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## *FEATURE ARTICLE*

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### **Geospatial Intelligence: An Emerging Discipline in National Intelligence with an Important Security Assistance Role**

By

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This article describes the emerging discipline of geospatial intelligence and its proponent, the National Geospatial-Intelligence Agency (NGA). In addition to its function as the newest member of the U.S. Intelligence Community, NGA has a specific role in security assistance as the implementing agency for international sharing of imagery and mapping information and associated systems. This article also addresses the range of NGA security assistance activities, with focus on the systems and services delivered to partner nations through foreign military sales and related programs.

Flanked by his immediate staff, the commander enters the darkened room, his eyes drawn immediately to the large lit screens on the front wall. The areas on the screens represent his realm, the entirety of the space in which he would meet the enemy. Symbols on the screens represent the allied and enemy forces, known obstacles and elements of the battlespace, as well as factors in the anticipated struggle. An unidentified voice welcomes him to the command center and begins the briefing on current status, immediate operational plans, and emerging contingencies. In response to the commander's questions, the screens glow with the emphasis of certain factors or change to new scenes to best depict the realities of the struggle.



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This scenario, its description intentionally general and hyperbolic, is played out in many different settings ranging from military command posts to civil operations centers to police and emergency headquarters. In short, the wonders of electronics and availability of data in many different forms and from many sources, make it possible to support decisions and actions in three-dimensional space in a fraction of the time that was required for papier mâché tables in World War II bunkers, map boards in Vietnam war rooms, or grease-pencil graphics on police-department bulletin boards. The scenarios are not always in military or para-military settings. Security at the Olympic and other sporting events now include attention to three-D models of their protection space and environs.

NGA, best known for its advisory support to national decision-makers and provision of geo-intelligence (GEOINT) data, products, and services to the nation's warfighters, plays a key role in the technical advancement and modernization of partner countries in this fast-moving field. Because the field and associated system capabilities are expanding so fast, the challenges in assuring interoperability of data and systems are constant. The challenges for partners eager to engage with the U.S. are immense. A major focus of NGA's security assistance engagement is former Warsaw Pact nations seeking ascension into the North Atlantic Treaty Organization (NATO).

(Official USN Photo)



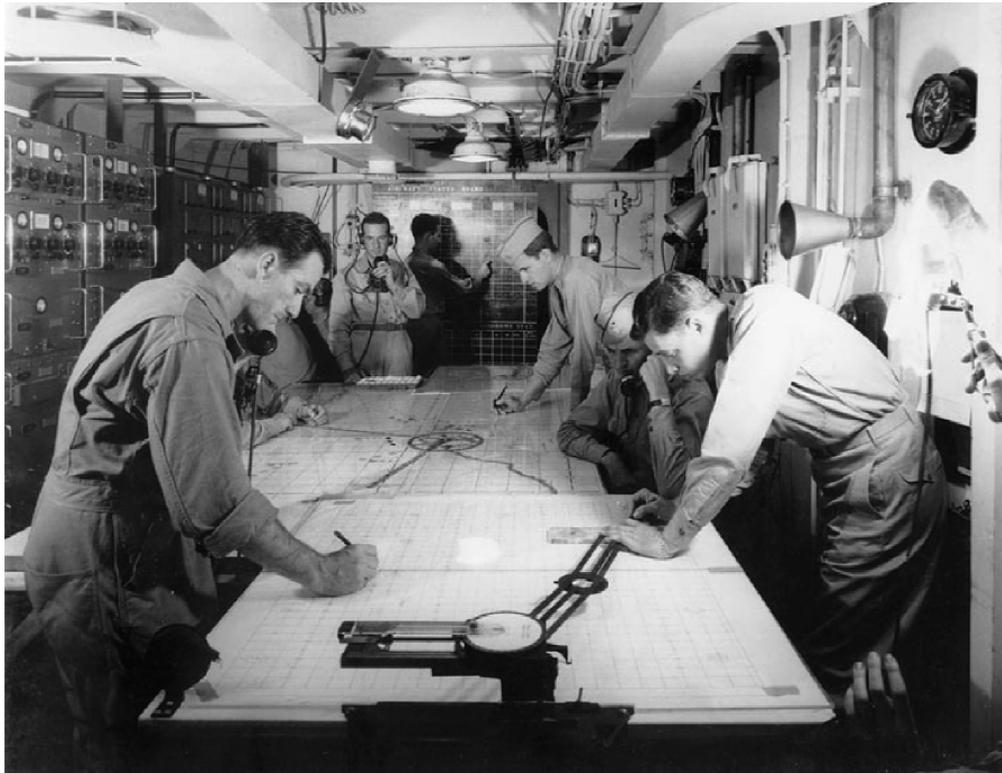
**U.S.S. MISSOURI's (BB-63) Main Battery Plot Room; off Korean coast, September 1950.**

