CHAPTER 1

Topographic Engineer Functions, Organizations, Responsibilities, and Relationships

IMPORTANCE OF TOPOGRAPHIC ENGINEERING

Throughout history, the physical effects of terrain and weather have played a major role in the development of society. During wartime, the effects of terrain and weather take on a different, but no less important, role. Knowledge of the terrain on which a battle is to be fought is important during all phases and levels of military planning. Commanders can influence the outcome of battle by exploiting the limits and advantages of terrain as a combat multiplier. Commanders will win in battle through rigorous application of METT-T:

- Mission.
- Enemy.
- Terrain and weather.
- Troops,
- Time available.

The unit commander is responsible for effectively making use of the terrain during military operations. The engineer is responsible for allowing the commander to see as much of the terrain as possible. By obtaining and providing information on the configuration of the physical surface of the earth, the engineer ensures that the supported commander can better visualize the battlefield.

Doctrine in FM 100-5 details how US Army forces fight in today's battle. US forces must be prepared to fight in the full range of combat situations anywhere in the world. Threat forces may use—

- Weapons of mass destruction.
  - —Nuclear arms.
  - —Biological.
  - —Chemical.
- Complex technology.
- Conventional weapons and tactics.
- Unconventional tactics.

Regardless of conditions, US forces must generate superior combat power at decisive times and places.

While there are no simple formulas for winning, certain key factors are critical for the success of military operations. One critical factor is the topographic engineering support provided to the combined arms team.

The goal or mission of topographic operations is to ensure that timely, accurate, and sufficient knowledge of the battle space will be provided to each commander throughout all phases of combat operations.

Topographic support includes—

- Geodetic survey control for precise positioning for artillery, aviation, intelligence, and signal.
- Map substitutes.

- Tactical decision aids for commanders necessary for control, communications, intelligence, and weapons systems.
- Terrain mobility and intervisibility information for targeting and force protection.

Normally, standard topographic products used in support of combat operations will be provided by the DMA or by host nations through international agreements negotiated by the DMA. Army topographic units supplement and enhance the DMA's efforts. They provide the maneuver commander with specific tailored products reflecting the current state of the terrain. When standard topographic products are not readily available, Army topographic units provide image-based products as map substitutes and other tailored topographic products from data available.

TOPOGRAPHIC FUNCTIONS

Topographic engineers provide timely, accurate knowledge of the battlefield and terrain visualization to operational commanders and staffs at all echelons throughout the operational continuum. Knowledge of the battlefield consists of information in narrative or graphic format describing the effects of terrain and weather on military operations. The ability of the commander to "see the battlefield" in all weather conditions before the battle will help him to develop dynamic operational plans; shape the area of operations; and locate, engage, and defeat the enemy with a more agile, synchronized force. The terrain information and tactical decision aids developed by Army engineers provide the basic terrain reference for land and air forces as well as other DOD and non-DOD agencies.

Critical Tasks of the Topographic Engineer

Critical tasks of the topographic engineer include—

- Commanding and controlling topographic units and providing mapping, charting, and geodesy (MC&G) planning.
- Deploying topographic units.
- Collecting, creating, updating, validating, and managing topographic information.
- Producing special topographic products.
- Disseminating special topographic products,

Terrain Analysis. Terrain analysis is the process of interpreting natural and man-made features of a geographic area. It interprets the influence of weather and climate on these features to predict their effect on military operations. The products of terrain analysis may include, but are not limited to, those listed in *Table 1-1*, which correlates the military aspects of terrain as they relate to some common terrain analysis products.

Terrain analysis is the focus of Army topographic operations. When the DMA-produced data base is available, the terrain anlayst uses this as a starting point for analysis of a geographic area. This consists of a series of terrain factor overlays at 1:50,000 or 1:250,000 scales. The analyst modifies and updates the data bases using data collected from the field. The data collected includes information supplied through host nations and current and all-source intelligence. All this together allows the analyst to supply an up-to-date picture of the battle space.

The DMA standard factor overlays used in studying the terrain are-

- Vegetation.
- Surface configuration (slope).
- Surface drainage.
- Surface materials (soils).
- Obstacles.
- Transportation.
- Water resources (1:250,000 scale only).

Table 1-1. Terrain analysis support.

