scale.

Conduct a Traverse Survey

A traverse is the process of extending horizontal control from one control station to another and networking geodetic control without the use of a GPS. The purpose of a traverse is to establish points relative to each other on a common reference system.

Conduct an Intersection Survey

An intersection survey is the process of extending horizontal control from control stations to an inaccessible point and networking geodetic control without the use of a GPS. The purpose of an intersection survey is to establish points relative to each other on a common reference system.

Apply Intelligence Dissemination Security Guidelines

When given an intelligence product, methods of release and disclosure must match the level of classification of the product.

Manage Systems Support

System support management involves ensuring GEOINT systems are operational and properly maintained. Management functions include ensuring record jackets and GEOINT systems are being maintained and understanding GIS architecture, GEOINT systems requirements, and the roles and responsibilities of contractor support. Geographic intelligence specialists will be able to properly use existing maintenance procedures to ensure GEOINT systems are operational.

Determine Consumer's Geographic Intelligence Requirements

Geospatial IRs can be vague. The geographic intelligence specialist will need to refine the consumer's RFI to satisfy GEOINT requirements.

Conduct Cultural Geographic Intelligence Analysis

Cultural geographic analysis is the analytical procedure used to determine cultural areas, patterns, and points of interest. These elements are determined by using multiple information sources and specific criteria to query against demographic, regional, and cultural information. These products are used to give the commander a better understanding of cultural features and trends within the AOI.

Conduct Hydrographic Analysis

Sea or hydrographic analysis is the study of areas containing shorelines. Intelligence of coasts and landing beaches is important to military planners because the coast is a country's first line of defense. Intelligence personnel conduct hydrographic analysis to evaluate coastal conditions that

support amphibious operations. The geographic intelligence specialist will provide geographic support with current geospatial data in order to determine the most suitable landing beaches and zones of entry.

Conduct Infrastructure Analysis

Infrastructure analysis includes compiling, consolidating, and graphically illustrating GEOINT. Such analysis produces a depiction of transportation, communications, and utility infrastructure of interest in support of commanders' force protection posture.

Conduct a Multidimensional Geographic Intelligence Analysis

Multidimensional GEOINT is GI that is represented in more than two dimensions. This information can also be used to extract terrain or features to value add to existing data sets. Some examples of analytical products include 3-D modeling, static or interactive fly through, digital elevation models, and perspective views. Geographic intelligence specialists can create and exploit multidimensional data and can produce GEOINT.

Conduct Predictive Analysis

Predictive analysis involves multiple environment variables that are combined into a predictive model which, when subjected to analysis, can be used to forecast future probabilities with an acceptable level of reliability. In predictive modeling, data is collected, a statistical model is formulated, predictions are made, and the model is validated or revised as additional data becomes available. This event supports IPB and MCPP.

Conduct Site Selection Analysis

Site selection analysis is the analytical procedure used to determine areas or points of interest. These areas are determined by using multiple information sources and specific criteria against which to query. These products are very specific, are based on the commander's criteria, are and usually time sensitive.

Conduct Pattern Analysis

Pattern analysis is used to explore spatial patterns for describing phenomena, such as urban pattern changes, influence of disease on a population, and land use change over time. The pattern analysis tasks also contribute to the geographic intelligence specialist's use of aspects of cultural geography, geostatistical analysis, site selection techniques, and predictive analysis.

Provide Analysis of Remotely Sensed Imagery

Remote sensing is used to gather and process information about an object without direct physical contact. Remotely sensed imagery sources vary in type and capability. Examples include MSI, hyperspectral imagery, ultraspectral imagery, SAR, and light detecting and ranging. These sources are used to extract the Earth's features and value add to existing GI.

Conduct Electronic Dissemination

Electronic dissemination of GEOINT and GI should be conducted through local, Service, and national level architecture in accordance with the intelligence dissemination plan.

Create a Nonenterprise Geospatial Database

A geospatial database can be used to store and manipulate GI and GEOINT data in an organized and logical format to conduct analysis and production. The creation of a nonenterprise geospatial database includes the following operations:

- Storing spatial and attribute data.
- Developing topology rules.
- Developing standard behaviors.
- Developing relationships.
- Editing databases.

Use Enterprise Geospatial Database

A geospatial database can be used to store and manipulate and GEOINT data in an organized and logical format in order to conduct analysis and production. Properly, geospatial databases are used for the following:

- Performing spatial and attribute data storage.
- Following topology rules, standard behavior rules, and validation rules.
- Following database editing rules to include versioning and multiuser editing.
- Performing editing, analysis, and production.

Create a User-Defined Sequence

User-defined sequences are steps in software that allow users to set up repetitive analytical or collection tasks. These sequences can be used to conduct quality control and ensure production and collection timelines are maximized. These processes assist in the timely and accurate collection or analysis of data to produce geophysical or GEOINT products.

Develop a Production Strategy

Developing a production strategy includes compiling and identifying resources to plan and schedule GEOINT production and GDC projects in support of GEOINT requirements. The production strategy will identify staffing, material, and schedule shortfalls in production requirements, which will allow the timely completion of GEOINT and GI products.

Conduct Quality Control

Quality control of data and analytical techniques is vital for ensuring accurate GEOINT and geophysical products are produced. Quality control must be implemented throughout the production and dissemination processes. Geographic intelligence specialists will ensure accurate GI is used to produce GEOINT products.

Conduct an Aeronautical Survey

Airfield obstruction and navigational aid surveying operations involve obtaining accurate and complete obstruction and geodetic positioning data for the navigational aid and its associated airport and/or heliport. Precise geographic positioning of these navigational facilities is required to support the Federal Aviation Administration and a wide range of National Airspace System activities. Data is collected for runways; stopways; navigational aids; Federal Aviation Administration Part 77, *Obstructions to Navigation*; aircraft movement aprons, prominent airport buildings; selected roads; and other traverse ways.

Manipulate Geophysical Data Collection Information

Geophysical data includes the features on the Earth's surface. These features are usually represented in three dimensions and require extensive calculations and adjustment procedures in order to annotate them on a common grid. Geographic intelligence specialists postprocess and adjust geophysical information to value add to existing geospatial databases and produce GEOINT products.

Apply Advanced Theories of Geospatial Information

The GI data sets are continually evolving with emerging technologies. Geographic intelligence specialists must understand emerging technologies and exploitation techniques to ensure GI is being used and exploited accurately and is assisting commanders in their decisionmaking process. Some methods of exploitation include network analysis, pattern analysis, and geocoding.

