

NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

PATHFINDER

The Geospatial Intelligence Magazine

MARCH/APRIL 2006



Working with the **Federal Community**

- >> An Open Letter from the Director of National Intelligence
- >> Modern Diplomacy Depends on GEOINT
- >> Crisis Brings Out Power of Partnership with NRO



ON THE COVER

From the President to Congress, from the Pentagon to the State Department, and from NGA to the IC, GEOINT continues to make a profound impact across the federal community. Photo © Corbis Corporation.

GETTING PUBLISHED

All members of the geospatial intelligence community are welcome to submit articles of community-wide interest. Articles are edited for style, content and length. The copy deadline is the last Friday of the third month before publication. For details on submitting articles, e-mail the Pathfinder. Our address is pathfinder@nga.mil.

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Director—Lt. Gen. James R. Clapper, Jr., USAF (Ret.)

Office of Corporate Relations,
 Director—Paul Weise

Corporate Communications Division,
 Associate Deputy Director for

Public Affairs—Art Haubold
 Strategic Communications Branch,

Chief—Louis Brune

Editor—Paul Hurlburt

Managing Editor—Matt Reiner

Visual Communications Division,
 Chief—Elizabeth Dann

Designer—Laura Garber

Correspondence should be addressed to:

Pathfinder, National Geospatial-Intelligence Agency

Office of Corporate Relations
 Strategic Communications Branch
 (OCRNS)

4600 Sangamore Road, Mail Stop D-54
 Bethesda, MD 20816-5003

Telephone: (301) 227-7388,
 DSN 287-7388, or

In St. Louis: (314) 263-4142,
 DSN 693-4142.

E-mail: pathfinder@nga.mil

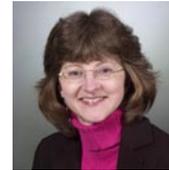
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About the Authors

Gail Cherochak is the Communications Specialist in NGA's New Campus East Program Management Office.



Gail Cherochak

Kia Coleman is a Booz Allen Hamilton contractor supporting the Office of Corporate Relations. Previously a Foreign Service Officer with the Department of State, she was posted to Rio de Janeiro and the Department Operations Center. In her final assignment, she was Special Assistant to former Secretary of State Colin L. Powell.



Kia Coleman

Kathleen Hufnagel is Chief of Staff Support in the National Reconnaissance Office Imagery Intelligence Directorate.



Kathleen Hufnagel

Karen Furgerson is an internal communications officer in the Office of Corporate Communications at the National Reconnaissance Office.



Karen Furgerson

Jorge Pereira is a staff officer in the Office of Geospatial Intelligence Management and a member of the planning team for the NSG Senior Management Council. He is a former Army officer.



Jorge Pereira

Scott Spaunhorst is Chief of the Coordinate Systems Analysis Branch of the Geosciences Division in the Source Operations and Management Directorate's Office of GEOINT Sciences.



Scott Spaunhorst

Dr. Martin K. Gordon is the NGA Historian and Chief, Corporate History Branch, Office of Corporate Relations.

Granville Peterson is the Washington Navy Yard Site Manager and Radio Frequency Identification Program Manager.



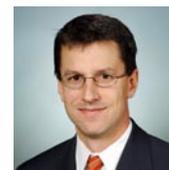
Granville Peterson

Lee Warren is the NGA and Department of Defense Lead for the Geospatial One-Stop program, a project of the interagency Federal Geographic Data Committee. He is assigned to the NGA Office of the Chief Architect.



Lee Warren

John Goolgasian is NGA's Senior Advisor for Geospatial Analysis and Deputy Director of the Office of Americas.



John Goolgasian



Endings and Beginnings

Letter to our Readers

This issue is the last in our six-part series on how geospatial intelligence (GEOINT) makes an essential difference for our many and varied customers. It is also my first as Director of Corporate Relations. On my last assignment as Deputy Director in the Analysis and Production Directorate, I was responsible for ensuring that customers received the most accurate and appropriate GEOINT available. And so, the idea of focusing on different customers in each issue appeals to me. The focus this time is on the Intelligence Community and federal government.

We begin with a special message from the Director of National Intelligence (DNI), John Negroponte. "There is no higher priority for our national security than the issue of information sharing," the DNI says. He also notes that "NGA has served as a catalyst for change and improvements in information sharing, 'showing the way' across the IC landscape." May we continue to earn such high praise!

The lead article features NGA's support to the Department of State in the traditional area of diplomacy, as well as with special initiatives like preventing deforestation and the spread of avian influenza.

Articles and columns that follow highlight relationships with the National Reconnaissance Office, the National System for Geospatial-Intelligence, and Geospatial One-Stop—an innovative Web site sponsored by a consortium of federal agencies.

In May we will begin another cycle in our series on how NGA makes an essential difference to our customers. Readers told the Pathfinder staff that focusing on different end users and collaborators in each issue gave them a handle on NGA's broad mission. Of course, there is much more to say about how NGA works with these groups, and since the GEOINT discipline continues its rapid growth, it's important to stay abreast of the latest developments. So look for future issues on how NGA interacts with warfighters, homeland defenders, policy makers, technology experts and international partners.

Mark Schultz, my predecessor, has made his mark in many ways, this magazine being one example. Using the Pathfinder as never before to tell the story of GEOINT from the customer's vantage point was one of his many contributions to relevant communication with our stakeholders. He made significant progress in advancing the understanding of GEOINT. I wish him well as he embarks on a new career outside NGA.

The focus of our next Pathfinder is on those who know best the cost of freedom: our warfighters. It will give you a deeper understanding of how GEOINT continues to make an essential difference—supporting their efforts to take action on the enemy and helping to save the lives of allies.

A handwritten signature in black ink that reads "Paul R. Weise". The signature is written in a cursive, flowing style.

Paul R. Weise
Director, Office of Corporate Relations



On My Mind

Progress in Defining GEOINT

From “Imagery and Mapping” to “Imagery Intelligence and Geospatial Information” and Beyond

By Lt. Gen. James R. Clapper, Jr., USAF (Ret.), Director, National Geospatial-Intelligence Agency

Our Agency has come a long way and made continuous, steady progress in the last decade. To understand the current definition of geospatial intelligence (GEOINT) requires a basic understanding of the events and circumstances that drove progress and change within the Agency over the past 10 years.

The concept of the Agency’s founders who envisioned and authored the National Imagery and Mapping Agency (NIMA) Act of 1996 focused on the marriage of imagery, imagery intelligence and imagery analysis with the tradecraft of mapping, charting and geodesy. While the concept was visionary, ultimately the NIMA name connoted a separateness, “imagery AND mapping,” and definitions for our new intelligence discipline did not fully establish its core tenets and boundaries.

Catalysts in Defining GEOINT

Four years after the release of the NIMA Act, two events spurred the Agency toward progress in defining roles and functions and reinforced the merit of integrating tradecrafts under one roof. The release of the NIMA Commission study and the tragic events of Sept. 11, 2001 were catalysts toward progress in defining the Agency’s role within the national security landscape. The NIMA Commission provided the roadmap, while the events of 9/11 provided the impetus for action.

The newly defined GEOINT described a power and capability found in multi-layered approach.

By the beginning of 2002, the Agency had accelerated the convergence of various analytic tradecrafts (cartography and geodesy, and geospatial, imagery, marine, aeronautical and regional analysis) toward more clearly defining and codifying its new

form of intelligence—an emerging discipline greater than the sum of its parts.