Much is made in today's culture of the immense volumes of information available on which to base decisions. The concept of an information explosion is hardly exaggerated. The rate of growth in information is indicated by, among other things, our vocabulary. A new term "exabyte" refers to the magnitude of one billion gigabytes; a concept that we would have had difficulty imagining just a few years ago. Digital imagery represents a cutting edge in this field. Some of the major advances in volume storage were driven by the large amount (at least by our standards years ago) of computer memory required by high-resolution images. At the same time, other fields of intelligence (specifically signals and electronic intelligence) require massive processing power to ensure their success. In fact, there has always been an element of information sorting in any given visualization of a complex problem in three-dimensional space, the distilling of

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information down to a manageable size. Even before the map tables of World War II, mapmakers worked hard to develop ways to reduce the amount of knowledge about the Earth's surface to what could be displayed useably on a piece of paper. The concept of contour lines was a quantum leap beyond perspective pictures of mountains laid onto a two-dimensional page. Today, unconstrained by the limits of paper, computer and video technology can allow the combining of literal images, actual pictures rather than line drawings, with other types of data, to give decision makers an easier grasp of conditions on the ground; situational awareness, if you will.

(Official USN Photo)



**U.S.S. ANCON's (AGC-4) Operations Center Plot; invasion of Sicily, July 1943.**

In all cases, a huge overhead is paid in analysis of available sources and reduction of data down to the elements needed by the intended user. In short, it is possible to create a perfect map of Baghdad that shows not only every house, every street, every alley, as well as telephone and power lines, sewer lines, and tactical intelligence information of many varieties and sources. The cost to create that map would be immense and the resources dedicated to its production would necessarily mean fewer maps produced of other areas. Therefore, the intended use is an extremely important factor in design and creation of a given data set. Similarly, a digital image of Baghdad at the resolution to which we are accustomed in normal photography would be so massive that most computers would choke on it. There is a trade-off centering on the concept of intended use and therefore what really must be displayed on a given image or graphic.

Intended use provides the defining characteristics of the end product, such as an aeronautical chart intended for use by fast-flying jets with little detail about ground features would be inappropriate for use by personnel traveling on the ground. The lines of so many features on that "perfect map" would become so crowded on the paper or computer screen that it would be unusable for other intended end uses. Historically, the solution to this crowding problem has been low tech; mylar overlays, allowing the combining of different themes of information. Overlays present various obstacles; not least of which are visibility and accuracy. The computer database

(Official USN Photo)



**U.S.S. COWPENS (CG-63) Maintaining the plot with a digital dead reckoning tracer in the Combat Information Center.**

concept of data layering allows an analyst to select the themes of information to be viewed, to change scales of all the themes at the same time, and to move flexibly and accurately between views.

Soon after his arrival as Director of the National Imagery and Mapping Agency, Lieutenant General James R. Clapper, USAF (Retired) promoted the term “geospatial intelligence”. His concept of a unifying discipline and doctrine evolved quickly into a new agency name: National Geospatial-Intelligence Agency (NGA). More than the three-letter acronym

indicating sisterhood with other major intelligence agencies, the new name represents the maturation of a new discipline and the doctrine for its use.



**An Air Force Captain demonstrates the new NGA Portal for the NGA Director. The first major deliverable of NGA's transformation, the Portal gives users new capabilities to discover and share data.**

The emerging discipline of geospatial intelligence can best be understood in the context of visualization. The operative question:

... what is the best way for the user/customer to perceive and grasp the particular information he or she needs to make a given decision or take a given action?

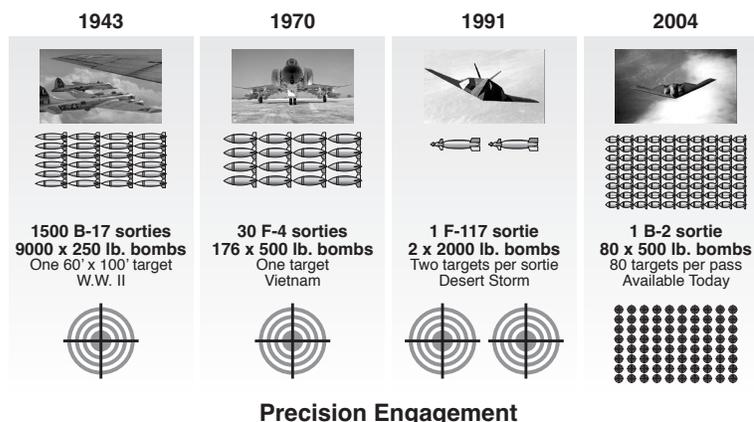
GEOINT is, then, the distillation of diverse information into a form sufficiently relevant, succinct, and accurate to meet the user’s need in a timely fashion.<sup>1</sup> Typically, GEOINT consists of information from many and various sources including the knowledge and experience of the analyst, inputs from various intelligence disciplines, tip-offs from signals intelligence (SIGINT) or human intelligence (HUMINT) for example, and historical and situational context often in the form of specialized databases. While pictures and maps are the visualizations that humans can most easily grasp when thinking about information in three-dimensional space, databases represent a very significant element of GEOINT. Feature characteristics beyond those immediately available to the naked eye may be critical to a GEOINT user making sources other than normal imagery increasingly important.