Apply Advanced Theories of Remotely Sensed Imagery

Advances in imaging technologies have resulted in new generations of RSI platforms that are capable of collecting high-resolution terrain data and spectrums of light beyond the reflective region. This new data requires advanced theories for processing and exploitation into GEOINT products. Advanced theories and applications of RSI focus on radar, hyperspectral imagery, ultraspectral imagery, and MASINT.

Manage Dissemination of Geospatial Intelligence Products

Dissemination management involves establishing dissemination priorities, selecting dissemination means, and monitoring the flow of GEOINT throughout the intelligence community. The objective of dissemination management is to deliver the required GEOINT to the appropriate user in the proper form at the right time. Dissemination management is also used for security control that does *not* impede the timely delivery or subsequent use of GEOINT but that *does* protect intelligence sources and methods.

Manage Geospatial Intelligence Operations

Proper management of GEOINT operations provides a tailored view of the battlespace by supporting the various operations within the MAGTF. Geospatial intelligence must satisfy the following requirements:

- Query.
- Retrieval.
- Integration
- Deconfliction.
- Intensification.
- Analysis.
- Production.
- Storage.
- Dissemination.

Geospatial intelligence operations must be linked throughout planning, decision, execution, and assessment at all echelons.

Manage an Enterprise Geospatial Database

A geospatial database can be used to store and manipulate GI and GEOINT data in an organized and logical format to conduct analysis and production. The management of a geospatial database is vital to ensure accurate GI and products. Management operations will include the following:

- Verifying geospatial database schema.
- Supervising production strategy using an enterprise database.

- Maintaining geospatial database file structure.
- Overseeing geospatial database rules and relationship establishment.

Produce an Annex M

Annex M (Geospatial Information and Services) is the GI&S annex to OPLANs and OPORDs. Annex M provides the commander with a list of products required, information and databases available, and agencies and Services that can support the operation.

Produce an Appendix 15 to Annex B

The geographic intelligence specialist is required to produce a GI&I estimate. Appendix 15 (Geographic Intelligence) is a critical step between the tab A and the annex M.

Manage Geospatial Intelligence Volumetrics

Geospatial intelligence volumetrics can be evaluated by calculating the amount of GEOINT data that can be sent and received in a standard time period. The management of GEOINT volumetrics is vital to ensure GEOINT is being disseminated and used properly. Managing volumetrics involves consolidating all volumetric reports for the given intelligence, verifying GEOINT volumetrics, and disseminating volumetric reports to HHQ. These reports are vital for determining GEOINT system architecture and requirements.

Manage Production Strategies

Manage the planning and scheduling of multiple GEOINT production strategies in support of operational and intelligence requirements. Production management will identify manning, material, and budgeting and scheduling shortfalls in production requirements. It also allows for timely completion of GEOINT products.

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GLOSSARY

SECTION I. ACRONYMS AND ABBREVIATIONS

AA . . . . . avenue of approach
ACE . . . . . aviation combat element
AC/S . . . . . assistant chief of staff
ADRG . . . . . equal arc second raster chart/map digitized raster graphic
AGI . . . . . advanced geospatial intelligence
AGIS . . . . . advanced geospatial intelligence specialist
AOI . . . . . area of interest
AOR . . . . . area of responsibility
ATF . . . . . amphibious task force
ATFIC . . . . . amphibious task force intelligence center

BGIS . . . . . basic geospatial intelligence specialist

C2 . . . . . command and control
CAP . . . . . crisis action planning
CCDR . . . . . combatant commander
CCIR . . . . . commander's critical information requirement
CCM . . . . . cross-country movement
CG . . . . . city graphic
CIA . . . . . Central Intelligence Agency
CIB . . . . . controlled image base
CIC . . . . . combat intelligence center
CIS . . . . . communications and information systems
CJCSI . . . . . Chairman of the Joint Chiefs of Staff instruction
CMC . . . . . Commandant of the Marine Corps
CMD . . . . . collections management and dissemination
CM/DO . . . . . collection management/ dissemination officer
COA . . . . . course of action
COMMARFOR . . . . . commander, Marine Corps forces
CONOPS . . . . . concept of operations
CONUS . . . . . continental United States
COO . . . . . combined obstacle overlay
COP . . . . . common operational picture
CTP . . . . . common tactical picture

DBDB . . . . . digital bathymetric database
DC CD&I . . . . . Deputy Commandant for Combat Development and Integration
DGIL . . . . . deployable geospatial information library
DIA . . . . . Defense Intelligence Agency
DIRINT . . . . . Director of Intelligence
DMS . . . . . defense message system
DOD . . . . . Department of Defense
DODD . . . . . Department of Defense directive
DPPDB . . . . . digital point positioning database
DTAMS . . . . . Digital Terrain Analysis Mapping System
DTAMS-L . . . . . Digital Terrain Analysis Mapping System-Light
DTED . . . . . digital terrain elevation data
DZ . . . . . drop zone

EETI . . . . . essential elements of terrain information

°F . . . . . degrees Fahrenheit
FoS . . . . . family of systems

G-1 . . . . . assistant chief of staff, personnel
G-2 . . . . . assistant chief of staff, intelligence
G-3 . . . . . assistant chief of staff, operations
G-4 . . . . . assistant chief of staff, logistics
G-5 . . . . . assistant chief of staff, plans
G-6 . . . . . assistant chief of staff, communications system
GBS . . . . . Global Broadcast System
GCCS . . . . . Global Command and Control System
GCE . . . . . ground combat element
GDC . . . . . geophysical data collection
GEOINT . . . . . geospatial intelligence
GEOTRANS . . . . . geographic translation software
GI . . . . . geospatial information
GI&I . . . . . geospatial information and intelligence
GI&S . . . . . geospatial information and services
GID . . . . . Geospatial Intelligence Division

GIL . . . . . geospatial information library
GIS . . . . . geographic information system
GIST . . . . . geographic information support team
GIT . . . . . geospatial intelligence team
GPS . . . . . Global Positioning System
GS . . . . . general service

HHQ . . . . . higher headquarters
HLZ . . . . . helicopter landing zone
HQMC . . . . . Headquarters, Marine Corps
HUMINT . . . . . human intelligence

I&L . . . . . installations and logistics
IAS . . . . . intelligence analysis system
IIP . . . . . imagery intelligence platoon
IMINT . . . . . imagery intelligence
INTELINK . . . . . Intelligence Link
IOC . . . . . intelligence operations center
IPB . . . . . intelligence preparation of the battlespace
IPI . . . . . information planning intelligence
IR . . . . . intelligence requirement
ISC . . . . . intelligence support coordinator
ITD . . . . . interim terrain data