With the signing of the fiscal 2004 Defense Authorization Act in November 2003, NIMA officially became the National Geospatial-Intelligence Agency (NGA), and geospatial intelligence was formally recognized and defined in Title 10, U.S. Code.

The Power of GEOINT

Through statutory acknowledgement, intelligence practitioners recognized that the power of GEOINT rested in the concept of “place”: Everyone and everything must be some place on the Earth. “Geo” comes from the Greek word for Earth, and “spatial” refers to place. GEOINT, therefore, was rightly segmented from other disciplines due to its visual-reference nature. The “power of the picture” was defined as the use of either manmade or natural features to describe the basic foundation upon which a variety of other layers of information could be applied. GEOINT was also recognized as being collaborative, allowing for other layers of data and information from disciplines such as human intelligence (HUMINT) and signals intelligence (SIGINT) to be readily laid over a geographic frame of reference.

The newly defined GEOINT described a power and capability found in a multi-layered approach. In addition, the formal definition established equal status between NGA and other “INT” organizations, some

of whom did not (and still do not) have statutory definitions guiding their tasking, processing, exploitation and dissemination processes.

Just as defining GEOINT served as our beacon over the last decade, “integration” must become our rallying cry for the future.

The current statutory definition of “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.” GEOINT consists of imagery, imagery intelligence and geospatial information.

The term “imagery” refers to a likeness or representation of any natural or manmade 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 likenesses and representations produced by satellites, airborne platforms, unmanned aerial vehicles, or other similar means. The term “imagery” does not include handheld or clandestine photography taken by or on behalf of human intelligence collection organizations.

The term “imagery intelligence” means the technical, geographic and intelligence information derived through the interpretation or analysis of imagery and collateral materials.

The term “geospatial information” refers to information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the Earth. It includes statistical data and information derived from, among other things, remote sensing, mapping and surveying

technologies, and mapping, charting, geodetic data and related products.

GEOINT does not include clandestine technical collection, SIGINT, non-Synthetic Aperture Radar MASINT (measurement and signature intelligence), or the MASINT sub-disciplines of radio frequency, materials, nuclear radiation and geophysical. By definition, MASINT represents technically derived intelligence data other than imagery and SIGINT.

Progress Continues

Progress in defining GEOINT certainly continues. In December 2005, the Office of the Director of National Intelligence (ODNI) amplified the statutory definition of GEOINT. It now incorporates all Overhead Non-Imaging Infrared (ONIR) and space-borne imagery-derived MASINT. This expanded definition was in keeping with a July 2005 ODNI memo transferring responsibility for tasking, processing, exploitation and dissemination of all overhead MASINT phenomenologies, including ONIR, to NGA. The amplified definition of GEOINT now provides the basis for a clear distinction between GEOINT and MASINT.

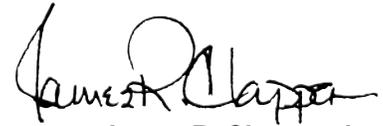
Steady progress over the past decade is now paying off for NGA. With a statutory definition and amplifications from the ODNI that clearly delineate lanes for NGA and other disciplines, one could say NGA and the concept of geospatial intelligence have finally “arrived.”

Just as defining GEOINT served as our beacon over the past decade, “integration” must become our rallying cry for the future. Internally, we must press for innovation in fusing all sources and types of GEOINT. Externally, we must create interface points for fusing GEOINT with the capabilities and products of our partner agencies across the Intelligence Community to handle and

analyze the future volume, velocity and variety of information at our disposal. Our national security demands it.

In the future, we will continue to make progress, sometimes at a jog and other times at a sprint. But in the end, we will maintain our focus on providing geospatial intelligence for decision makers,

whether they are in the cockpit or the White House.



James R. Clapper, Jr.
Lieutenant General, USAF (Ret.)
Director

NGA to Consolidate at New Campus East

By Gail Cherochak

While NGA continues to transform its processes and systems for the geospatial intelligence (GEOINT) mission, the Agency will soon begin an even more visible change: consolidating its eastern facilities. In accordance with the Department of Defense Base Realignment and Closure (BRAC) actions announced in November 2005, NGA will move operations to a "New Campus East" (NCE) at Fort Belvoir, Va., by Sept. 15, 2011. NGA will close its primary sites in Bethesda, Reston and the Washington Navy Yard, in addition to relocating smaller NGA functions to Fort Belvoir. Facilities of NGA West in St. Louis and Arnold, Mo., while not directly involved in the consolidation, will play a critical role in mission assurance and NGA business continuity.

Fulfilling NGA's vision of creating one eastern home for GEOINT, the move will support a unified organization and culture, provide state-of-the-art facilities at a single location that will enable integrated operations and support horizontal integration, increase force protection and mission assurance, and reduce facility operation and maintenance costs. In addition, quality of life features such as improved dining facilities with a variety of quality food, an expanded fitness center, and other amenities are planned to attract and retain the best GEOINT professionals for the NGA workforce. Architectural and engineering design work on NCE will begin this spring under the oversight of the NCE Program Management Office.



An Open Letter to the NGA Team

By John D. Negroponete, Director of National Intelligence

The beginning of each year provides a fresh opportunity to focus our sights on the future. With the global war on terrorism a continuing challenge, the stakes for our nation remain high and demand that the Intelligence Community (IC) continue to retain the advantage over our enemies in terms of speed, agility and resourcefulness.

As we move into a new year, I want our NGA team to know I view your talent and contributions as a source of competitive advantage for our nation in the fight against global extremists. I clearly recognize the value of geospatial intelligence (GEOINT) in providing essential and critical information to our national leaders and warfighters, all of whom make decisions of fundamental importance to the security of our nation.

Across the IC, our job is to make sure implementation of the Intelligence Reform and Terrorism Prevention Act of 2004 is value-added, not zero-sum. Critics of our implementation suggest that we

NGA tsunami relief efforts set a standard for rapid assimilation into a dynamic environment and provided a model for efficiency in information and data exchange within the interagency process.

are not moving aggressively enough to address previously identified gaps and emerging threats. I think the story is quite the contrary. First and foremost, I believe there is no higher priority for our national security than the issue of information sharing. This said, I believe our intelligence effort is better integrated today than in previous years and I think we are doing a good job at bringing together foreign, domestic

and military intelligence. NGA has served as a catalyst for change and improvements in information sharing, “showing the way” across the IC landscape.

Examples of NGA partnering and leadership abound. Within the IC, I am extremely impressed with NGA’s pioneering collaborative work with the National Security Agency, effectively linking our nation’s “eyes and ears.” Similarly, NGA partnerships with the Defense Intelligence Agency and National Reconnaissance Office have contributed to a more responsive capability suite, increased situational awareness and sped decision-making processes across our community and for our nation’s leaders.

Outside the immediate IC family to our greater customer and stakeholder base, NGA’s record of collaboration is second to none. Partnership with the Department of Homeland Security for the presidential inauguration in January 2005 was superb. However, you truly put yourself on the map with support for Hurricane Katrina. I was very proud of you during a time when so many Americans needed your leadership and guidance in helping establish a common operating picture and supporting damage assessment across myriad local, state and federal agencies.

Your leadership in the international community is also compelling. NGA tsunami relief efforts set a standard for rapid assimilation into a dynamic environment and provided a model for efficiency in information and data exchange within the interagency process. I have watched with interest the evolutionary development of the Multinational Geospatial Co-production Program (MGCP). Your work in leading a 28-nation contingent in the development of an international data warehouse and information sharing

process has been excellent. Many of our European allies have embraced GEOINT concepts and taken to replicating your processes—the most sincere form of flattery.