There is a fundamental shift underway in the doctrine of war-fighting and decision-making in general. As information becomes more routinely available to all around the world, the art of war about being able to perceive-decide-and-act in a shorter window of time than can the adversary. A major focus of GEOINT is, therefore, providing the three-dimensional context in which the war-fighter decision-maker can comprehend divergent pieces of information, reach a decision, and initiate an action. A classic example of this application is traditional artillery doctrine and the effect of the fire finder concept. During Operation Desert Storm, data that we would now call GEOINT, enabled allied artillery to compute precise locations of Iraqi artillery shortly after the munitions left their firing tubes and to prepare a counter-battery firing solution and return fire before the enemy could cease fire and move to a different location. In some locations, the enemy artillery was literally destroyed by a shell coming right back “down the tube” and exploding at the heart of the weapon. The repeated success of the fire finder itself suppressed Iraqi artillery fire by ensuring that any weapon that was fired would receive immediate, highly accurate return-fire. By the end of Operation Iraqi Freedom, traditional artillery was less a factor than it otherwise might have been with the knowledge that it would be both ineffective and short-lived.

A similar example is that of battle damage assessments (BDAs) following bombing missions. The ability to see a given target soon after it is attacked allows the decision maker to plan and initiate returns, if necessary, or dedicate resources to other targets if the first mission was successful. The ability to collect and analyze imagery soon after a mission combines with accurate targeting information to make air weaponry highly effective. At the same time, target locations can be derived with accuracy allowing possible error measured in fractions of meters rather than in kilometers and, with the creation of highly precise weaponry, allows for more efficient use of aircraft sorties.

Note the graphic compares accuracy and efficiency of delivery of this generation with previous war scenarios. Air forces of today, with the data available from NGA and its partners, can deliver much more firepower far more precisely to many more targets than ever before.

Core doctrine of modern warfare, as taught in U.S. service academies, includes two key



<sup>1</sup> The textbook definition (as pronounced in GEOINT Basic Doctrine) is “the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth.”

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concepts; situational awareness and preparation of the battle space. The history of modern warfare is rife with a commanders' desire for better information about the enemies they face, for example:

- The enemy numbers;
- Deployment;
- Resource mix; and
- Logistical support.

Many are the caveats that decisions were “. . . right, based on the information we had at hand.” Similarly, with the ability to envision the battle space and intended actions in it, commanders can prepare the battle space by attacking and weakening or destroying key elements in an opponent's force structure.

At the tactical level, scene visualization emerged, first, in the development of flight simulation. Digitized terrain and feature data was created to support flight simulators in military training schools, allowing young pilots to fly their first missions in well-controlled simulations rather than expensive planes. As the price for computers decreased and processing power increased, simulators found their way into tactical settings. In early air campaigns in Bosnia, pilots could literally fly an intended mission several times in very realistic, desk-top simulation before ever taking a plane into hostile air space. Because current imagery and other intelligence advancements allowed precise prediction of the limits of anti-aircraft defenses, those pilots could plan routes and maneuvers for most efficient delivery of weapons to targets while minimizing the risk to themselves and their aircraft.

Similarly, the U.S. Army doctrine long called for the ability to simulate ground movement and tactical maneuvers before actual engagement with the enemy but the immense amount of data required to sufficiently model the ground at the required level of detail left that doctrine largely on the theoretical shelf. With the recent completion of processing of the Shuttle Radar Topography Mission (SRTM), terrain data and the large amounts of commercial imagery now available to the Army, the theoretical capability to simulate ground warfare on a large scale is a practical reality. An Army system called Urban Tactical Planner, featured in a November 2004 *New York Times* article, allows:

commanders (to) simulate flying overhead to practice air or ground approach routes . . . zooming down they also saw buildings, streets and spots where soldiers could assemble with some protection from sniper fire.<sup>2</sup>

The system is one of many with which military personnel can gather together diverse data into a common viewpoint and then use it to advantage. The concept of GEOINT is, the logical extension of a long history in which imagery and mapping disciplines and their fast-moving, technical advances converged.