J-2 . . . . . intelligence directorate of a joint staff
J-6 . . . . . communications system directorate of a joint staff
JAC . . . . . joint analysis center
JCAPP . . . . . Joint Crisis Action Planning Process
JDISS . . . . . joint deployable intelligence support system
JFC . . . . . joint force commander
JIC . . . . . joint intelligence center
JIOC . . . . . joint intelligence operations center
JISE . . . . . joint intelligence support element
JMCIS . . . . . Joint Maritime Command Information System
JOG . . . . . joint operations graphic
JOG-A . . . . . joint operations graphic-air
JOPES . . . . . Joint Operation Planning and Execution System
JP . . . . . joint publication
JSCP . . . . . Joint Strategic Capabilities Plan
JTF . . . . . joint task force
JWICS . . . . . Joint Worldwide Intelligence Communications System

km . . . . . kilometer(s)
KOCOA . . . . . key terrain, observation and fields of fire, cover and concealment, obstacles, and avenues of approach

LAN . . . . . local area network
LCE . . . . . logistics combat element
LOC . . . . . line of communications
LOS . . . . . line of sight

m . . . . . meter(s)
MAGTF . . . . . Marine air-ground task force
MARCORSYSCOM . . . . . Marine Corps Systems Command
MARDIV . . . . . Marine division
MASINT . . . . . measurement and signature intelligence
MARSOC . . . . . United States Marine Corps Forces Special Operations Command
MAW . . . . . Marine aircraft wing
MCCC . . . . . Marine Corps Component Command
MCEN . . . . . Marine Corps enterprise network
MCGB . . . . . Marine Corps Geospatial Board
MCGC . . . . . Marine Corps Geospatial Council
MCGDB . . . . Marine Corps Geospatial Database
MCGIL . . . . . Marine Corps geospatial information library
MCIA . . . . . Marine Corps Intelligence Activity
MCISR-E . . . . . Marine Corps intelligence, surveillance, and reconnaissance-enterprise
MCOO . . . . modified combined obstacle overlay
MCPP . . . . . Marine Corps Planning Process
MCWP . . . Marine Corps warfighting publication
MEB . . . . . Marine expeditionary brigade
MEF . . . . . Marine expeditionary force
METOC . . . . meteorological and oceanographic
METT-T . . . . . mission, enemy, terrain and weather, troops and support available-time available
MEU . . . . . Marine expeditionary unit
MGRS . . . . . military grid reference system
MLG . . . . . Marine logistics group
MOS . . . . . military occupational specialty
MOUT . . . . . military operations on urbanized terrain
mph . . . . . miles per hour
MSC . . . . . major subordinate command
MSDS . . . . . mission-specific data set

MSE . . . . . major subordinate element
MSI . . . . . multispectral imagery

NGA . . . . . National Geospatial-Intelligence Agency
NGC . . . . . National Geospatial Intelligence College
NIPRNET . . . . . Nonsecure Internet Protocol Router Network
NIST . . . . . national intelligence support team
NSG . . . . . National System for Geospatial Intelligence
NST . . . . . National Geospatial-Intelligence Agency support team

OCAC . . . . . operations control and analysis center
OIC . . . . . officer in charge
ONC . . . . . operational navigation chart
OPIR . . . . . overhead persistent infrared
OPLAN . . . . . operation plan
OPORD . . . . . operation order

P&A . . . . . production and analysis
PFDB . . . . . planning factors database
PIR . . . . . priority intelligence requirement
PITD . . . . . planning interim terrain data
POC . . . . . point of contact

QRS . . . . . quick response system

RFI . . . . . request for intelligence
RSI . . . . . remotely sensed imagery

S-1 . . . . . personnel officer
S-2 . . . . . intelligence officer
S-3 . . . . . operations officer
S-4 . . . . . logistics officer
S-6 . . . . . communications system officer
SAR . . . . . synthetic aperture radar
SARC . . . . . surveillance and reconnaissance cell
SIGINT . . . . . signals intelligence
SIPRNET . . . . . SECRET Internet Protocol Router Network
SOA . . . . . sustained operations ashore
SOP . . . . . standing operating procedures
SPMAGTF . . . . . special purpose Marine air-ground task force

3-D . . . . . three-dimensional
TCPED . . . . . tasking, collection, production, exploitation, dissemination
TDN . . . . . tactical data network
TGIL . . . . . tactical geospatial information library
TIR . . . . . thermal infrared
TLM . . . . . topographic line map
TPC . . . . . topographic production capability
TPFDD . . . . . time-phased force and deployment data
TPFDL . . . . . time-phased force and deployment list
TTP . . . . . tactics, techniques, and procedures

US . . . . . United States
USIGS . . . . . United States Imagery and Geospatial Information System

VMap . . . . . vector map
VMapL1 . . . . . vector map level 1
VMapL2 . . . . . vector map level 2

WAN . . . . . wide-area network
WET . . . . . weather, enemy, and terrain
WGS 84 . . . . . World Geodetic System 1984
WRS . . . . . war reserve stock

SECTION II. DEFINITIONS

accuracy—1. The degree of conformity with a standard, or the degree of perfection attained in a measurement. Accuracy relates to the quality of a result and is distinguished from precision, which relates to the quality of the operation by which the result is obtained and can be repeated. 2. The closeness of the best estimated value obtained by the measurements to the "true" value of the quantity measured. (MIL-HDBK-850)

aeronautical chart—A specialized representation of mapped features of the Earth, or some part of it, produced to show selected terrain, cultural and hydrographic features, and supplemental information required for air navigation, pilotage, or for planning air operations. (JP 1-02)

aerospace—Of, or pertaining to, Earth's envelope of atmosphere and the space above it; two separate entities considered as a single realm for activity in launching, guidance, and control of vehicles that will travel in both entities.