In looking to the future and thinking about how the IC must function, it is especially important that we note the speed of our enemies in adapting to our policies and actions, and build into our plans a capacity

NGA has served as a catalyst for change and improvements in information sharing, “showing the way” across the IC landscape.

to innovate even faster. Similarly, we must be capable of responding to the demands of a more diverse customer base looking for predictive and targetable intelligence

while often engaged in 24/7 operations. These challenges require us to become a learning community, ready to deal with contingencies, trade-offs and change.

I find it heartening that NGA has already moved forward with innovation: Your Geospatial Intelligence Knowledge Base, harnessing the power and potential of knowledge management, provides a superior example of focused innovation. I am equally excited about future prospects for developments in the areas of persistent surveillance and three-dimensional visualization.

The importance of technical innovation notwithstanding, I know that NGA recognizes the simultaneous need to build up our overall analytic expertise and works hard to attract and unify a diverse, multitalented workforce. Again, NGA “shows the way” in workforce innovation, having partnered with Harvard University to develop spatial-skills testing to better recruit, train and assess imagery analysts.

Our National Intelligence Strategy aims to ensure no gaps exist in our understanding of threats to our national security. It also aims to bring more depth and accuracy to intelligence analysis, and it requires IC resources to generate both present results and future capabilities. The work you do at NGA is vital to the success of our National Intelligence Strategy. Your GEOINT products and analytical judgments are used by our nation’s leaders on a daily basis in making decisions affecting all Americans.

Ultimately, the National Intelligence Strategy leverages the extraordinary talents and patriotism of our diverse community. As our community and our nation look toward the future and continued efforts in the global war on terrorism, rest assured we will continue to look to the professionals at NGA to “Know the Earth and Show the Way.” Thanks for all that you do for our great country.

With Modern Diplomacy Depending on GEOINT, NGA Team Steps Up Support to State Department

By Kia Coleman

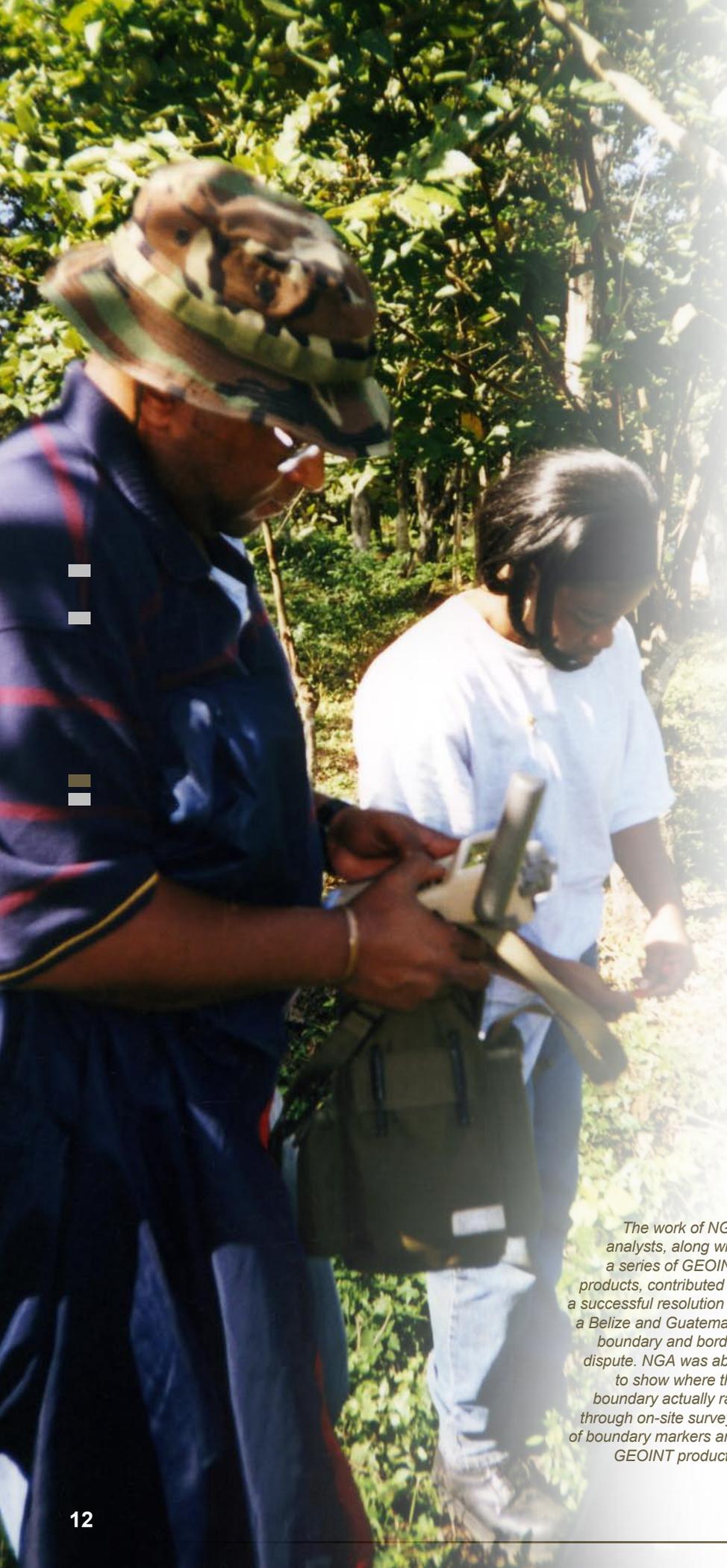
From Darfur to Belize City, from Kashmir to Kabul, and from Riyadh to Baghdad, geospatial intelligence (GEOINT) is making a critical difference in the world of international affairs. Diplomacy and foreign policy have often been thought of as realms where the power of the spoken and written word can skillfully resolve international conflicts, forcefully ignite negotiations between disputing countries, and deftly convey a nation's foreign policy and national ideals to the world. GEOINT reframes that perception. Its dynamic, composite visualizations and analyses of natural and manmade features and activities on Earth provide U.S. Department of State and diplomatic security officials with detailed, timely—often instant—understandings of complex foreign policy and security issues. GEOINT and the NGA Support

Team (NST) that provides it to the Department are proving that a picture is just as necessary, if not better in some cases, than a thousand words.

The NST works hard to ensure that Department of State officials have the robust GEOINT they need to support modern diplomacy and diplomatic security efforts. Headed by Patrick D. Warfle, the NST is embedded in the Department's Bureau of Intelligence and Research (INR). Its members provide tailored GEOINT to customers such as Carol Rodley, the Acting Assistant Secretary of Intelligence and Research, other senior Department officials, U.S. ambassadors posted around the world, the Department's many regional and functional bureaus, INR analysts and the Department's diplomatic security corps.

Members of the State Department NST use GEOINT tools to conduct a security assessment of a U.S. diplomatic facility. GEOINT provides a common operating picture for Diplomatic Security forces around the world.





An Overnight Look

On a typical morning, well before many Department of State employees arrive for the day, the NST pushes out tailored digital GEOINT products to officials such as the INR Assistant Secretary. The NST often pulls these products directly from the Web page of NGA's Analysis and Production Directorate to show officials what activities happened around the world overnight and to inform customers about late-breaking or current events of high interest. At any time, senior staff can pass particularly compelling GEOINT to Secretary of State Condoleezza Rice, in addition to what she already sees in the daily morning intelligence briefing.