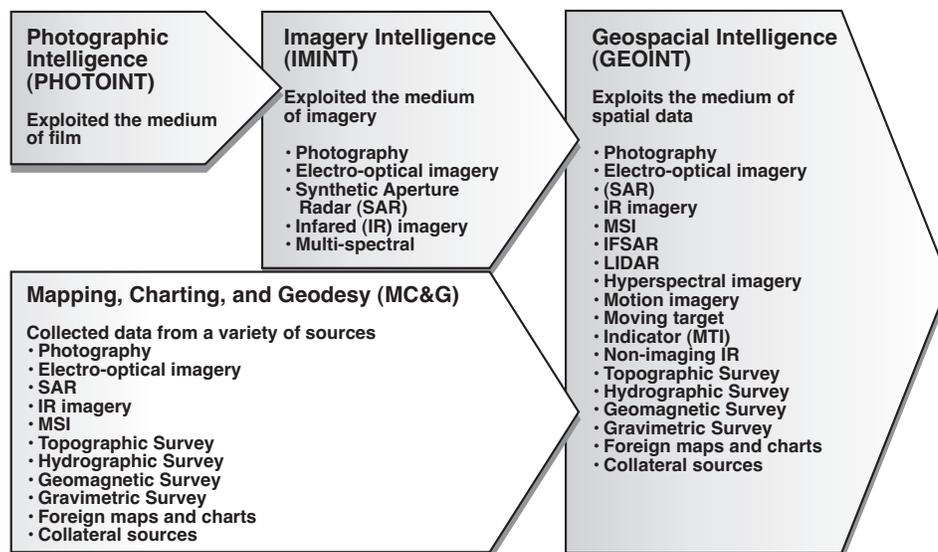
### **The Foundation and Evolution of Geospatial Intelligence**

In today's world, it is important, to understand the concept of GEOINT in uses other than warfare. There has always been an element of GEOINT in civil applications most notably the World Geodetic System 1984 (WGS84), the mathematical model of the earth on which the Global Positioning System or GPS is based which finds its roots in the geodesy and geophysics data collections held by the NGA. Similarly, safety of military aviation in the U.S. and around the world is largely attributable to the distribution of aeronautical information by NGA. NGA commissions updates of aeronautical information using radio beacons, advisories, etc., on a

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2 “3-D Maps From Commercial Satellites Guide G.I.'s in Iraq's Deadliest Urban Mazes,” Eric Lipton, *New York Times*, 26 November 2004, p., A12.

rigorous schedule, typically twenty-eight days, and delivers that data to its military and foreign partners electronically. NGA data now enables 3-D visualization of the ocean bottom, especially valuable in harbors and approaches combined with environmental sensors, 4-D, 5-D, even 7-D visualization of conditions as a ship transits its route. Electronic transmission of corrective patches allows updates to on-board, digital charts while at sea.



**The Foundation and Evolution of Geospatial Intelligence.**

### **Additional Applications of Geospatial Data and Advances Abound**

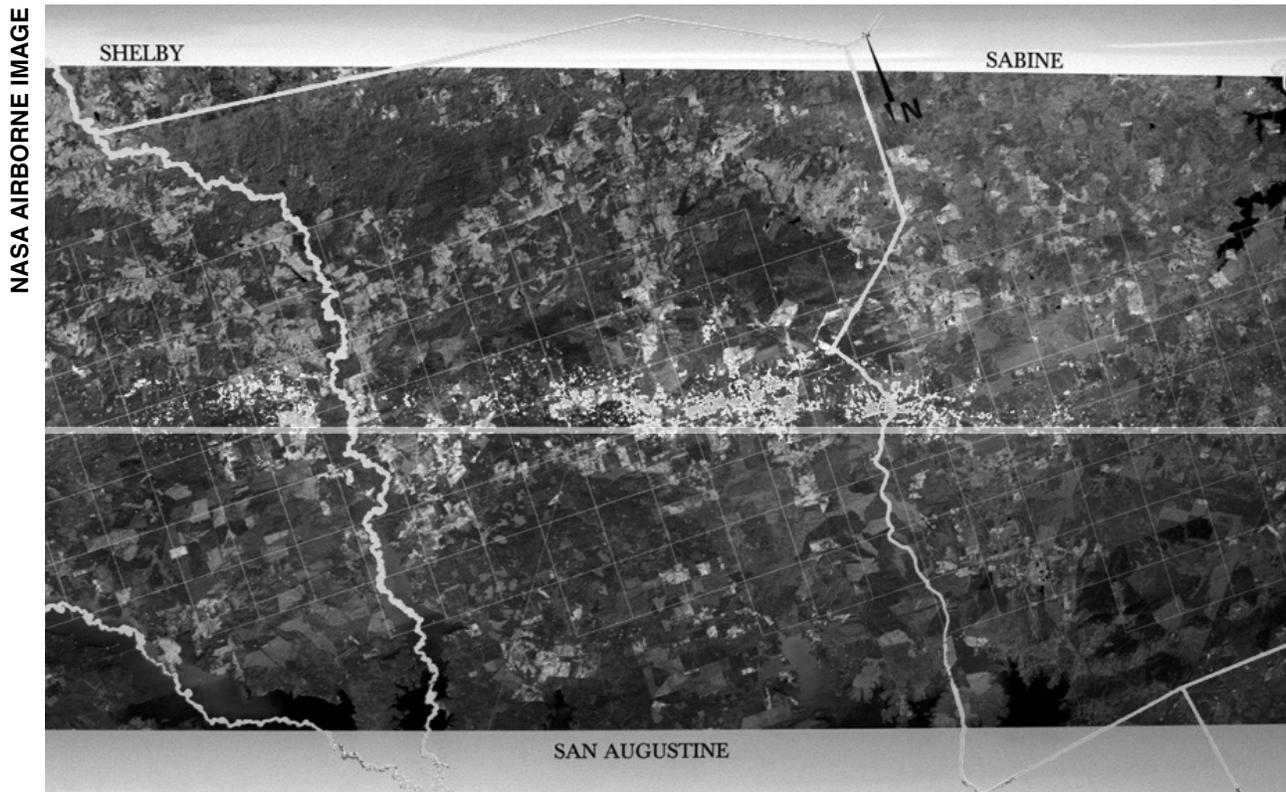
The military concept of preparation of the battlespace now has a corresponding concept in the homeland security lexicon; preparation of the environment. The concept is clear planners, analysts, and decision makers concerned about securing the homeland must bring together immense amounts of information about potential targets, possible methods of attack, and the surrounds in three-dimensional space. Preparation of the environment, therefore, is a core tenet; protecting vital assets, anticipating possible effects, and equipping people to respond.