all-source intelligence—Intelligence products and/or organizations and activities that incorporate all sources of information, most frequently including human intelligence, imagery intelligence, measurement and signature intelligence, signals intelligence, and open-source data in the production of finished intelligence. (Part 1 of a 2-part definition.) (JP 1-02)

arc—1. (topology) An individual line segment defined by a series of X, Y coordinate pairs. Nodes are at the ends of arcs and form the points of intersection between arcs. 2. (geodesy) A portion of a geodetic triangulation network, between two high-order stations. 3. Acronym for Equal Arc Second Raster Chart/Map. (MIL-HDBK-850) A unit of measurement used in surveys of the Earth and for describing distances for an environment encompassing curvature. (Dictionary of Science)

area of interest—That area of concern to the commander, including the area of influence, areas adjacent thereto, and extending into enemy territory. This area also includes areas occupied by enemy forces who could jeopardize the accomplishment of the mission. Also called **AOI**. (JP 1-02)

avenue of approach—An air or ground route of an attacking force of a given size leading to its objective or to key terrain in its path. Also called **AA**. (JP 1-02)

base map—A map or chart showing certain fundamental information, used as a base upon which additional data of specialized nature are compiled or overprinted. Also, a map containing all the information from which maps showing specialized information can be prepared. (MIL-HDBK-850)

battlespace—The environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly forces; facilities; weather; terrain; the electromagnetic spectrum; and the information environment within the operational areas, areas of interest, and areas of influence. (MCRP 5-12C)

cartography—The art and science of expressing graphically, by maps and charts, the known physical and political/administrative features of the Earth, or of another celestial body. (MIL-HDBK-850)

chart—1. A special-purpose map, generally designed for navigation or other particular purposes, in which essential map information is combined with various other data critical to the intended use. (Part 1 of a 2-part definition.) (MIL-HDBK-850)

coastal chart—A nautical chart intended for offshore navigation of vessels having a need for positions relative to the coast. Depicted information supports coastal navigation and military

operations. Produced from 1:100,000 to 1:1,000,000 scale. (MIL-HDBK-850)

collection—In intelligence usage, the acquisition of information and the provision of this information to processing elements. (JP 1-02) The gathering of intelligence data and information to satisfy the identified requirements. (MCRP 5-12C)

command and control—The exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, communications, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations in the accomplishment of the mission. (JP 1-02) This means by which a commander recognizes what needs to be done and sees to it that appropriate actions are taken. Command and control is one of the six warfighting functions. Also called **C2**. (MCRP 5-12C)

concealment—The protection from observation or surveillance. (MCRP 5-12C)

contour line—A line on a map or chart connecting points of equal elevation. (MIL-HDBK-850)

control marking—A note or other form of caveat shown on a mapping, charting, and geodetic product indicating a need for special handling and for controlled dissemination. (MIL-HDBK-850)

cover—In intelligence usage, those measures necessary to give protection to a person, plan, operation, formation, or installation from the enemy intelligence effort and leakage of information. (JP 1-02)

crisis support—The provision of a GI&I product or service, including those not previously validated, needed on a one-time or first time basis where the urgency of the requirement precludes normal processing and production programming action. Geospatial information and intelligence crisis support, as defined herein, is limited to situations directed by the office of the Joint Chiefs of Staff where the possibility exists that United States forces might be deployed.

cross-country movement study—A graphic or series of graphics and supporting text or tables portraying off-road movement conditions for specific vehicles or a group of vehicles. It is usually overprinted on a medium- or large-scale topographic map base. (MIL-HDBK-850)

database—Information in the form of physical files or formatted automated data processing system data files that is normally structured and indexed for user access and review. Databases may exist. (JP 1-02)

datum—Any numerical or geometrical quantity or set of such quantities which may serve as reference or base for other quantities. Where the concept is geometric, the plural form is "datums" in contrast to the normal plural "data." (MCRP 5-12C)

datum (geodetic)—1. 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. (Part 1 of a 2-part definition.) (JP 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**. (JP 1-02)

displacement—1. (cartography) The horizontal shift of the plotted position of a topographic feature from its true position, caused by required adherence to prescribed line weights and symbol sizes. (Part 1 of a 2-part definition.) (MIL-HDBK-850)

dissemination—Conveyance of intelligence to users in a suitable form. (MCRP 5-12C)

drainage—In mapping, all features associated with water, such as shorelines, rivers, lakes, marshes, etc. (MIL-HDBK-850)

editing—The process of checking a map or chart in its various stages of preparation to insure accuracy, completeness, and correct preparation from and interpretation of the sources used, and to assure legible and precise reproduction. Edits are usually referred to by a particular production phase, such as compilation edits, scribing edit, etc. (MIL-HDBK-850)

electromagnetic spectrum—The range of frequencies of electromagnetic radiation from zero to infinity. It is divided into 26 alphabetically designated bands. (JP 1-02) The entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light. Most remote sensing systems are designed to operate within the electromagnetic spectrum. (MIL-HDBK-850)

elevation—The vertical distance of a point or level on, or affixed to, the surface of the Earth measured from mean sea level.

equal arc second raster chart/map digitized raster graphic—Digital raster representations of paper graphics products. Maps/charts are converted into digital data by raster scanning and transforming the map image into the Equal Arc Second Raster Chart/Map System frame of reference. Used for electronic map displays. Also called **ADRG**. (MIL-HDBK-850)

essential elements of terrain information—Those aspects of the terrain, both natural and manmade, that are identified as critical to mission success. Also called **EETI**.

estimate—1. An analysis of a foreign situation, development, or trend that identifies its major elements, interprets the significance, and appraises the future possibilities and the prospective results of the various actions that might be taken. 2. An appraisal of the capabilities, vulnerabilities, and potential courses of action of a foreign nation or combination of nations in consequence of a specific national plan, policy, decision, or contemplated course of action. 3. An analysis of an actual or contemplated clandestine operation in relation to the situation in which it is or would be conducted in order to identity and appraise such factors as available as well as needed assets and potential obstacles, accomplishments, and consequences. (JP 1-02)

fires—The use of weapon systems to create specific lethal or nonlethal effects on a target. (JP 1-02) Those means used to delay, disrupt, degrade, or destroy enemy capabilities, forces, or facilities as well as affect the enemy's will to fight. Fires is one of the six warfighting functions. (MCRP 5-12C)

flight information and air facilities data—Data concerning airfields and seaplane stations and related information required for the operation of aircraft. (MIL-HDBK-850)

force protection—Preventive measures taken to mitigate hostile actions against Department of Defense personnel (to include family members), resources, facilities, and critical information. Actions or efforts used to safeguard own centers of gravity while protecting, concealing, reducing, or eliminating friendly critical vulnerabilities. Force protection is one of the six warfighting functions. Also called **FP**. (MCRP 5-12C)

gazetteer—An alphabetical list of place names giving feature identification and geographic and/or grid coordinates. (MIL-HDBK-850)

general chart—A nautical chart intended for offshore coastwise navigation. A general chart is of smaller scale than a coast chart, but of larger scale than a sailing chart. (MIL-HDBK-850)

geodesy—The science which deals with the determination of the size and figure of the Earth. (MIL-HDBK-850)

geodetic and geophysical data—Information or earth data, pertaining to the sciences of geodesy and geophysics. Typically includes gravity information, geodetic point positioning data, datum definition, etc. (MIL-HDBK-850)

geodetic survey—A survey in which the figure and size of the Earth is considered. It is applicable for large areas and long lines and is used for the precise location of basic points suitable for controlling other surveys. (MIL-HDBK-850)