The Department of State is not this NST's only customer. The team also caters to its customers *within* NGA, serving as a liaison between the Department and NGA analysts. The NST has the unique ability to share critical information about important foreign policy issues and its understanding of what the Department needs from NGA. The NST also educates the NGA workforce about the Department's mission. To further improve a *mutual* understanding of requirements and capabilities, the NST also facilitates analyst-to-analyst connections between INR and NGA by hosting several exchange opportunities and promoting visits by senior Department officials to NGA for a firsthand look at Agency operations.

The NST's overarching mission remains its ability to deliver the GEOINT products and services that serve as key enablers for the Department of State in the world of diplomacy and international affairs. "GEOINT has become a solid foundation for policy and mission success," Warfle notes, "whether that's supporting traditional Department missions or the bevy of emerging, new initiatives that demand GEOINT."

The work of NGA analysts, along with a series of GEOINT products, contributed to a successful resolution of a Belize and Guatemala boundary and border dispute. NGA was able to show where the boundary actually ran through on-site surveys of boundary markers and GEOINT products.

Showing the World

The Department of State's efforts to end humanitarian crises around the world offer a critical example of the successful partnership between GEOINT and diplomacy. In early 2004, NGA analysts, working closely with the NST, provided GEOINT to the Department that brought significant attention to the humanitarian crisis in Darfur, Sudan. NGA, in collaboration with the Department's Humanitarian Information Unit (HIU), developed a Darfur atlas using a commercial software application, ArcGIS, and DigitalGlobe imagery for use as a field tool. The U.S. Agency for International Development (USAID) and non-government organizations used the 10-page atlas to pinpoint conflict areas in the Darfur region. An embedded NST member applied commercial satellite imagery to create high-resolution image maps of refugee camps, individually displaced persons and destroyed villages. With these GEOINT tools, Department officials could quickly visualize and understand what was occurring in the region, despite the barrier of its inaccessible terrain.

Former USAID Administrator Andrew S. Natsios was among the government representatives to use these mapping products to brief the U.N. Security Council, U.N. Secretary-General Kofi Annan, and the government of Sudan as part of an effort to inform the international community about the enormity of the crisis. The image maps allowed users to immediately grasp the plight of displaced persons in the region. In addition to use for diplomatic purposes, these visual products were used on the Senate floor, in the press and by human rights and relief organizations, including USAID's Office of Foreign Disaster Assistance and the Centers for Disease Control and Prevention.

The NST is also facilitating the use of GEOINT to help resolve international boundary and border disputes, with a team member

working specifically on these politically sensitive issues. Based on NGA's role, as a neutral party with geospatial expertise, in demarcating the border between Ecuador and Peru, the State Department requested GEOINT that would depict the border between Belize and Guatemala. Belize had claimed that Guatemalan settlers living near the border had crossed into its territory. Many of the settlers in question simply could not physically see where the border of one country ended and the next began. NGA was able to show, through on-site surveys of boundary markers and a series of GEOINT products, where the boundary actually ran, which helped to resolve the issue.

The resolution of environmental issues is another type of mission that benefits from GEOINT. When an oil tanker spills its load somewhere in the world, the Department of State can turn to the NST to request products that show the extent of the spill and support damage assessments. The Department also uses GEOINT to reveal the effects of deforestation, soil erosion and water pollution around the globe, caused by careless stewardship or outright violation of international conventions. GEOINT can provide "snapshots" of a region over time, showing the change in landscape as a result of environmental devastation. The NST is working with the Analysis and Production Directorate to apply tools and tradecraft developed through NGA's experience with Hurricanes Rita and Katrina to improve GEOINT support to environmental and humanitarian disasters overseas.

Supporting Security

Supporting security planning at the Department of State has long been a major mandate for the NST. Working with the Department's Bureau of Diplomatic Security, NGA is significantly expanding GEOINT support to protecting our embassies and diplomats. Diplomatic Security



The NST recently launched a program to help train security teams to strengthen force protection of diplomatic facilities like the US Embassy in Riyadh, Saudi Arabia.

provides a safe and secure environment for the conduct of U.S. foreign policy. Every diplomatic mission in the world operates under a security program designed and maintained by the Bureau. In the United States, Diplomatic Security protects the Secretary of State and high-ranking foreign dignitaries and officials visiting the United States. Overseas, Diplomatic Security protects Department of State facilities and personnel as well as American citizens. GEOINT provides a common operating picture for Diplomatic Security forces that are spread out across the globe.

This year the NST launched a program with NGA's Source Operations and Management Directorate to create GEOINT based on commercial imagery that covers over 350 U.S. diplomatic facilities around the world, including sites where new embassies are being planned. The NST tailors GEOINT support to high-interest posts in Asia, the Middle East and South America. In January, NST members traveled to Saudi Arabia, where they helped train security teams on how to use GEOINT products to strengthen force protection.

The NST has also embedded a geospatial analyst in Diplomatic Security's Command Center, which pleased officials so

much they purchased a high-end NGA workstation to equip the analyst, Warfle said. Reaching back across NGA, the analyst produces GEOINT that provides Diplomatic Security visual baselines of foreign countries or densely populated terrain. In a disaster, security officers overseas and officers back at the Diplomatic Security Command Center can immediately work from the same visual baseline to conduct damage assessments and consequence management. This kind of visual baseline is also critical to support special international events such as the Olympics and the U.N. General Assembly, where the Department helps to coordinate security.

Serving as Liaison

Overall, one of the NST's most important traditional mandates at the Department of State remains its liaison function. The team works closely with NGA directorates to ensure the successful delivery of needed intelligence products. For example, the team helps NGA's Office of International Affairs and Policy carry out its release-and-disclosure function so that the Department can more quickly use critical NGA products, while safeguarding national security. The team also spends a significant

amount of time supporting educational programs between the Department and NGA. Senior NST staff members teach courses on intelligence and GEOINT at the Diplomatic Security training school and overseas while on temporary duty. At NGA, Warfle briefs senior leadership classes on NGA's contribution to the Department of State and the importance of fostering interagency analysis.

The NST also supports a variety of emerging educational initiatives. Mid-level NGA geospatial and imagery analysts have the unique opportunity to work in INR on 90-day details, working as teammates with their INR colleagues in multi-intelligence assessments and analyses. For less experienced analysts, the NST has a program that gives them an opportunity to work on short-term humanitarian issue-focused projects in the HIU Unit. Not only do these analysts benefit from the exposure to one of NGA's most valued customers, but the Department benefits from their added skill, analysis and different problem-solving perspectives.

NST Chief Patrick Warfle shakes hands with Secretary of State Condoleezza Rice. Warfle's team provides GEOINT products and services to State officials, which helps sustain a successful and synergistic relationship between NGA and the Department.



Environmental Issues

Other new and expanding initiatives include the NST's work with the Bureau of Oceans and International Environmental and Scientific Affairs (OES). OES coordinates an extensive portfolio of issues related to science, the environment and the world's oceans. The NST is coordinating with OES to ensure that the Bureau has the GEOINT it needs to attack issues such as deforestation and avian flu.

The NST is also heavily involved with NGA Day at the Department of State, regional-emphasis days at NGA sponsored by the Analysis and Production Directorate, and visits by top Department officials to NGA. These types of information-sharing events promote the kind of interagency awareness necessary to sustain the successful, synergistic relationship that exists between NGA and the Department.

As the Department of State NST looks toward the future, it will continue supporting emerging initiatives. These will produce a more robust form of GEOINT, further proving that written, spoken and visual analysis can form comprehensive solutions to modern foreign policy issues.

"Leveraging NGA's experts to have a positive impact on U.S. foreign policy has been one of the greatest rewards of my work at the Department of State," said the NST Deputy Chief for Operations, Alan Huguley.