NGA contributions to the field of homeland security and disaster response include application of GEOINT capabilities to civil problems. For example, in the immediate aftermath of the Space Shuttle Columbia disaster, NGA analysts, working with NASA personnel, precisely mapped the likely trajectory of shuttle debris so that search efforts could be focused, and then refined the model with data of actual recoveries. Data collection and analysis by NGA personnel assisted disaster response in the days following Hurricane Isabel in September 2003 with imagery, line drawings, and damage assessments.

The newest GEOINT advances are in the field of event security, where NGA plays a significant role in security and response planning for major national events. Most recent examples include the national political conventions, presidential inauguration, and the Super Bowl. In those cases, NGA brings to the table the same capabilities for scene visualization, situation analysis, intelligence data fusion, and contingency planning that it provides military customers. The same technology that enables flight simulation is modified to allow walk through or drive through without the complications of stopping traffic, etc. Analysts bring together information from divergent sources in the same way that they would in GEOINT support to military customers. One notable example of which was the discovery in utility-company records of a tunnel running directly under the site of the World Trade Center Memorial dedication. On the

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basis of that discovery, New York City police were able to secure the tunnel and eliminate a potential risk of attack.



**Columbia's debris field plotted over track of the space shuttle's descent.**

In deployments to support security planners at the national political conventions, NGA added new imagery sources to the mix; commercially available terrain data from radar source, avoiding the limitations of cloud cover, at a very high resolution. Such high resolution base data became the standard for other major, non-intelligence activities.

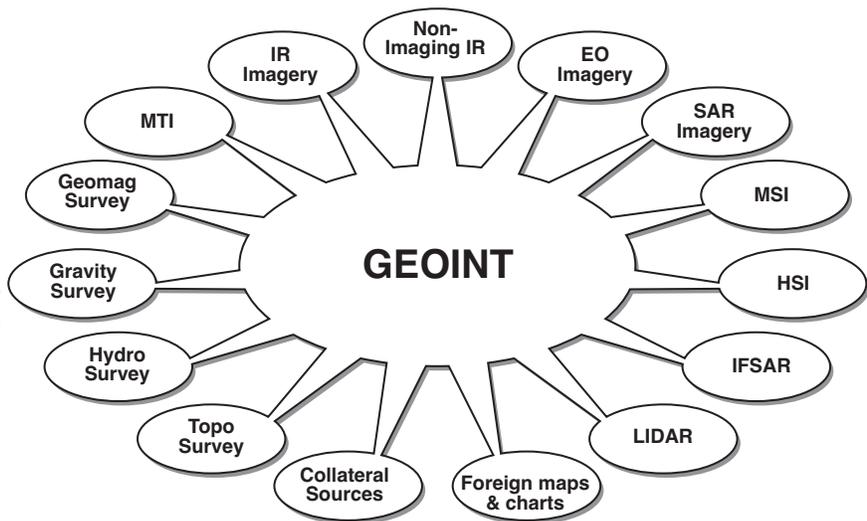
One major evolution in GEOINT doctrine is presence with customers. Increasingly, NGA analysts and staff officers are embedded with their customers so that responsiveness to their needs is more often measured in minutes than in hours or days. While the concept of a central analytical facility will never go away, NGA leaders continually seek more ways to:

- Co-locate diverse analytic elements, seeking maximum synergies among diverse fields; and
- Support customers in their actual location.

Initially, assignments were to the major commands, providing staff presence and reach back into the central analytical facilities more than establishing analytical expertise at the locations. NGA sends imagery and geospatial analysts to provide direct support in command centers and operational units. Analysts accompany operational units into war zones like the Persian Gulf with a high point of 120 plus personnel in-theater during Operation Iraqi Freedom. Today, a cadre of specially trained and equipped personnel is available to deploy on a short notice to any location around the world in support of military or intelligence partners.