geographic (geographical) —Signifying basic relationship to the Earth considered as a globe-shaped body. The term geographic is applied alike to data based on the geoid and on other spheroids. (MIL-HDBK-850)

geographic coordinates—The quantities of latitude and longitude which define the position of a point on the surface of the Earth with respect to the reference spheroid. (JP 1-02)

geoid—The equipotential surface in the gravity field of the Earth which approximates the undisturbed mean sea level extended continuously through the continents. The geoid is the surface of reference for astronomic observations and for geodetic leveling. (MIL-HDBK-850)

geospatial framework—A trusted, consistent set of geospatial information and supporting services that provides a coherent frame of reference to support the formation of an integrated view of the mission space. (DOD Geospatial Information Master Plan)

geospatial information—Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth, including: statistical data and information derived from, among other things, remote sensing, mapping, and surveying technologies; and mapping, charting, geodetic data and related products. (JP 1-02)

geospatial, information, and intelligence priorities—The priorities defined by the JCS for indicating the relative importance of GI&I geographical area and weapons systems support requirements. The priorities are used as one of the factors in allocating NGA production resources. Priority definitions are contained in the Joint Strategic Planning Document. (CJCSI 3901.01)

geospatial, information, and intelligence product—A specific item (i.e., map, chart, digital tape, report) approved by NGA to support military, intelligence, and statutory requirements.

geospatial information and services—The 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. Geospatial services include tools that enable users to access and manipulate data, and also include instruction, training, laboratory support, and guidance for the use of geospatial data. Also called **GI&S**. (JP 1-02)

geospatial information and services requirement—A validated statement of need for a geospatial information and services product or service identified by a user to support his operational and training requirements, stated in terms of specific geographic areas and installations, and intended uses and/or accuracies required.

geospatial intelligence—The exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth. Geospatial intelligence consists of imagery, imagery intelligence, and geospatial information. Also called **GEOINT**. (JP 1-02)

Global Command and Control System—A deployable command and control system supporting forces for joint and multinational operations across the range of military operations with compatible, interoperable, and integrated communications systems. Also called **GCCS**. (JP 1-02)

global information infrastructure—The worldwide interconnection of communications networks, computers, databases, and consumer electronics that make vast amounts of information available to users. The global information infrastructure encompasses a wide range of equipment, including cameras, scanners, keyboards, facsimile machines, computers, switches, compact disks, video and audio tape, cable, wire, satellites, fiber-optic transmission lines, networks of all types, televisions, monitors, printers, and much more. The friendly and adversary personnel who make decisions and handle the transmitted information constitute a critical component of the global information infrastructure. Also called **GII**. (JP 1-02)

global navigation chart—A 1:5,000,000 scale series of multicolored charts designed for general planning purposes for operations involving long distances or large areas of in-flight navigation in long range, high altitude, high speed aircraft. Also called **GNC**.

gradient—The rate of inclination to horizontal expressed as a ratio, such as 1:25, indicating a one unit rise to 25 units of horizontal distance. (JP 1-02) 1. A rate of rise or fall of a quantity against horizontal distance expressed as a ratio, decimal, fraction, percentage, or the tangent of the angle of inclination. Also called **the percentage of slope**. 2. The rate of increase or decrease of one quantity with respect to another. (MIL-HDBK-850)

graphic—Any and all products of the cartographic and photogrammetric art. A graphic may be either a map, chart, mosaic, or even a film strip that was produced using cartographic techniques. (MIL-HDBK-850)

grid—1. Two sets of parallel lines intersecting at right angles and forming squares; the grid is superimposed on maps, charts, and other similar representation of the Earth's surface in an accurate and consistent manner in order to permit identification of ground locations with respect to other locations and the computation of direction and distance to other points. 2. A term used in giving the location of a geographic point by grid coordinates. (JP 1-02)

harbor chart—A nautical chart intended for navigation and anchorage in harbors and smaller waterways. (MIL-HDBK-850)

hydrographic chart—A nautical chart showing depths of water, nature of bottom, contours of bottom and coastline, and tides and currents in a given sea or sea and land area. Also called **marine map; nautical chart**. (MIL-HDBK-850)

hydrography—1. The science which deals with the measurements and description of the physical features of the oceans, seas, lakes, rivers, and their adjoining coastal areas, with particular reference to their use for navigational purposes. 2. That part of topography pertaining to water and drainage features. (MIL-HDBK-850)

imagery—A likeness or presentation of any natural or man-made feature or related object or activity, and the positional data acquired at the same time the likeness or representation was acquired, including: products produced by space-based national intelligence reconnaissance systems; and likeness and presentations produced by satellites, airborne platforms, unmanned aerial vehicles, or other similar means (except that such term does not include handheld or clandestine photography taken by or on behalf of human intelligence collection organizations). (JP 1-02)

imagery intelligence—The technical, geographic, and intelligence information derived through the interpretation or analysis of imagery and collateral materials. Also called **IMINT**. (JP 1-02)

intelligence—The product resulting from the collection, processing, integration, evaluation, analysis, and interpretation of available information concerning foreign nations, hostile or potentially hostile forces or elements, or areas of actual or potential operations. The term is also applied to the activity which results in the product and to the organizations engaged in such activity. (JP 1-02) (Marine Corps amplification follows.) Knowledge about the enemy or the surrounding environment needed to support decisionmaking. Intelligence is one of the six warfighting functions. (MCRP 5-12C)

intelligence cycle—A six-step process by which information is converted into intelligence and made available to users. The six steps are planning and direction, collection, processing and exploitation, production, dissemination, and utilization. (MCRP 5-12C)

intelligence operations—The variety of intelligence and counterintelligence tasks that are carried out by various intelligence organizations and activities within the intelligence process. (JP 1-02)

intelligence preparation of the battlespace—The analytical methodologies employed by the Services of joint force component commands to reduce uncertainties concerning the enemy, environment, time, and terrain. Intelligence preparation of the battlespace supports the individual operations of the joint force component commands. Also called **IPB**. (JP 1-02) The systematic, continuous process of analyzing the threat and environment in a specific geographic area. (MCRP 5-12C)

intelligence requirement(s) —1. Any subject, general or specific, upon which there is a need for the collection of information, or the production of intelligence. 2. A requirement for intelligence to fill a gap in the command's knowledge or understanding of the operational environment or threat forces. (JP 1-02) Questions about the enemy and the environment, the answers to which a commander requires to make sound decisions. Also called **IR**s. (MCRP 5-12C)

intensification—The process of increasing the density of information contained in the geospatial database or increasing the amount of attribute information associated with a known feature.