Military Aspects of Terrain (OCOKA)	Elements of Terrain Information	Examples of Terrain Analysis Products
Observation/fields of fire	• Vegetation (summer and winter) • Surface configuration • Battlefield environmental effects on the terrain • Urban areas	• Horizontal line-of-sight for direct-fire weapons, antennas, and radar • Emplacement suitability for ground surveillance
Cover and concealment	• Vegetation (summer and winter) • Surface configuration • Obstacles (microrelief) • Battlefield environmental effects on terrain • Urban areas	• Cover potential from direct and indirect fire (good/fair/poor) • Concealment potential from horizontal and vertical observation (good/fair/poor)
Obstacles	• Vegetation (summer and winter) • Surface configuration • Drainage characteristics • Natural and man-made • Microrelief • Surface materials (wet and dry) • Urban areas	• Location of existing natural and man-made obstacles • Mobility potential on the battlefield expressed in GO, SLOW-GO, and NO-GO for track and wheeled vehicles
Key terrain	• Urban areas • Lines of communication • Surface configuration • Drainage characteristics	• Location of key terrain features, both natural and man-made. Examples are bridges, choke points, high ground, and key military facilities.
Avenues of approach	• Vegetation (summer and winter) • Urban areas • Surface configuration • Surface materials (wet and and dry) • Drainage characteristics • Lines of communication	• Mobility corridors • Drop zones • Landing zones • Landing beaches • NOE navigation

In addition to DMA standard factor overlays, the following assets may be utilized by the terrain analyst:

- Ž Multi-spectral imagery (MSI) and national imagery.
- Ž Digital terrain elevation data (DTED).
- • Digital feature analysis data (DFAD).
- • Interim terrain data (ITD).
- Ž Terrain studies.
- Ž Special products such as geology, soils, and vegetation.
- Ž Library.

The analyst, uses information from these sources to produce terrain analysis products.

Using weather information and data provided by the staff weather officer (SWO), and operational parameters for tactical equipment, the commander is provided with an analysis by the G2 or S2 of the expected effects of terrain and weather on future operations.

Terrain teams prepare and present their findings in several forms: oral, graphic, image-based, or textual, depending on the commander's need. Resulting products include cross-country movement (CCM) (wet or dry), lines-of-communication, river-crossing, and cover-and-concealment information. Terrain analysis products are provided in limited quantities for staff use and maintained in local data bases.

Graphics, data tables, and textual evaluations and descriptions are characteristic of prebattle and postbattle responses. Most of the responses during battle, particularly at division level, may be verbal. Responsiveness within the time frame established by the commander is very important. Emphasis can be placed on the informational content and not on appearance. Rapid-response products are provided to meet tight time requirements. If the terrain analysis team cannot respond to a commander's need, and time allows, the requirement is forwarded to the next higher topographic unit for completion.

Where the DMA data base is not available, echelons above corps (EAC) and corps topographic units are responsible for creating terrain data base materials that can be used by division terrain teams for the production of topographic products.

Terrain analysts are responsible for analyzing the effects of the weather on the terrain. Some examples are—

- Effects of soil moisture on mobility (cross-country movement, equipment, and personnel).
- Effects of smoke on intervisibility (sensor line of sight).
- Effects of fog on nap-of-the-earth (NOE) flying.
- Effects of rainfall on fording and river crossing.

Terrain analysis products can be no more accurate than the accuracy and currency of the terrain data in the topographic data base. Terrain analysts have the responsibility of advising users of the limitations based on lack of data, currency, or accuracy of the data base.

Production. This function includes the cartographic production of image- or map-based graphics, reproduction of these graphics, and the production of topographic survey data. Cartography is the art and science of graphically portraying physical and man-made features of the earth, usually as a map, chart, or image-based photomap.

Topographic units use cartographic and reproduction techniques in the production of image- and map-based graphics to-

- Support an operation.
- Supplement or replace old or nonexistent standard products.
- Overprint terrain information not on standard products.
- Produce multiple copies required for distribution.

Production capabilities are used to make-

- Operations and intelligence overlays and overprints.
- Map substitutes (to include image-based maps).
- Expedient revisions or updates to standard maps.
- Draft manuscripts of terrain-analysis overlays and graphics.
- Special purpose products (see *Table 1-1, page 1-3, and Table 1-2).*
- Precise survey and geodetic positions.
- Digital data (transform, develop, or duplicate).