In the early years of cooperation among mapping and imagery communities, there was a high level view that we were, increasingly, in the information business. That abstract concept of

information foremost was belied by both communities' heavy focus on products, the standard outputs of routine analysis and production processes. The convergence of those communities and the emergence of the new intelligence discipline parallels advancements in technology that make the information business, as opposed to product orientation, a reality. Today, the focus of geospatial intelligence is in acquiring, merging, and exploiting data from many sources to create usable intelligence, read information, and supply it to the right customers and partners at the time it is needed.



### Other Contributors and Shareholders in the Process

The most obvious and well-publicized source of data from outside the intelligence community (IC) is commercial imagery. The IC and military have made it clear that acquisition and exploitation of commercial imagery with its improving resolution, now less than a meter, and increasing volume, hundreds of square kilometers of potential coverage per day, is critical to their success. NGA is the largest single customer of commercial imagery worldwide; buying imagery data for its own analytical and production purposes, and to support the defined needs of its military and intelligence customers. At the same time, an increasing number of private, public, and foreign suppliers of geospatial intelligence are found in the commercial marketplace each with its own standards of quality viewed in terms of currency, positional accuracy, and fidelity. Acknowledging that it is fully in the information business, NGA cannot ignore these sources and, in fact, exploits them to the maximum extent possible.

At the center of this exploitation is positional accuracy. The same physical principles and technology that allow delivery of a missile to a precise position on the other side of the Earth can allow alignment of inaccurate source material with highly accurate geodetic control data. The result is a much more accurate source data set and resulting higher value to analysts and customers. It is for this and related reasons that NGA remains the world's largest employer of geodesists and geodetic scientists.<sup>3</sup>

NGA is also a major employer of college graduates in technical fields, and NGA is highly rated by its employees for the training and employee development opportunities offered. Along with the substantial presence of NGA-funded students in allied graduate school courses around the country, the National Geospatial-Intelligence College, located at Fort Belvoir, Virginia, offers a wide range of technical and professional development courses. Typical offerings range from basic courses to more advanced courses such as:

- Geodetic Survey;
- Geographic Information Systems;
- Operations of Various GEOINT Production Systems;

<sup>3</sup> Geodesy (and geophysics) deal with information or earth data pertaining to gravity, point positioning, earth models (datums), etc.

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- Advanced Courses in the Same Areas;
  - Classroom Training to Hands-on System Operations; and
  - New-employee Orientation to Tradecraft Seminars.

The college trains not only NGA employees but also students from the military services, intelligence community, as well as personnel from foreign partner organizations. Historically, training of foreign counterparts in various technical skill areas has resulted in direct return to the U.S. in terms of co-production.

Co-production remains a major source of the GEOINT products and data provided to U.S. customers. NGA and its various predecessor organizations have never been able to produce all of the relevant data, products, and services required by its various customers. This shortfall is a function of the exponential growth of customer requirements and capabilities over time. There has never been enough images, maps, pixels or digits to fully meet all of the needs of the NGA customer community. With this perpetual shortfall and the inevitable shortage of resources to “catch-up” with the requirements, foreign partners continue to be a major source of data. Complicating this dependency has been the phenomenal advancement of technology in which the U.S. has historically led the world. This means that NGA’s predecessors have always tended to run ahead of the partners around the world and been faced with the constant need to bridge that gap between partner capabilities and the relative state of the art.

U.S. policy and military doctrine have come to focus on coalition rather than unilateral operations. It is in the U.S. national interest to exercise with potential coalition partners and ensure that their forces can appropriately engage and coordinate with U.S. forces. Ultimately, U.S. forces are better off if their potential partners are accustomed to the uses of geospatial intelligence in military operations not just during exercises with U.S. forces, but to some realistic extent, day-to-day operations. Few of our foreign partners have the critical mass of science and technology to develop technological solutions independently.

### **Foreign Military Sales and the National Geospatial-Intelligence Agency**

The use of foreign military sales (FMS) processes to equip coalition partners with military equipment is long standing; its uses range from:

- Aircraft to Watercraft;
- Bullets to Bullet-proof Vests; and
- Cannons to Torpedoes.

The former Defense Mapping Agency, an NGA-predecessor used FMS methodology to deliver a wide range of mapping products to our allies. Today, FMS remains one way for allies to acquire maps or associated products and data as needed to fully utilize weaponry or equipment which is acquired through FMS channels. FMS is used to equip foreign partners with GEOINT capabilities similar to those in NGA. This is particularly significant for emerging democracies in the former Soviet bloc who seek ascension into NATO. The checklist for inclusion in NATO includes certain basic capabilities to produce maps, paper and digital, of their own nation and those maps must meet NATO standards.