According to Warfle, "Getting active GEOINT to the right players in State at the right time helps us safeguard American lives, advances U.S. foreign policy and gives us a little more room to avoid putting metal on target or boots on the ground. That makes all the difference in the world. That's why we're here."

Crisis Brings Out Power of Partnership with NRO

By Kathleen Hufnagel and Karen Furgerson

In recent years, the National Reconnaissance Office (NRO) has become much more involved in exchanging information and ideas and disseminating new imaging techniques and capabilities to tactical users. A situation caused by Hurricane Katrina demonstrated this proactive approach, which took a willingness to help, personal sacrifice and creative problem solving. Resolving the crisis also demonstrated the power of NRO's partnership with NGA.



Headquartered in Chantilly, Virginia, the NRO develops and operates unique and innovative space reconnaissance systems and conducts intelligence-related activities essential for U.S. national security.

Through a fortuitous conversation at a fast-food restaurant, NRO's Directorate of Military Support was able to provide valuable assistance to the Naval Oceanographic Office (NAVOCEANO) at NASA's Stennis Space Center in Bay St. Louis, Miss.

On their way back from the Gulf Coast, where they provided donated supplies to a local church, a member of the directorate's Operational Support Office (OSO), Air Force Lt. Col. Matt Mandina, and his family stopped for fast food in Meridian, Miss. While in line, Mandina observed a woman buying a large order of hamburgers and commented that she appeared to be buying enough food to feed a small army. She corrected him, saying she was "actually feeding a small navy." The woman, Navy

Lt. Deborah Maybey, explained that she worked for NAVOCEANO as a hydro cartographer, mapping shorelines and waterways. Mandina informed her that he worked at the NRO and asked if they use imagery for their work. Maybey replied "yes," but said that at the time they had no communications link for receiving imagery. Mandina gave her his card and told her to call him Tuesday morning and he would try to help.

Communications Disrupted

Mandina returned to work Tuesday to find a voicemail from Maybey requesting assistance. Maybey put Mandina in contact with one of the two NGA representatives at Stennis who did not evacuate to St. Louis. He had critical mission-support requirements from his NAVOCEANO customer, but the ability of Stennis to receive communications was severely hampered. Existing base communications were portioned out for emergency purposes so that the base could account for the safety of its people. Those systems were operating at "dial up" speed, completely insufficient for the emergency-response task at hand.

Mandina told the NGA representative he might be able to provide a portable system that could help speed up communications. Within an hour, the NGA representative received a "thumbs up" from Stennis—they would accept the help. Mandina quickly put together a team and sought permission to assist from NRO leadership. Mandina spent Wednesday refining the requirement and figuring out details of the support needed. The next morning, the NRO approved his plan and an OSO engineering team departed that evening.

Upon arrival at Stennis, the team staged its portable system, called Buzz Lite, setting up its antenna and related equipment on the roof. The NRO employees then set up their personal equipment—air mattresses and sleeping bags—in the office where they would work. Though unconventional, their TDY quarters received no complaints because the building, operating on generator power, had air conditioning, for which everyone in the hot, humid climate was grateful.

The Buzz Lite communications equipment made it possible for NAVOCEANO to receive high-bandwidth mission-critical imagery and other data in near real time. In addition to receiving classified imagery products, Buzz Lite was able to access unclassified commercial imagery products.

Vital Information Provided

The Buzz Lite team's efforts enabled NAVOCEANO to collect the information needed to support the U.S. Northern Command's Joint Task Force Katrina and other military operations in the Gulf of Mexico, NGA Support Team (NST) members said.

"It was a pleasure to work with the Buzz Lite team," one NST member said. "Their mission was tough, and the timeline was short. That they succeeded in the face of such adversity speaks volumes about their dedication and professionalism."

There was a desperate need for information, as the hurricane had destroyed map supplies and familiar landmarks. NAVOCEANO used the imagery data to determine locations for naval amphibious landing craft to safely and effectively go ashore to deliver supplies.

Although the team was prepared to stay for an extended period of time, they were not needed that long. By the time they left eight days later, Stennis was back on the electric power grid, the communication lines were open, and the Internet was back up.

A member of the OSO team used one word to sum it all up: "teamwork," saying, "Nobody does it all by himself." The extraordinary teamwork that went into deploying a Buzz Lite unit to NAVOCEANO during a crisis clearly demonstrated how effective, and how important, the NGA and NRO partnership is.

Buzz Lite to the Rescue

Buzz Lite is a rugged, portable communications system for securely downloading imagery and other data at remote locations in a timely manner. Engineers in NRO's Directorate of Military Support, Operational Support Office, designed the system.

NGA deploys Buzz Lite to support national security special events. However, neither of NGA's two domestic Buzz Lite units was available to support the Naval Oceanographic Office at NASA's Stennis Space Center after Hurricane Katrina. One unit was in New Orleans providing hurricane relief support and the other was in New York to support a meeting of the U.N. General Assembly.

NRO had a Buzz Lite development model on hand, which the Office of Support Operations took to Stennis. The Buzz Lite team downloaded NRO system images, commercial images and other data files, including maps, reports and briefings—a total of 244 gigabytes of data in seven days of operations.



NSG Unites Producers and Users of GEOINT

By Jorge Pereira

NGA Director retired Air Force Lt. Gen. James R. Clapper Jr. brought together the community of users and producers of geospatial intelligence (GEOINT) in a new forum last fall. As Functional Manager for the National System for Geospatial-Intelligence (NSG), he initiated the NSG Senior Managers Council, an open and collaborative meeting to discuss issues and strategies that affect the production and consumption of GEOINT today and in the future.

Held Nov. 29-30 in Wye River, Md., the Council meeting drew senior leaders from the Offices of the Secretary of Defense and Director of National Intelligence, Joint Staff, national intelligence agencies, military services and commands and civil community. Also attending were NSG partners from the Commonwealth.

The NSG is the amalgamation of technology, policies, capabilities, doctrine, activities, people and community needed to produce GEOINT in an integrated, multi-intelligence environment. It supports GEOINT policy development, unified operations, doctrine and tradecraft, adoption of standards and the provisioning of interoperable systems. The NSG community discusses, coordinates, manages, sponsors, advocates and advances the GEOINT interests of its members.

A Vital Role

The NSG's role is vital because it establishes the framework for interactions within the GEOINT community, enabling the consumers and producers of GEOINT to be better served.

In one example, the NSG is working to improve the discipline and delivery of

GEOINT through the leadership activities of the National Geospatial Intelligence College in NGA's Human Development Directorate. The College not only serves the training and development needs of NGA employees, but also works extensively with the military services and commands, as well as other members of the Intelligence Community, such as the Department of Energy and Defense Intelligence Agency, to establish training standards and curriculum for GEOINT consumers and producers. The Community Geospatial Intelligence Training Council is the functional activity led by NGA that brings together the broad membership of the NSG to collegially develop training standards for the NSG. The work of this council insures that all members of the NSG have a set of basic skills and abilities that ensure the proper utilization of GEOINT in their support of national security objectives.

Functional Manager's Role

As Functional Manager for the NSG, the NGA Director also has a vital role, ensuring that the NSG meets its primary mission to provide timely, relevant and accurate geospatial intelligence (GEOINT) in support of national security. The Director must ensure that GEOINT gets to whoever needs it and wherever it is needed to support our nation. The Functional Manager also develops and maintains the GEOINT vision for the NSG in support of national security as a means to address future and enduring intelligence challenges. Functional management of the NSG is implemented through the development of standards, plans, policies, doctrine and programs that

unite members into a unified community of producers and users of GEOINT.