Table 1-2. Topographic support to Army systems.*

Army Systems	Standard Products	Special-Purpose Products (Produced by Topographic Engineer Units)
Command and control	• Standard topographic maps: 1:50,000** 1:250,000 (Joint operations graphic (JOG)) • Gazetteers • Air target materials • City graphics • JOG • DTED • ARC Digitized Raster (Graphics)	• Terrain analysis (see note) • Image maps • Minor map update • Military operations on urbanized terrain (MOUT) analysis • Weather effects on terrain • War damage analysis • Lines of communication • Operations and intelligence overlays and overprints
Maneuver	• Standard topographic maps: 1:50,000** 1:250,000(JOG) • Standard terrain analysis products: CCM for the main battle tank (MBT) Transportation—road and bridge maps • FLIPs • Vertical obstruction data (VOD)	• CCM analysis for all types of Army vehicles (wet and dry conditions) • CCM analysis for threat vehicles (wet and dry conditions) • Route analysis • Zones of entry • Nonstandard maps • Image maps • River- or gap-crossing information • Cover and concealment • NOE (aviation support) • MOUT analysis • Flood prediction
Weapon sytems	• Standard topographic maps: 1:50,000** 1:250,000(JOG) PPDB • Trig lists • DTED • DFAD • Air target materials • Geodetic survey control points (first order)	• Line of sight • Geodetic survey control points (second order) • Nonstandard maps • Image maps • Deep battle target interdiction analysis • Cover and concealment • Route analysis
Combat suport and combat service support	• Standard topographic maps: 1:50,000** 1:250,000(JOG) • Transportation—road and bridge maps	• Route analysis • CCM analysis for all types of Army vehicles (wet and dry conditions) • Nonstandard maps • Image maps • Material resource locations • MOUT analysis

* This table depicts some of the topographic support available.
** 1:100,000 where 1:50,000 is not available.
NOTE: See *Table 1-1, page 1-3.*

Reproduction equipment of topographic units includes, but is not limited to, single-color lithographic presses, diazo-reproduction equipment, and facsimile machines. Lithographic presses are used for high-volume and multicolor printing of standard sheet-sized products (22 1/2 by 29 1/2 inches). The time required for a multicolor product can take several hours or a few days. Multiple-color products are not practical when time is critical. Single-color products are the preferred solution unless digital-based, low-volume color copies are available.

The DMA holds the charter for bulk printing and distribution of standard map products. Overprinting of these products by topographic units is not recommended.

Registering (aligning) information during printing is a problem. Field topographic units must print the sheet using color separates and overprinted information.

When only a few copies of a single-color product are required, such as rapid-response terrain-analysis products, topographic units use a diazo-reproduction machine, photographic copies, and digital plotters. Products can be reproduced on film (acetate) or on various types of paper.

Facsimile machines provide transmission of graphic materials such as maps, photographs, or printed text by electronic means.

Topographic survey provides precise geodetic positioning and elevation data required by -

- Artillery.
- Air defense.
- Aviation.
- Chemical.
- Missile fire control.
- Communications and intelligence systems.

Surveyors recover existing ground control and extend it by third-order conventional survey or satellite methods to the division rear or to the specific system when directed. They establish a minimum of two third-order or higher control points in each division area. Besides making precise point determination, they can provide azimuths for missile systems and the orientation of communications equipment. They are also able to provide precise positioning to support updating of terrain analysis data bases. Surveyors also provide low order (3d order and below) positional information of friendly positions and enemy targets. This is possible with the use of point positioning data bases (PPDB).

Topographic engineers provide quality information for all products produced, giving information about sources and dates of data, procedures and equipment used, datum and coordinate systems, and accuracy estimates.

Standard Map Storage and Distribution. Standard map storage and distribution is being eliminated as an engineer function. In the near future the Quartermaster Corps assumes this function fully. The map storage and distribution function includes the storage, maintenance, and distribution of standard MC&G products. This function is handled differently in each theater. Additionally, some map depots cannot be opened until mobilization of reserve components. Neither the DMA nor Army topographic units have organic transportation assets to move maps. Movement of maps and digital data between the continental United States (CONUS) and theater depots and movement of maps from in-theater depots to the requesting unit are based on priorities set by commanders. In-theater distribution is made on a supply point basis. Units must go to the supporting map distribution point to pickup maps.

Various organizations provide map storage and distribute bulk quantities from theater to division levels. At the theater level, the DMA supports the theater Army area commander (TAACOM).