interoperability—1. The ability to operate in synergy in the execution of assigned tasks. 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. (JP 1-02)

jet navigation chart—A 1:2,000,000 scale, coordinated series of multicolored charts, designed to satisfy long range navigation of high-altitude, high-speed aircraft. Also called a **JNC**. (MIL-HDBK-850)

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. (JP 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**. (JP 1-02)

joint intelligence center—The intelligence center of the joint force headquarters. The joint intelligence center is responsible for providing and producing the intelligence required to support the joint force commander and staff, components, task forces and elements, and the national intelligence community. Also called **JIC**.

joint operation planning—Planning activities associated with joint military operations by combatant commanders and their subordinate joint force commanders in response to contingencies and crises. (JP 1-02)

Joint Operation Planning and Execution System—An adaptive planning and execution system technology. Also called **JOPES**. (JP 1-02)

joint operations—A general term to describe military actions conducted by joint forces and those Service forces employed in specific command relationships with each other, which of themselves, do not establish joint forces. (JP 1-02)

joint operations graphic—The standard 1:250,000 scale Department of Defense cartographic product which may be produced in any of the following three versions to meet the validated unified and specified commands and military departments area requirements: the JOG/G (Series 1501) is designed to meet ground use requirements; JOG/A (Series 1501 Air) is designed to meet air use requirements; and JOG/R (Series 1501 Radar) is the Air Target Material version in support of radar/intelligence planning and operations requirements. Also called **JOG**. (MIL-HDBK-850)

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**. (JP 1-02)

key terrain—Any locality, or area, the seizure or retention of which affords a marked advantage to either combatant. (JP 1-02)

large-scale map—A map having a scale of 1:75,000 or longer. (JP 1-02)

level of detail—Within the current joint planning and execution system, movement characteristics for both personnel and cargo are described at six distinct levels of detail. Levels I, V, and VI describe personnel and Levels I through IV and VI for cargo. Levels I through IV are coded and visible in the Joint Operation Planning and Execution System automated data processing. Levels V and VI are used by Joint Operation Planning and Execution System automated data processing feeder systems. a. **level I**–personnel: expressed as total number of passengers by unit line number. Cargo: expressed in total short tons, total measurement tons, total square feet, and total thousands of barrels by unit line number. b. **level II**–cargo: expressed by short tons and measurement tons of bulk, oversize, outsize, and non-air transportable cargo by unit line number. Also square feet for vehicles and nonself-deployable aircraft and boats by unit line number. c. **level III**–cargo: detail by cargo category code expressed as short tons and measurement tons as well as square feet associated to that cargo category code for an individual unit line number. d. **level IV**–cargo: detail for individual dimensional data expressed in length, width, and height in number of inches, and weight/volume in short tons/measurement tons, along with a cargo description. (Each cargo item is associated with a cargo category code and a unit line number). e. **level V**–personnel: any general summarization/aggregation of level VI detail in distribution and deployment. f. **level VI**–personnel: detail expressed by name, Service, military occupational specialty and unique identification number. Cargo: detail expressed by association to a transportation control number or single tracking number or item of equipment to include federal stock number/national stock number and/or requisition number. Nested cargo, cargo that is contained within another equipment item, may similarly be identified. Also called **JOPES level of detail**. (JP 1-02)

line of communications—A route, either land, water, and/or air, that connects an operating military force with a base of operations and along which supplies and military forces move. Also called **LOC**. (JP 1-02)

logistics—Planning and executing the movement and support of forces. It includes those aspects of military operations that deal with: a. design and

development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of materiel; b. movement, evacuation, and hospitalization of personnel; c. acquisition or construction, maintenance, operation, and disposition of facilities; and d. acquisition or furnishing of services. (JP 1-02) 1. The science of planning and executing the movement and support of forces. 2. All activities required to move and sustain military forces. Logistics is one of the six warfighting functions. (MCRP 5-12C)

maneuver—1. A movement to place ships, aircraft, or land forces in a position of advantage over the enemy. 2. A tactical exercise carried out at sea, in the air, on the ground, or on a map in imitation of war. 3. The operation of a ship, aircraft, or vehicle, to cause it to perform desired movements. 4. Employment of forces in the operational area through movement in combination with fires to achieve a position of advantage in respect to the enemy. (JP 1-02) The movement of forces for the purpose of gaining an advantage over the enemy. Maneuver is one of the six warfighting functions. (MCRP 5-12C)

map—1. A graphic representation, usually on a plane surface and at an established scale of natural and artificial features on the surface of a part or the whole of the Earth or other planetary body. The features are positioned relative to a coordinate reference system. 2. To prepare a map or engage in a mapping operation. (MIL-HDBK-850)

mapping—The transformation of likelihood vectors from a given object class into another object class by application of mapping matrices. (AAP-28)

map reference—A means of identifying a point on the surface of the Earth by relating it to information appearing on a map, generally the graticule or grid.

map series—A group of maps or charts usually having the same scale and cartographic specifications, and with each sheet appropriately identified by producing agency as belonging to the same series. (MIL-HDBK-850)

marginal data—All explanatory information given in the margin of a map or chart which clarifies, defines, illustrates, and/or supplements the graphic portion of the sheet. Also called **border data; border information; margin information**. (MIL-HDBK-850)

Marine Corps Planning Process—A six-step methodology which helps organize the thought process of the commander and staff throughout the planning and execution of military operations. It focuses on the mission and the threat and is based on the Marine Corps philosophy of maneuver warfare. It capitalizes on the principle of unity of command and supports the establishment and maintenance of tempo. The six steps consist of problem framing, course of action development, course of action war game, course of action comparison and decision, orders development, and transition. Also called **MCPP**. (MCRP 5-12C)

medium-scale map—A map having a scale larger than 1:600,000 and smaller than 1:75,000. (JP 1-02)

meteorology—The study dealing with the phenomena of the atmosphere including the physics, chemistry, and dynamics extending to the effects of the atmosphere on the Earth's surface and the oceans. (JP 1-02)

military grid reference system—1. The alphanumeric position reporting system used by US Military. 2. (JCS) A system which uses a standard-scaled grid square, based on a point of origin on a map projection of the Earth's surface in an accurate and consistent manner to permit either position referencing or the computation of direction and distance between grid positions. Also called **MGRS**. (MIL-HDBK-850)

mission-specific data set—Further densification of global geospatial foundation data. Information

created to support specific operations, operation plans, training, or system development. Information conforms to established Department of Defense data specifications. Also called **MSDS**. (JP 1-02)