As the Functional Manager, the Director of NGA receives direction from both the Director of National Intelligence and the Secretary of Defense. The Director of NGA is the principal advisor to the Director of National Intelligence for GEOINT as well as the Intelligence Community's Functional Manager for GEOINT, carrying with that title a wide portfolio of authorities. The Director of NGA is similarly charged by the Secretary of Defense, through the Deputy Secretary of Defense and Undersecretary of Defense for Intelligence, to support the Department of Defense, including the Chairman of the Joint Chiefs of Staff, the services and the combatant commands. This support includes GEOINT products, functional management capabilities, GEOINT advice, and advisory tasking of tactical GEOINT collectors.

NGA and NSG Work Together

Functional management of the NSG is not something that can be done by NGA alone. It takes leadership from NGA senior officials and effort on the part of the NSG community to make it a fruitful and collaborative relationship. The most visible part of functional management is the external outreach to the community, through a variety of fora and programs, concerning issues that affect the production and consumption of GEOINT.

To ensure effective execution of functional management roles and responsibilities for the NSG, the Director of NGA established the Office of Geospatial Intelligence Management (OGM) to broadly oversee the implementation of subordinate functional management authorities. These authorities are delegated responsibilities for the major functional areas of production and analysis, acquisition and source collection. Under this structure, OGM sets broad NSG goals and guidance, while the subordinate functional managers focus on their distinct mission areas, providing detailed plans and guidance.

Leading the NSG is never easy; it involves balancing the requirements of multiple agencies and services with different needs and priorities. The end goal is to make this difficult task appear seamless and ensure that when our national leaders are faced with critical decisions or our warfighters are in harm's way, the NSG is prepared to support their GEOINT requirements.



Geodetic Research Can Solve GEOINT Mysteries

By Scott Spaunhorst

In the global war on terrorism, being able to exploit historical maps and charts published by various countries has become a valuable asset. The ability to convert unknown coordinate strings into a usable location tied to NGA's global coordinate reference frame, or datum, World Geodetic System 84 (WGS 84), is especially valuable. Such exploitation continues to increase as the variety of source material continues to expand.

The ability to fully utilize and exploit these sources relies on a very important aspect of geospatial intelligence (GEOINT) called geodetic research. This kind of research involves many functions within NGA, such as library research, regional knowledge, map production techniques and the practical applications of geodesy. Geodetic research is often needed for immediate support to warfighters in theater and directly supports national security objectives.

Origin of Datums

By the mid-20th century, most technically advanced nations had developed their own geodetic system to an extent governed by their economic and military requirements, such as the North American Datum 1927, European datum 1950, and the Indian datum. Some systems were developed by the expansion and unification of existing local surveys and others by new nationwide surveys replacing outdated local ones.

Before the development of regional datums, neighboring countries often did not use the same horizontal and vertical datum. There was no economic requirement for common geodetic information, and the use of common datums was contrary to the

military interests of each country. The net result was many different surveys of varying size with no correlation to neighboring countries. National maps based on these independent surveys also differed widely. This variation has highlighted the need for geodetic research.

Geodetic research requires an understanding of geodesy. The dictionary defines geodesy as "that branch of applied mathematics which determines by observation and measurement the exact positions of points and the figures and areas of large portions of the Earth's surface, the shape and size of the Earth, and the variations of terrestrial gravity."

Geodesy and GEOINT

A thorough study of the science of geodesy is not a simple undertaking. However, it is possible to understand the historical development and a general knowledge of the methods and techniques of the science by looking at the way the Department of Defense (DoD) and Intelligence Community are using geodesy to solve problems.

Determining the exact size and shape of the Earth was purely a scientific endeavor for many years. It became a practical matter when the military developed a global reach and the need to determine exact positions on Earth for weapon-system guidance, artillery control and mapping. To support the mission, it became paramount that geodesy as a scientific endeavor merge with its practical applications. This merger allowed DoD to take advantage of scientific advances to develop long-range ballistic missile targeting, defensive missile operations, satellite tracking, precise positioning and global navigation.



The Intelligence Community uses geodetic research as a tool to solve GEOINT mysteries. NGA has concentrated its effort within the Coordinate Systems Analysis Branch of Geosciences—a division in the Source Operations and Management Directorate's Office of GEOINT Sciences. Branch efforts include library research, imagery analysis, map accuracy evaluation and applications of a geographic information system (GIS) to solve geodetic problems. Individuals involved in this type of research must be part historian, have Internet proficiency and demonstrate a technical knowledge of geodesy. In addition, they must be experts in map production techniques, have geographic knowledge of the area in question and be able to evaluate information gathered and formulate a conclusion.

Recurring Issues

There are two recurring issues that lead to geodetic research. One is the detection of a string of numbers during intelligence gathering and the other is trying to utilize old maps and charts to support a variety of

GEOINT activities. In each case the goal is to tie the information to a location within the WGS 84 coordinate reference frame in latitude and longitude and the Military Grid Reference System (MGRS).

In regard to the string of numbers, many times this is the only information that is available other than a general location such as a country. The first step is to decipher the string into something recognizable. Staff members combine their coordinate-systems expertise with analytical interpretation techniques to unravel the mystery and begin to develop the building blocks for a possible WGS 84 position. The final conclusion is based on a conglomeration of data pulled from NGA sources, as well as sources available through the World Wide Web. Sources can range from text files, written documents and geodetic software to survey data and imagery. In addition to establishing WGS 84 positions, the staff determines a confidence factor, which provides a level of trust to the newly located positions.



In another instance, geodetic research may be needed to determine the validity of an old map or chart and whether it can be positioned in WGS 84. So that users can “trust”

this type of material, staff must develop some type of history to indicate the production parameters available

at the time. Many times historical maps and charts do not have the critical information

(geodetic information), like datum and projection, that can be used to geographically tie the map to a location on the Earth.

Consequently, NGA staff must

identify the coordinate reference system used and other production parameters to successfully

turn the information into a

known location in WGS 84. Research is necessary to build a package that can help determine the production parameters for the material. If the staff can establish production parameters, then the processes to evaluate the old map or chart become easier and the utilization of the material increases considerably. NGA also uses old maps and charts to locate historic sites, to identify potential targets, and to populate geospatial databases.

Proven Capability

The capability to perform geodetic research has proven to be vital in NGA’s effort to

produce accurate, timely and relevant GEOINT. This effort is used to support long-range planning missions and the crisis intelligence needs of the warfighter on the ground.

GEOINT mysteries NGA has solved through geodetic research include a case where communications about troop locations were obtained and a conversion of these locations to WGS 84 was requested. Analysts reviewed all known geodetic/grid systems in the region but could not match a system to the locations. Fortunately, the report also gave names of geographic features, which provided the first piece of the puzzle. With the names, the analysts inferred a grid system that correlated with the troop locations and made a conversion to WGS 84. Within 24 hours, they provided these results as points on a digital version of a 1:250,000 scale map along with qualifying statements as to the accuracy of the results.

In another example, branch personnel used local geodetic history to decipher data obtained by one of the commands into a usable set of WGS 84 coordinates. They used a GIS to display the information and validate the data. This information they passed back to the command within 24 hours, prompting the response: “Excellent work. The converted coordinates gave us the location we needed.”

As we continue to fight the war on terrorism and expand our reach into far places on the globe, the need to perform geodetic research increases. The concept of knowing history before you can step into the future is right in line with the efforts described in this article. Geodetic research has directly impacted national security objectives, and it will continue to provide answers to difficult questions in the future.