The TAACOM provides map inventory control and handles storage and supply-point distribution of war reserve and operational stocks. At division level, the division support command (DISCOM) provides supply-point distribution for standard MC&G products. Stock levels and capabilities decrease progressively from theater to division, although war reserve stockage may be kept at levels that match expected prebattle contingencies.

The unit's basic load of standard MC&G products may be stored at any level, according to local command policy. The maintenance of maps and the replacement of obsolete products with new editions are done at the level where the stockage is held. The types and quantities of products held

and the geographical coverage are determined by the operations that are required. This is outlined in each command's contingency plans (CONPLANs), operation plans (OPLANs), and operation orders (OPORDs).

Distribution of special-purpose products produced by topographic units is, and will remain, a topographic engineer function. Topographic units will be manned to provide this service. Distribution is dependent on the theater of operations. When small quantities are produced for a specific purpose, they are distributed directly from the producing unit to the user. For example, a terrain analysis product of a specific avenue of approach would be provided directly to the user. Special products produced in large quantities are moved through the command and staff channels by the operations, engineer, or intelligence staff, depending on the product's intended use. For instance, a product depicting helicopter landing zones would be distributed through operations and aviation channels where an intelligence overlay would be distributed through intelligence channels. Digital products are distributed on magnetic media by the channels discussed above or by digital communications using standard communication channels or the intelligence communication channels.

Knowledge of the Battle Space

All aspects of military operations—close, deep, and rear—require topographic support. Missions associated with these operations can be preplanned in peacetime or they can evolve from battlefield situations. Essentially the same functions are performed regardless of the type of military operation. Each response is variable and tailored to the tactical situation and the geographic area of operations.

Major customers of topographic products and service in support of planning and operations are—

- Special operations force (SOF).
- Maneuver units.
- Field artillery.
- Aviation.
- Air defense,
- Intelligence.
- Signal corps.
- Engineers.
- Logistics.

Table 1-2, page 1-5, relates typical topographic support to Army systems.

TOPOGRAPHIC ORGANIZATIONS

Unified and Specified Commands and Staff

Unified and specified and component commanders define military task requirements to support CONPLANs/OPLANs/OPORDs, Based on a commander's concept of the operation, the topographic engineer advises the Deputy Chief of Staff, J2 (Intelligence) (J2) and other staff officers in preparing the topographic annex for each CONPLAN/OPLAN/OPORD. The commander outlines the specific support requirements needed for the command. Details for preparing a topographic annex can be found in the appendix.

DMA

The DMA provides MC&G support for all US armed forces. This agency plays an important role in army topographic operations. DMA provides the standard hardcopy and digital topographic, aeronautical, and hydrographic products to support the following:

- Position location.
- Terrain analysis.
- Strategic, operational, and tactical planning.
- Close air support (CAS).

- Offshore and over-the-shore movement.

NOTE: Based upon availability of data base.

DMA produces standard topographic products listed below to meet the requirements of the services and regional Commander in Chiefs (CINCs).

- Ž 1:25,000, 1:50,000, 1:250,000, and smaller-scale maps.
- Ž Aeronautical and nautical charts.
- Terrain analysis data bases.
- Trig list.
- Ž Gazetters.
- Flight information publications (FLIP).
- Ž Digital data.

Products will not be available in areas where requirements have not been identified. The MC&G requirements process is managed by the DMA with the MC&G officers of regional CINCs. Army topographic unit leaders must be involved with their intelligence staff counterparts to ensure appropriate topographic requirements are identified for their commands.

However, due to production priorities and prioritization of areas for production, they may not be available even if requirements have been established.

The DMA provides theater-level storage and bulk supply to the theater of operations. Digital topographic data is typically provided to select users where data analysis, point positioning, and map background display capabilities and requirements exist.

Intelligence Staffs

From the Deputy Chief of Staff for Intelligence (DCSINT) at Headquarters, Department of the Army (HQDA), down through the division G2 (Intelligence), the intelligence officer has general staff responsibility for topography. This means the intelligence officer is responsible for-

- Ž Topographic policy.
- Solicitation and validation of requirements.
- Identification, confirmation, and coordination priorities for topographic support.