A significant portion of the NGA systems acquisition activity under FMS has been in this area; the development of the required capability to contribute as a full member of the NATO alliance. For example, foreign military financing (FMF) establishes credits for the prospective NATO member who then determines priorities and engages the relevant U.S. government organization for support in the acquisition. NGA is the designated implementing agency for FMS acquisition of systems related to mapping, imagery, and allied disciplines, whether funded via FMF or national sources. The National Geospatial Acquisition Directorate (NGA/A) enables, acquires, and provides systems, supplies, services, and business solutions that advance NGA’s

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national leadership role in geospatial intelligence. That role broadly encompasses engineering, infrastructure development, and procurement functions along with the integration of systems. Within NGA/A is the National Geospatial Acquisition Systems Office (NGA/AS) which is specifically charged with development and delivery of systems both for NGA elements and on behalf of customers and partners in the broader GEOINT community. The International Programs Division manages acquisition of systems on behalf of foreign partners including all system and related procurements under FMS.

Under the Warsaw Initiative, signed in the mid-1990's to advance the Partnership for Peace (PfP), a significant amount of money administered by the Defense Security Cooperation Agency (DSCA) supports the development of defense capabilities in the former Soviet bloc countries. To advance the knowledge of PfP members, NGA and DSCA annually hosts a PfP geospatial-intelligence symposium featuring presenters from NGA, PfP and NATO participants, and associated U.S. industry. The symposium, traditionally chaired by the Director of NGA, seeks:

- To develop the member nations' capabilities in geospatial intelligence; and
- To make them contributing members of the GEOINT community.

General Clapper's involvement is not just symbolic as the functional manager for the National System for Geospatial-Intelligence (NSG); he is also the manager of the international system for GEOINT. He oversees all development of NGA, customer, and participating partner capabilities in the field; ensuring the compatibility of systems and interoperability of data within that broader system. The symposium serves as a development forum in which partners can learn about emerging developments in the field, vendors can demonstrate their capabilities before many potential customers, and the collective efforts of the parties can be coordinated.

**Presentations at the 2004 PfP GEOINT Conference included the following:**

- NGA Federated Operations
- Multinational Geospatial Coproduction Program
- NGA Status Update
- Geographic Support with NATO Standard Maps; the Main Goal of the Military Topographic Directorate
- Geographic Information System and Interactive Map System "JS Latvija"
- Topographic support of the Slovak Armed Forces and NATO Preparations
- Wireless GEOINT
- Hydrometeorology Service to the Military in Latvia: Present and Future
- Concept of the Military GIS development in the Republic of Moldova
- Air Defense Airport Meteorological Equipment

The NGA conference, scheduled for May 2005, in Chisinau, Moldova, centers on the theme "GIS Support to Multinational Peacekeeping Efforts" and will, as in previous years, feature a wide range of presenters and topics.

PfP and FMF represent direct assistance to partner nations not just in delivery of U.S. technology, but also in establishment of standards for systems in the host country. Many organizations around the world have experienced the frustration of incompatible systems and data structures that prevent critical systems from talking to one another and resulting waste of tech-money. A major focus of the NSG's international system for GEOINT' is establishment of well-defined standards for the systems, components, software, and data incorporated into NGA and allied systems. Not only do participating partners benefit from the initial guarantee of system and

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data compatibility; they also gain the regimen of a standards-based system and a basis on which to assess the compatibility of future potential components. For NGA's less-technically-advanced partners, the entry into a standards-based regimen for systems is a quantum leap in effectiveness of their current and future system-dollars.

The keyword in discussions of standards and standards-based systems is interoperability. Interoperability is the *sine qua non* [the Latin translation without which not] of joint and coalition operations. The ability to cooperate in military operations and to collaborate in intelligence analysis depends entirely on the capability to communicate, speak, listen, and understand among systems. The premium that U.S. commanders now place on the ability to perceive-decide-and-act demands that cooperation with foreign partners must not degrade that ability; delays because a foreign partner's system could not transfer critical data to the command center for consideration in a decision are intolerable. The technical importance of joint exercises is, therefore, in assuring that connected systems can communicate and that data passed between systems will have the same meaning in each.

The variations in the capabilities and hardware/software of former Warsaw Pact and Soviet Republic members require that their needs must be assessed uniquely to determine appropriate, next-step developments. There are additional differences in the national cultures that affect the way they will respond to technology. Several East European countries, PfP, and NATO members use mobile phone technology much more than the U.S. public. The several reasons for this includes the lack of a well-established land-line infrastructure. This explains the lesser impact of the internet in those countries. For example, in the former Czechoslovakia and the Baltic States the populace is much more oriented toward exploitation of technology. The military is much more comfortable with technological advances in the GEOINT realm than are those in other former Soviet or Soviet-bloc members. On the other hand, a country that is "behind" may sometimes leap-frog a full generation of technology, implementing an advanced solution without having the expense of upgrades for older equipment. The FMS needs of individual PfP or other FMS-client countries are, therefore, unique and must be assessed individually.

Among the most popular technologies in NGA's FMS-partner countries are the following:

- Modern Printing Capabilities;
- Geographic Information System Technology;
- Global Positioning System Technology;
- Photogrammetric Equipment; and
- Software.