Our Heritage

World War II Spurred Major Tradecraft Changes

By Dr. Martin K. Gordon

World War II spurred three major changes in aerial photo interpretation and mapmaking: technological improvements, closer international collaboration and unanticipated demographic change. Improving on World War I era technology, reconnaissance aircraft were bigger and faster, and they flew higher than their earlier counterparts. At the same time, their cameras were now capable of taking more photographs at faster speeds and higher distances than before.

During World War II, over 300 members of the American armed forces—men and women—worked in the United Kingdom at the Allied Central Interpretation Unit at Royal Air Force Medmenham.

In the face of common threats from the German and Japanese empires, American and British intelligence agencies began unprecedented cooperation—a sharing that has continued. Although American and British military map makers had been improving their own techniques in photogrammetry ever since World War I, both nations had allowed their ability to derive intelligence from aerial photos to atrophy. The British were saved, however, through the efforts of Australian entrepreneur and



pilot Sidney Cotton, and now Americans would learn from their expertise. After all, Britain had been at war since September 1939. In mid-1941, even before the United States officially entered the war, American students arrived in the United Kingdom for training in photo interpretation. Like-

It was the permanent entry of women and African Americans into the professional workforce that marked a major demographic change in the closely related cartographic and intelligence disciplines.

ewise, four days after the Japanese attack at Pearl Harbor in December 1941, without the United States even having to ask, the British copied a complete set of their war maps and sent them to Washington, D.C. The

two allies shared both photographic and cryptographic intelligence. By 1944 over 300 members of the American armed forces—men and women—were working in the United Kingdom at the Allied Central Interpretation Unit at Royal Air Force Medmenham.

The Army Map Service (AMS) was established in 1942 out of the Engineer Reproduction Plant and based in the Ruth Building in Bethesda, Md. Faced with the enormous demand for maps the

war was generating, the AMS changed to producing maps on an assembly-line basis. This method meant that its expanding workforce needed training in only one procedure involved in producing a map, greatly reducing training time. American photo interpreters were trained in Harrisburg, Pa., and at the Anacostia Naval Air Station in Washington, D.C.

It was the permanent entry of women and African Americans into the professional workforce that marked a major demographic change in the closely related cartographic and intelligence disciplines. As the war progressed, women began to fill many positions for which only men had been previously considered qualified. Many became map analysts assembling, mounting and interpreting mosaic maps. Others worked in map production at the AMS. They trained first at selected colleges, then came to Washington for final training and were put to work in map production.

The three changes outlined in this article had an enormous impact. Yet they only hint at the contributions of imagery analysis and mapmaking to winning the war. These contributions provide much grist for future articles.

Partnerships

NGA is Key Player in Geospatial One-Stop

By Lee Warren

NGA is a contributing partner in the Geospatial One-Stop (GOS) program, the main vehicle for sharing geospatial metadata across federal, state, local and tribal governments and with the public.

GOS is a project of the 19-member interagency Federal Geographic Data Committee and one of 25 eGovernment initiatives the Office of Management and Budget adopted.

The GOS Portal serves as a public gateway for improving access to geospatial information and data using open and interoperable applications and metadata. The portal is designed to facilitate communication and sharing of geographic data and resources to enhance government efficiency and improve citizen services. The portal will make it easier, faster and less expensive for all levels of government and the public to access domestic geospatial information.

As the lead agency for the Department of Defense, NGA has made a great deal of headway with its contributions to GOS, but there is still more work to do to achieve full participation from the present prototype. NGA supports GOS on portal development, framework standards and program management. The NGA contributions serve to align GOS with NGA goals as well as support the wider GOS community.

In addition to its work with the federal community, NGA has initiated work on an NGA GOS (NGOS). It will provide the GOS with domestic, releasable metadata. NGA will make the metadata available through a portlet on the NGA Portal at www.nga.mil.

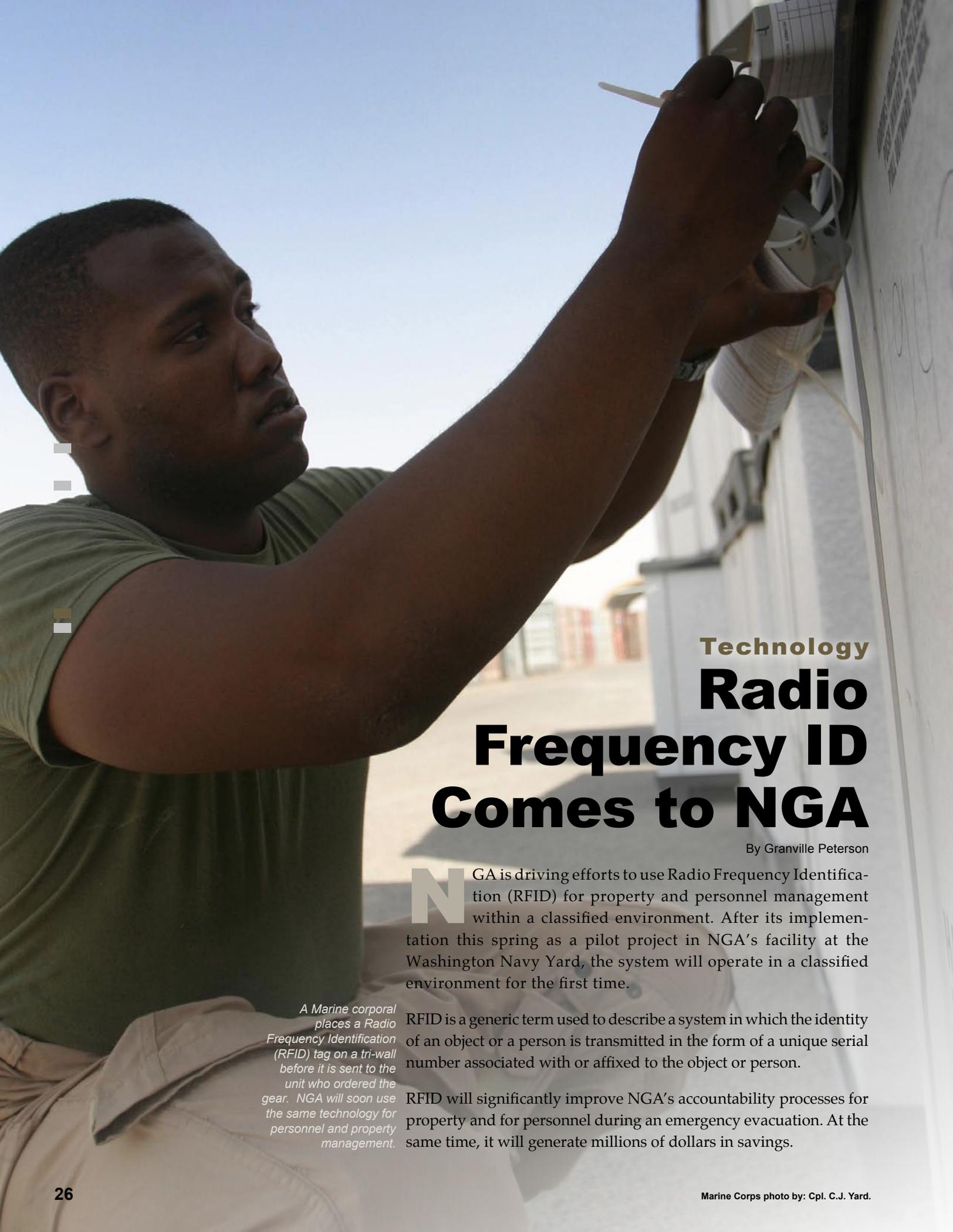
NGA is also looking inward to determine which metadata is releasable and how to best manage it. In some cases NGA already shares data through interagency agreements and through conduits such as the U.S. Geological Survey's National Map. Other data sources remain to be mined and cleared through the NGA public-release process.