High priority is given to supporting the intelligence preparation of the battlefield (IPB) process. This includes providing commanders at all levels products which assist in battle planning. These products should reach the units at the same time as the warning orders in order to help the commander visualize the battlefield. Topographic units at corps and theater can reinforce division terrain teams to ensure that assets are available to provide this support. The corps G2 tasks the corps terrain team of the tactical operations center (TOC) direct support element and coordinates other topographic support requirements and priorities with the corps engineer. Battalion and brigade intelligence officers (S2s) compile and submit topographic requirements and priorities for their commands to their division G2. The G2 consolidates these requirements with division requirements, establishes priorities, tasks the division terrain team, and coordinates support with the division engineer.

Terrain teams at both corps and division provide the analysis of the area of operations or terrain analysis appendix to intelligence annex of the OPORD.

Engineer Staffs

From the Office of Chief of Engineers at HQDA down through the division engineer, the engineer officer has special staff responsibility for topography. This means the engineer officer is recognized as the terrain utilization expert responsible for—

- Topographic program execution.
- Training.
- Resourcing.

Ž Coordination of technical topographic requirements with the staff and subordinate commands.

Battalion task force and brigade engineers are terrain experts at their organizational levels. All engineers regularly help in terrain data collection (river, soils, route, and bridge classification) to fill data voids and verify data in analysis data bases. All engineers also exploit terrain data and analyses to focus reconnaissance efforts. Engineers help in site selection, planning, and estimating for performance of mobility, countermobility, survivability, and general engineering missions.

Engineers at all echelons are responsible for the topographic operations annex to CONPLANs/OPLANs/OPORDs. Depending on unit standing operating procedures (SOPs), topographic operations may be an appendix to engineer annex at division level.

Topographic Engineering Center (TEC)

The US Army TEC is a field operating activity under the command of the Commanding General, US Army Corps of Engineers (USACE). The mission of TEC is to-

Ž Review all concepts, mission needs statements (MNS), and operational requirements documents according to Army Regulation (AR) 70-1 and AR 71-9.

Ž Conduct research and development of the topographic sciences.

Ž Develop material that provides commands with knowledge of the battlefield and terrain visualization.

- Provide technical operational support to topographic units and organizations.

The TEC has two subordinate offices that provide support to the topographic field units, They are—

Ž The Terrain Analysis Center (TAC), which is an operational production unit that provides terrain analysis/terrain intelligence support to field units, major Army command (MACOM) staffs, Army staffs, National Intelligence Agencies, and the Federal Emergency Management Agency. It maintains a specialized terrain analysis/digital data library and a digital hydrologic database. TAC can purchase multispectral imagery for topographic support.

- The Field Support Office (FSO) which acts as the interface of topographic research and development with the operational Army. It provides technical support to fielded topographic units (battalions, company, and detachments), and other users of topographic information.

Corps of Engineer Laboratories

The three Corps of Engineers Laboratories include—

Ž US Army Engineer Waterways Experiment Station (WES).

Ž Construction Engineering Research Laboratory (CERL).

- Cold Region Research Engineering Laboratory (CRREL).

These laboratories have the mission of providing technical expertise and analytical products that relate to mobility, countermobility, survivability, and sustainment engineering.

Topographic Engineer Units

Topographic units located at EAC, corps, and division supplement the DMA's effort by compiling data from various sources into

special-purpose topographic products tailored to meet the supported commander's needs. These units belong to the topographic battalion in the theater of operations, but maintain a habitual relationship with their supported echelons (unit). Their rapid response aids the commander in—

- Visualizing the battle space.
- Understanding the effect of terrain, weather, infrastructure, geography, and environment on military operations.
- Navigating on the battlefield.
- Ensuring precise positioning of command and control, maneuver, weapons, and support systems.

Special-purpose products include—

- Terrain information (graphic and textural).
- Precise positioning through geodetic survey (EAC).
- Map overprints and image-based products (corps and EAC).

All topographic units are focused to support the forward areas and are specifically tailored to the requirements of a particular theater. Their primary interest is in direct and rapid response to support command needs. When DMA coverage is not available, these units may provide original, hasty, image-map, and terrain coverage. *Figure 1-1* shows the major participants of the topographic arena.

TOPOGRAPHIC RESPONSIBILITIES AND SUPPORT RELATIONSHIPS

Commanders at all levels are assigned areas of responsibility based on unit mission. They define the topographic requirements needed to support specific CONPLANs/OPLANs/OPORDs. At all levels, requirements are contained in a topographic annex to each CONPLAN/OPLAN/OPORD similar to that found in the appendix of this manual, The commander is responsible for maintaining and managing the unit's basic load of products and ensures the proper conservation and use of maps, In addition, the commander can establish the transportation priorities needed to ship products from supply points to users. Every division and corps commander is responsible for effectively employing their direct-support units allocated from the topographic battalion at EAC.