mobility corridor—Areas where a force will be canalized due to terrain restrictions. They allow military forces to capitalize on the principles of mass and speed and are therefore relatively free of obstacles. (JP 1-02)

modified combined obstacle overlay—A joint intelligence preparation of the operational environment product used to portray the militarily significant aspects of the operational environment, such as obstacles restricting military movement, key geography, and military objectives. Also called **MCOO**. (JP 1-02)

new edition—Contains changes of such importance to map or chart users that all previous printings are made obsolete. (MIL-HDBK-850)

national intelligence support team—A nationally sourced team composed of intelligence and communications experts from various intelligence community agencies and groups. Also called **NIST**. (JP 2-0)

noncombatant evacuation operations—Operations directed by the Department of State or other appropriate authority, in conjunction with the Department of Defense, whereby noncombatants are evacuated from foreign countries when their lives are endangered by war, civil unrest, or natural disaster to safe havens as designated by the Department of State. Also called **NEO**s. (JP 1-02)

obstacle—Any natural or man-made obstruction designed or employed to disrupt, fix, turn, or block the movement of an opposing force, and to impose additional losses in personnel, time, and equipment on the opposing force. (JP 1-02)

oceanography—The study of the sea, embracing and integrating all knowledge pertaining to the sea and its physical boundaries, the chemistry and physics of seawater, and marine biology. From a military perspective, oceanography includes basic oceanography plus the study of bathymetry, hydrography, geophysics, astrometry and precise time; supported by ocean engineering, operational supercomputing, and operations research. (JP 1-02)

operational need—The relative importance of an individual product item or request for service. The Department of Defense component or federal agency uses the service provided guidance for product significance or a product line to a force or system and applies it to a specific operational situation.

operational navigation chart—The standard worldwide small-scale (1:1,000,000) aeronautical chart series. It contains cartographic data with an aeronautical overprint depicting obstructions, aerodromes, etc., designed for medium altitude high-speed visual and radar navigation. Also used for mission planning/analysis and intelligence briefings. Also called **ONC**. (MIL-HDBK-850)

original classification—An initial determination that information requires, in the interest of national security, protection against unauthorized disclosure. The original classification authority is an individual authorized in writing, either by the President, or by agency heads or other officials designated by the President, to classify information in the first instance. (Executive Order 12958)

orthorectification—In photogrammetry, the process of removing geometric distortions in an image caused by sensor tilt and terrain relief, and projecting the resulting image onto a map projection system. (AAP-06)

overprint—1. Information printed or stamped upon a map or chart, in addition to that originally printed, to show data of importance or special use. Also called **surprint**. 2. A feature of a composite map image incidentally printed so as to interfere with another feature. (MIL-HDBK-850)

planning factors database—Databases 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 database identifies: unit requirements at the information content level, for geospatial data and services; system requirements for standard Department of Defense 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**. (JP 1-02)

priority intelligence requirement—An intelligence requirement, stated as a priority for intelligence support, that the commander and staff need to understand the adversary of other aspects of the operational environment. Also called PIR. (JP 1-02) (Marine Corps amplification follows.) An intelligence requirement associated with a decision that will critically affect the overall success of the command's mission. (MCRP 5-12C)

product—The end item produced from geospatial information and intelligence source material for distribution in an appropriate medium, such as lithographic chart/map, video disc, compact disc read-only memory, write once read many, magnetic tape, computer printout, etc. The regulations regarding geospatial information and intelligence products are applicable regardless of the medium in which the final product is distributed.

profile—1. A vertical section of the surface of the ground, or of underlying strata, or both, along any fixed line. 2. Elevation of the terrain along some definite line. Elevations are measured at a sufficient number of points to enable defining the configuration of the ground surface. (MIL-HDBK-850)

reachback—The process of obtaining products, services, and applications, or forces, or equipment, or material from organizations that are not forward deployed. (JP 1-02) (Marine Corps amplification follows.) The ability to exploit resources, capabilities, expertise, etc., not physically located in the theater or joint operations area, when established. (MCRP 5-12C)

recompilation—The process of producing a map or chart that is essentially a new item and which replaces a previously published item. Normally, recompilation of a map or chart involves significant change to the horizontal position of features, revision of vertical values, improvement in planimetric or navigational data, or any combination of these factors. (MIL-HDBK-850)

reconnaissance—A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or adversary, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. Also called **RECON**. (JP 1-02)

release—The physical issuance of classified or unclassified Geospatial Information and Intelligence information or released data to a United States national, an official representative of a foreign government or international organization who possesses the necessary clearance and has the need-to-know. The issuance is to be made in concert with the Naval Doctrine Publication-1 and is in the best interest of the United States.

relief—Inequalities of elevation and the configuration of land features on the surface of the Earth which may be represented on maps or charts by contours, hypsometric tints, shading, spot elevations, or hachures. (MIL-HDBK-850)

road map—A medium- or small-scale special-purpose map, generally showing only planimetric detail, with emphasis upon the road network and related data. Its main purpose is to furnish pertinent road information for tactical and administrative troop movement. (MIL-HDBK-850)

sailing chart—A small-scale chart used for offshore sailing between distant coastal ports and

for plotting the navigator's position out of sight of land and as he approaches the coast from the open ocean. They show offshore soundings and the most important lights, outer buoys, and natural landmarks which are visible at considerable distances. (MIL-HDBK-850)

sailing directions—A descriptive book for the use of mariners, containing detailed information of coastal waters, harbor facilities, etc. Also called **coast pilot**. (MIL-HDBK-850)

scale—1. The ratio or fraction between the distance on a map, chart, or photograph and the corresponding distance on the surface of the Earth. 2. A series of marks or graduations at definite intervals on a measuring device or instrument. 3. Measurement by means of a scale. (MIL-HDBK-850)

situational awareness—Knowledge and understanding of the current situation that promotes timely, relevant, and accurate assessment of friendly, enemy, and other operations within the battlespace in order to facilitate decisionmaking. An informational perspective and skill that foster an ability to determine quickly the context and relevance of events that are unfolding. Also called **SA**. (MCRP 5-12C)

source material—Data of any type required for the production of geospatial information and intelligence products including, but not limited to ground control, aerial and terrestrial photographs, sketches, maps, and charts; topographic, hydrographic, hypsographic, magnetic, geodetic, oceanographic, and meteorological information; intelligence documents and written reports pertaining to natural and man-made features of the area to be mapped or charted. (MIL-HDBK-850)