As modern as the U.S. military is today, NGA continues to print more paper products every year to meet the increasing needs of its customers. It is, therefore, unrealistic to imagine that foreign partners will get out of the printing business. The telling point is in the requirements of the foreign partners' customers and the efficiencies necessary to keep up with those requirements. Under FMS arrangements, NGA has installed off-set printing presses accompanied by computer-to-plate technology that was, only a few years ago, a theoretical capability. Personal computers increasingly are the technology of choice for capabilities that, in earlier years, required specialized, highly powerful workstations. In almost every major equipment transaction, climate-control technology becomes part of the package to ensure the longest possible life for a given system. Training packages are another common and important feature; ensuring that the foreign partner can get the most out of the given system. Hardware and software maintenance, and upgrade packages are a ubiquitous feature.

In heavily resource-constrained environments, foreign buyers and managers of systems feel an immense temptation to get by with minimal software maintenance and the fewest possible

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upgrades. For NGA as functional manager of a national system with major international connections, the concept of getting by with software maintenance is an anathema. The ability to smoothly exchange data among partners is critical to the co-active disciplines:

- Coalition;
- Cooperation; and
- Collaboration.

If a critical foreign partner is out-of-sync with their data-exchange partners, it is possible, even likely, that difficulties will arise in the exchange of data between them. With even the most stringent standards for software development and data formats, any decision to delay or minimize software maintenance and upgrades carries significant risk. One of the largest costs in the life cycle of a given system is software maintenance.

Along with the very specific GEOINT related technologies delivered commonly by NGA, many foreign partners have identified unique needs and requested specific assistance. Deliveries of weather sensors, cloud ceilometers and such are not uncommon; the ease of working with NGA within its FMS framework being a determining factor. Because few foreign partners have either the experience working with technology vendors or the technical and acquisition expertise amassed in one place as does NGA, it is logical for foreign partners to seek such arrangements under which they can depend on the NGA international acquisition group to deliver the required items such as data, products, equipment, software, or systems, on time, on budget, and to the required specification.

This ease of working with the FMS framework has the additional value of streamlining the acquisition process, one that can otherwise be difficult in some countries and ensure the highest standards for openness or transparency of the process. The obvious focus on American commercial vendors, Buy America First, if you will has tangible value for the participating foreign partner where the exceptional quality of American technology is acquired, often with pricing that only a large-scale buyer may enjoy.

### **Conclusion**

The nation's newest intelligence agency, the National Geospatial-Intelligence Agency (NGA), is the champion of an emerging intelligence discipline, a field that embraces and enjoins the two key tradecrafts of imagery and geospatial analysis along with their support and production elements. Geospatial intelligence is the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically-referenced activities on the earth that have national security implications. It brings together those two tradecrafts and their associated support activities to enable military operations, inform policy and decision makers, respond to homeland security and national (and international) disaster imperatives, as well as collaboration with other intelligence disciplines.

Central to this emerging intelligence discipline is scene visualization; the use of imagery and graphic data plus other information keyed to a single frame of reference. With this expanding capability decision makers, commanders, planners, or implementers can readily visualize events in three-dimensional space and act, as needed. This combining of data from many different sources opens the door to collaboration among analysts, operators, and many others in ways that we are still coming to understand.

Because the needs and requirements of GEOINT customers have always exceeded and for the foreseeable future will outstrip the capabilities to develop and provide data, NGA must continue to make best use of commercial, civil, and foreign partnerships to meet those needs. Central to the foreign partnerships is maintaining at least similar technological capabilities so that data, information, and analytical expertise can be readily exchanged. Through security assistance

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activities, primarily FMS and associated vehicles, NGA engages with foreign partners, seeking mutual benefit, and cooperative effort. By its outreach to the former Soviet and Soviet bloc entities and other emerging democracies around the world, NGA plays a role in the larger national effort to engage and support them in their democratic efforts. The upcoming Partnership for Peace Geospatial Conference at Chisinau, Moldova, in May 2005 is the next formal effort to that end. At the same time, NGA continues to reach out to PfP and other partners with a capability to deliver equipment, data, software, and systems as requested with continued focus on cost, schedule, and performance in delivery to those partners.

#### **About the Author**

John M. Doty advises the National Geospatial Intelligence Agency chief of international acquisition on matters related to technology transfer, security accreditation, data release, and acquisition policy. In that role, he facilitates exchange of information among the many NGA functions that relate to international partners around the world. He began his professional career with the Defense Mapping Agency Aerospace Center in St. Louis, Missouri as a photogrammetrist and has an education background that includes botany, physical sciences, mathematics and statistics. His career includes two significant international assignments, one in the United Kingdom during a time of exceptional technical advances among mapping organizations of the United States and the United Kingdom. The second was in Thailand during a transformation of that country's national mapping. Additional assignments included management of the first multinational database of digital terrain and cultural feature data; control of all map product and data releases to public, non-defense, and foreign entities; and standup of the first production organizations implementing an all-digital production system.