DMA

The DMA is the main provider of standard MC&G products. This agency provides MC&G support to the US armed forces. The DMA is responsible for—

- Producing all standard topographic, aeronautical, and nautical products.
- Providing distribution of MC&G stocks to theater depot.
- Coordinating MC&G agreements with allied forces, host nations, and allied topographic offices.

DMA production is based on requirements submitted by the services and CINCs. The priorities for production are established by the Joint Chiefs of Staff (JCS). Army components of unified and specified commands must ensure their requirements for standard products, to include terrain analysis data bases, are identified through the requirements process to DMA.

Theater Army Engineer

The theater army engineer is the principal adviser to the theater army commander for all engineer matters—to include topographic engineering (see *Figure 1-2, page 1-12).* The theater topographic engineer battalion commander (the theater topographic engineer selects the assistant theater topographic engineer (ATTE) from his staff. He is normally attached to the army component command

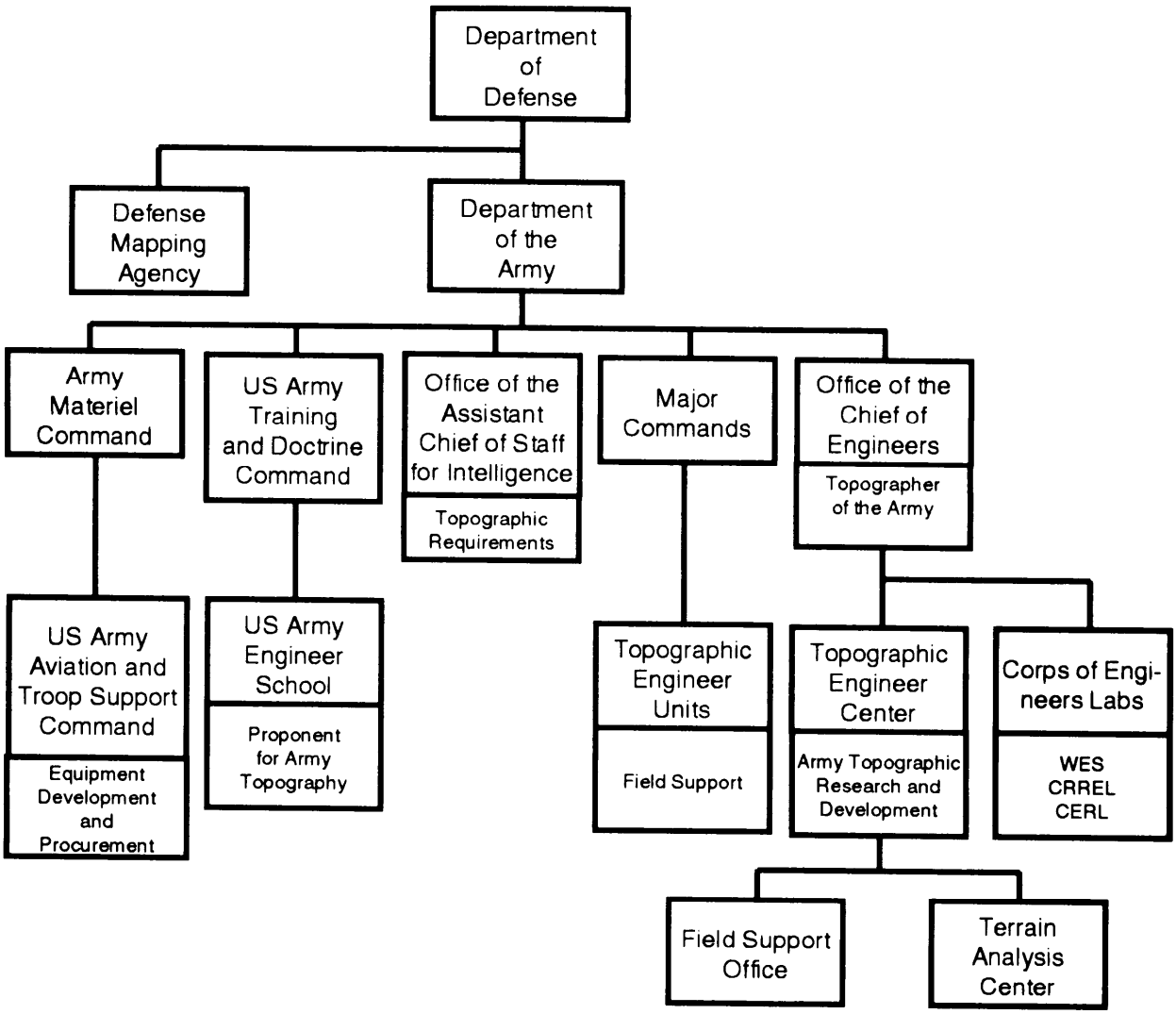

Figure 1-1. The Army mapping, charting, and geodesy community.

G2 or G3 (Operations and Plans). He performs staff planning and coordination for topographic support within the theater. He arranges topographic support between the Army component command, the DMA other services and allied organizations. The theater army engineer is responsible for—

- Operational control of the theater topographic battalion and, indirectly, all Army topographic assets in the theater.
- Ž Overall planning, management, and coordination of topographic support to the theater army.
- Ž Providing topographic support for the theater army and coordinating these requirements with higher joint headquarters, the DMA, host-nation, and allied topographic offices.
- Ž Acting as the interim theater-level map inventory control point.
- Ž Preparing the topographic annex in concert with the theater army staff.
- Coordinating topographic requirements with the theater army staff.
- Ž Providing topographic technical expertise to the commander and staff.