NGA and Defense Department partners are an integral part of achieving GOS success through timely and significant contributions. They will also benefit from the collaborative effort and wealth of information that will be available through GOS and NGOS.

Today GOS is harvesting and exposing geospatial metadata, providing a "marketplace" for sharing the acquisition of geospatial data, and developing GOS standards for the exchange of geospatial data and information among participants. The GOS Portal is online at www.geodata.gov and is available for review and use by everyone with access to the World Wide Web.

What Is Metadata?

Metadata is information about a dataset. It provides content information such as geographic location, accuracy, dates, source, method of collection or compilation, projection and originator information about a set of geospatial data. Analysts then use that information to determine the usefulness of the dataset to solve a given geospatial issue or problem and to perform their analysis.



Technology

Radio Frequency ID Comes to NGA

By Granville Peterson

NGA is driving efforts to use Radio Frequency Identification (RFID) for property and personnel management within a classified environment. After its implementation this spring as a pilot project in NGA's facility at the Washington Navy Yard, the system will operate in a classified environment for the first time.

A Marine corporal places a Radio Frequency Identification (RFID) tag on a tri-wall before it is sent to the unit who ordered the gear. NGA will soon use the same technology for personnel and property management.

RFID is a generic term used to describe a system in which the identity of an object or a person is transmitted in the form of a unique serial number associated with or affixed to the object or person.

RFID will significantly improve NGA's accountability processes for property and for personnel during an emergency evacuation. At the same time, it will generate millions of dollars in savings.

RFID Operations

At the Washington Navy Yard, battery-powered tags attached to an object or person will transmit their serial numbers when an activator tells the tags to “wake up.” The activators, operating on a short-range low frequency, will be installed at all building exits and at key points on each floor of the building.

Tags are always asleep (no transmissions) until awakened by an activator. Once a tag is activated, it will transmit its own ID and the ID of the activator. Then it will go back to sleep. An RFID reader (essentially a wireless receiver) receives the tag message and forwards the data to a central server. The RFID tags will contain only their own ID number; no asset or personnel data will be stored on the tag. Only a protected database will associate the tag ID with a property item or person.

With the activator ID, the system will display where the tag was last seen. By viewing the sequence of messages from a tag, each containing a different activator ID, the route and direction of travel of a tag can be determined.

Uses of RFID

NGA will use the RFID technology to ensure appropriate control, redistribution and disposition of accountable government property at the Washington Navy Yard. Officials will affix an RFID tag to approximately 14,000 pieces of accountable property. The RFID system will then track the movement and location of each accountable property item, from entry into the building until disposal.

NGA will realize the following benefits by using RFID technology for property management:

- real-time total asset visibility
- total control of property entering and leaving the site
- major reduction in lost property

- improved inventory accuracy, approaching 100 percent
- reduction in the number of property custodians/hand receipt holders from 130 to six
- improved availability of employees for performing their primary duties
- major reduction in time for inventory audits and searches for missing property
- enhanced information security.

For emergency evacuation, RFID activators will be located at all building entry and exit points, including emergency exits, loading docks and roll-up doors, and at all perimeter fence gates. During the pilot phase, personnel will attach an RFID tag to their badge. During routine operation, tags will be activated and read as personnel enter and depart the building or pass through interior “choke points.”

In the event of an emergency requiring evacuation of the building, NGA can account for personnel with RFID tags immediately. The system will track personnel as they pass points in and out of the building, and the last activator zone they passed through. A remote terminal located at or near the assembly site will provide accountability data to help emergency personnel locate and rescue injured or disabled personnel.

Engineers from the Department of Energy’s Oak Ridge National Laboratory have been working with NGA personnel to design and implement the pilot system. Once the system is operational, they will develop enhancements, including software interfaces to ensure interoperability of data to and from other NGA systems.

RFID allows for the automated transfer and tracking of equipment and personnel at multiple geographically dispersed sites. NGA’s system is deployable to other sites, including the future campus at Fort Belvoir, Va.

Hurricane Isabel



Darfur



Tsunami



Iraq



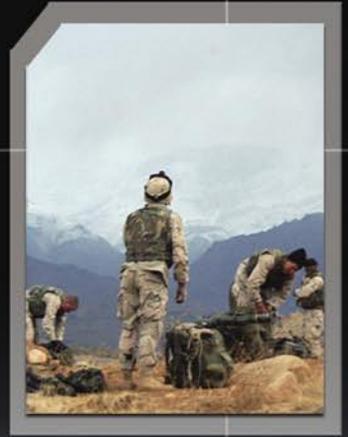
NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Afghanistan

GEOINT

It Makes the Difference

A Pictorial History of Recent Mission Support



Special Event Security



Hurricane Katrina



NGA

Through our dedicated workforce, expert analysis, and advanced technology, NGA continues to make a difference by delivering GEOINT to those who need it most...no matter where the mission takes us.

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Viewpoint

Technology Lets Analysts Share GEOINT Methods

By John Goolgasian

Wouldn't it be cool if...Wouldn't it be great if...What we really need is....I have heard sentences started with these five words or some adaptation of them hundreds of times. I have said these things myself many times.

Geospatial technology is revolutionizing the way we view the world. With the arrival of Google Earth, the domain of geospatial analysis is no longer just for professionals. As for professionals, geospatial technology is revolutionizing the way we produce and analyze geospatial information. It has led to the emergence of geospatial intelligence (GEOINT), what we once thought was a cool idea and is now a reality.

However, technology alone cannot solve the intelligence and operational issues we face as GEOINT professionals. Although they continue to be shaped by technology, the basic methods that comprise the GEOINT tradecraft existed long before geospatial technology as we know it today.

Capturing GEOINT Methods

Wouldn't it be cool if we had the ability to capture geospatial methodological workflow as we conduct analyses and share those methods with other GEOINT professionals?

Graphically modeling workflow is not a new concept, but recent advances in commercial geospatial technology may revolutionize the capture, sharing and use of GEOINT-analysis process flow. New industry tools can capture workflow, information about the dataset being analyzed, and analysts' comments. Such output could replace written standard operating

procedures and act as a mechanism for ensuring that future analysts learn from their predecessors.

On the Internet, blogs, wikis (software that allows users to create and edit Web-page content), online forums and chat rooms have transformed communication. They can be a mechanism for capturing tradecraft and will grow in importance on classified systems. Much like online imagery keys that provide a quick reference for analysis, they can serve as building blocks for a methodology knowledge base.

Building a Methodology Knowledge Base

Software to model workflow, blogs and chat rooms currently exists on NGA networks, and wikis will soon be available. With these tools, we can begin capturing methods and workflows. The need for the future is a repository for methods akin to our repository for GEOINT content, the Geospatial Intelligence Knowledge Base.

The analyst is the key to the success of NGA. Every day, NGA analysts transform complex spatial, spectral and temporal intelligence information into understandable textual assessment and visual displays. Technology enables this work; it does not replace it. Just as the ability to use Microsoft Word does not make an author, neither does the ability to use GIS or an electronic light table make a GEOINT professional. In the end, analysis remains an art and relies on the intuitive ability of the human mind. We must leverage existing technology and drive the development of future capabilities to capture, archive and employ proven GEOINT methods.



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