staff cognizance—The broad responsibility and authority over designated staff functions assigned to a general or executive staff officer (or their subordinate staff officers) in their area of primary interest. These responsibilities and authorities can range from coordination within the staff to the assignment or delegation to the staff officer by the commander to exercise the commander's authority for a specified warfighting function or subfunction. Staff cognizance includes the responsibility for effective use of available resources and may include the authority for planning the employment of, organizing, assigning tasks, coordinating, and controlling forces for the accomplishment of assigned missions. Marine Corps orders and doctrine provide the notional staff cognizance for general or executive staff officers, which may be modified by the commander to meet mission requirements. (MCRP 5-12C)

stereoscopic—Of or pertaining to the science which deals with three-dimensional effects and the methods by which they are produced. (MIL-HDBK-850)

sustained operations ashore—The employment of Marine Corps forces on land for an extended duration. It can occur with or without sustainment from the sea. Also called **SOA**. (MCRP 5-12C)

tactical intelligence—Intelligence required for the planning and conduct of tactical operations. (JP 1-02) (Marine Corps amplification follows.) Intelligence concerned primarily with the location, capabilities, and possible intentions of enemy units on the battlefield and the tactical aspects of terrain and weather within the battlespace. (MCRP 5-12C)

terrain analysis—The collection, analysis, evaluation, and interpretation of geographic information on the natural and manmade features of the terrain, combined with other relevant factors, to predict the effect of the terrain on military operations. (JP 1-02)

thematic layer—A map layer designed to portray a specific set of geographic features (such as transportation, vegetation or drainage features).

topographic map—A map which presents the vertical position of features in measurable form as well as their horizontal positions. Also called **JCS**. (MIL-HDBK-850)

topography—The configuration of the ground to include its relief and all features. Topography addresses both dry land and the sea floor (underwater topography). (JP 1-02)

warfighting functions—The six mutually supporting military activities integrated in the conduct of all military operations. The six warfighting functions are command and control, fires, force protection, intelligence, logistics, and maneuver. (MCRP 5-12C)

war reserve stock—That portion of total materiel assets designated to satisfy the war reserve materiel requirement. Also called **WRS**. (JP 1-02)

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REFERENCES AND RELATED PUBLICATIONS

Federal Publications

United States Code, Title 10, Armed Forces, part 1, chapter 22, subchapter IV, section 467, Definitions

Department of Defense Issuances

Department of Defense Directives (DODDs)

5105.60	National Geospatial-Intelligence Agency (NGA)
5200.1	DOD Information Security Program
5230.11	Disclosure of Classified Military Information to Foreign Governments and International Organizations
5230.24	Distribution Statements on Technical Documents

Department of Defense Instruction (DODI)

5000.56	Programming Geospatial-Intelligence (GEOINT), Geospatial Information and Services (GI&S), and Geodesy Requirements for Developing Systems

Chairman Joint Chiefs of Staff Instructions (CJCSIs)

3900.01_	Position (Position and Area) Reference Procedures
3901.01_	Requirements for Global Geospatial Information and Services

Joint Publications (JPs)

1	Doctrine for the Armed Forces of the United States
1-02	Department of Defense Dictionary of Military and Associated Terms
2-0	Joint Intelligence
2-01	Joint and National Intelligence Support to Military Operations
2-03	Geospatial Intelligence in Joint Operations
3-0	Joint Operations
3-02	Amphibious Operations
3-06	Joint Urban Operations
3-07	Stability Operations
3-59	Meteorological and Oceanographic Operations
4-0	Joint Logistics
5-0	Joint Operation Planning
6-0	Joint Communications System

Secretary of the Navy Instruction (SECNAVINST)

M5510.36	Department of the Navy Information Security Program

National Geospatial-Intelligence Agency (NGA) and National Imagery and Mapping Agency Publications(s)

5200.1	Information Security Program
8510.3.	Distribution of Gazetteers
8660.1	Procedures for Request, Release, Handling, and Distribution of Defense Mapping Agency Mapping, Charting, and Geodesy Digital products
8900.1	Department of Defense Mapping, Charting, and Geodesy Training at the Defense Mapping School
DMS NO ST 005	Geometric Geodetic Accuracy Standards and Specs for Using GPS
DMS NO ST 031	Standards and Specifications for Geodetic Control Networks
DMS ST 003	Comprehensive Review of Mathematics
NGS ST 605	Introduction to Survey Mathematics and Electronic RPN Calculator
DMA TM 8350.2	Universal Transverse Mercator and Polar Stereographic
DMA TM 8358.1	Datums, Ellipsoids, Grids and Grid Reference Systems
DMA TR 8358.2	World Geodetic System 1984
EM 1110-1-1003	NAVSTAR Global Positioning System Surveying
EM 1110-1-1005	Engineering and Design Control and Topographic Surveying

Chief of Naval Operations Instructions (OPNAVINSTs)

5510.1	Department of the Navy Information and Personnel Security Program Regulations

Military Standard (MIL-STD)

MIL-HDBK-850	Military Handbook: Glossary of Mapping, Charting, and Geodetic Terms

Naval Doctrinal Publications (NDPs)

1	Naval Warfare

Army Publications

Army Tactics, Techniques, and Procedures (ATTPs)

3-18.12	Air Assault Operations
3-34.80	Geospatial Engineering

Army Field Manuals (FMs)

1-02	Operational Terms and Graphics
3-25.26	Map Reading and Land Navigation
3-34.331	Topographic Surveying
3-06	Urban Operations

Marine Corps Publications

Marine Corps Doctrinal Publications (MCDPs)

1	Warfighting
2	Intelligence

5	Planning
6	Command and Control

Marine Corps Warfighting Publications (MCWPs)

3-40.3	MAGTF Communications System
3-40.8	Componency
2-1	Intelligence Operations
2-21	Imagery Intelligence
3-2	Aviation Operations
3-17.4	Engineer Reconnaissance
3-35.7	MAGTF Meteorology and Oceanography Support
5-1	Marine Corps Planning Process

Marine Corps Reference Publications (MCRPs)

2-3A	Intelligence Preparation of the Battlefield/Battlespace
2-25A	Reconnaissance Reports Guide
3-17.7G	Military Soils Engineering
3-17.7H	Materials Testing
3-17A	Engineer Field Data
5-12C	Marine Corps Supplement to the Department of Defense Dictionary of Military and Associated Terms

Marine Corps Intelligence Agency Publications

MCIA-1549-005-03	Generic Intelligence Requirements Handbook (GIRH)
MCIA-1586-005-99	Urban Generic Information Requirements Handbook (UGIRH)
MCIA-2112-004-03	Riverine Generic Information Requirements Handbook (R-GIRH)

Federal Aviation Administration

FAA 405	Standards for Aeronautical Surveys and Related Products

Miscellaneous

Marine Corps Midrange Threat Estimate: 2005–2015

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