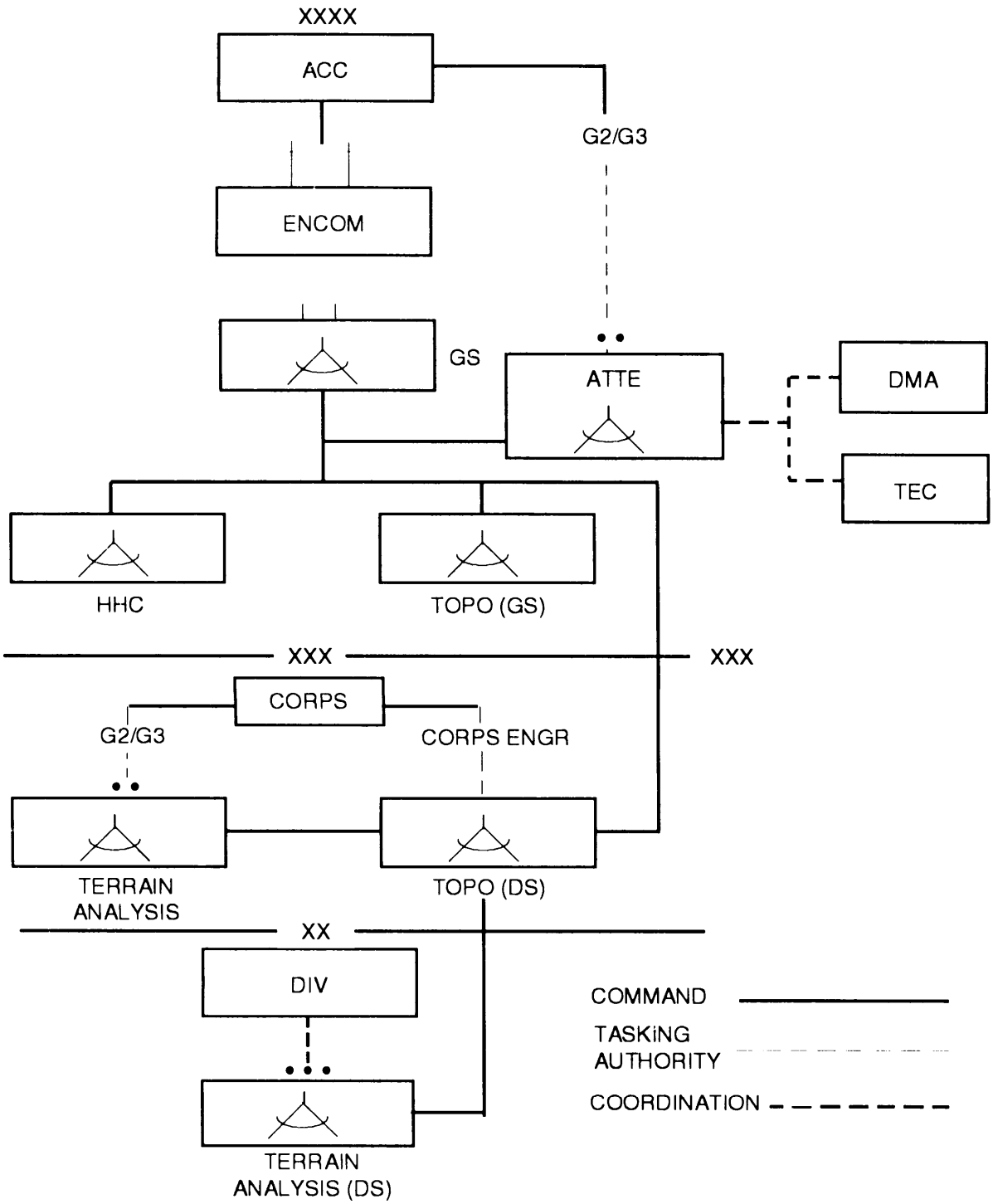

Figure 1-2. Normal topographic organizational alignment

Topographic Engineer Battalion Commander

The commander of the topographic engineer battalion at EAC commands all topographic units in the theater. This commander has a responsibility to—

- Provide the ATTE element to the appropriate theater army component staff. This element helps the theater engineer to accomplish his topographic mission and coordinates production requirements and priorities.
- Provide general support to unified and specified commands.
- Provide general support to subordinate topographic units for requirements beyond their capability.
- Furnish topographic support to all Army units at EAC.
- Manage the in-theater, topographic production program, to include topographic data bases.
- Provide supply-point storage and distribution of special topographic products at EAC and corps levels.
- Assist assigned units with topographic technical supplies.
- Provide direct and general support maintenance of topographic equipment located at all assigned units.

ATTE

The ATTE performs staff planning and coordination for topographic support within the theater. The ATTE works with the CINC MC&G officer to arrange topographic support between the Army component command, the DMA, and other services and allied organizations. The ATTE is normally attached to the Army component command, (DCSINT) G-2, or the Deputy Chief of Staff for Operations (DCSOPS). The ATTE coordinates requirements for special topographic products with both the customer and the topographic engineer battalion.

Corps Engineer

The corps engineer is the corps engineer brigade commander. This special staff officer is responsible to the corps commander for all engineer-related matters, including topographic engineering. The corps engineer is aided by the corps topographic engineer located in the Assistant Corps of Engineers (ACE) office. The corps engineer has a responsibility to—

- Coordinate corps topographic support requirements for terrain analysis and production with the theater engineer.
- Task and prioritize the work effort of the corps topographic company that is in direct support of the corps from the theater battalion.
- Facilitate direct support of corps topographic company to corps G3/G2.
- Coordinate with the corps G3/G2 for collection of battlefield-terrain information.
- Assist in the distribution of terrain analysis and other special topographic products.
- Prepare the topographic operations annex for corps CONPLANs/OPLANs/-OPORDs.
- Assist G2 in defining stockage requirements for maps to be held to support the corps.

Division Engineer

The commander of the division engineer brigade or battalion is the division engineer. This special staff officer is responsible to the division commander for all engineer-related matters including topographic engineering. The division engineer is the chief adviser to the division commander on how to use the battlefield terrain effectively. The division engineer has a responsibility to—

- Provide advice to the division commander on effective use of the terrain.
- Facilitate terrain team-support requirements of division G3/G2 plans and operations.
- Assist the G3/G2 in evaluating topographic-support requirements and setting priorities.
- Assist the distribution of terrain analysis and other special topographic products.
- Coordinate with the corps engineer for additional requirements in terrain analysis beyond the capacity of the division terrain team.
- Coordinate with corps engineer for requirements in topographic production.
- Coordinate with the G3/G2 for collection of battlefield terrain information.
- Prepare the topographic operations annex or topographic appendix to engineer annex for division CONPLANs/-OPLANs/OPORDs in coordination with the G2, G3, G4 (Logistics), and chief of the division terrain team.

The division engineer and the Assistant Division Engineer (ADE) must be familiar with the capabilities and limitations of engineer topographic units. They must give priority to the management of all engineer resources, to include topographic engineering, They need a completed special background investigation so they can manage data base acquisition and personnel operating in the all-source intelligence arena.