

THE NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Vol. 6 No. 4

PATHFINDER

THE GEOSPATIAL INTELLIGENCE MAGAZINE

SERVING THE FRONT LINE

July/August 2008



GEOINT'S EVOLUTION
ENERGIZES MILITARY
CAPABILITIES



ANALYSTS LEARN THE
LESSONS OF GETTYSBURG

Our Compact With the Warfighter— Maintaining a Sacred Trust

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE AUG 2008		2. REPORT TYPE		3. DATES COVERED 00-07-2008 to 00-08-2008	
4. TITLE AND SUBTITLE Our Compact with the Warfighter - Maintaining a Sacred Trust (Pathfinder, July/August 2008)				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) National Geospatial-Intelligence Agency, Office of Corporate Communications, 4600 Sangamore Road, Bethesda, MD, 20816-5003				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 32	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			



ON MY MIND

NGA's Expeditionary Mission— Going Where We Are Needed Most

Virtually all military and intelligence operations depend on NGA's ability to provide geospatial intelligence (GEOINT) when and where they need it most—in their battle space. This complements the extensive external assignments and deployments that we have in support of domestic missions and civilian components of the government. Operational commanders and deployed forces in theater are experiencing the power of embedded NGA support and subsequently increasing their expectations and requirements daily. Having our NGA analysts and staff forward deployed, in our mission partners' battle rhythm, makes the critical difference in a wide variety of missions. The common baseline for our deployed personnel is that, regardless of where they are located, they operate in a unique and crucial position. They make sure that the people who rely on us the most have the GEOINT they require, in a way that it can be digested and absorbed effectively.

For example, through GEOINT Support Teams (GSTs) we have fielded NGA staff officers and analysts to support subordinate elements throughout the U.S. Central Command area of responsibility, as well as Latin America and the western Pacific region. These GSTs provide NGA analysis, products and services to the warfighters, allowing the mission planners to, for example, ensure additional safety for convoys, provide mission planning support for operations and give soldiers in the trenches updates on local conditions and changing terrain.

Asymmetric Conflicts Demand Flexible, Forward Posturing

To quote Secretary of Defense Robert Gates, "We can now expect asymmetric warfare to be the mainstay of the contemporary and future battlefield...As the U.S. military evolves from a Cold War posture, there are two basic components to the makeover. First, retool the force for the counterinsurgency approach that is appropriate to asymmetric warfare. Second, pull together deployable civilian assistance that will mesh effectively with the military effort."

NGA accepts the reality that an expeditionary mission will be with us for the rest of our professional careers, and we will continue to grow this mission to best meet the needs of our warfighters and other mission partners. To do this, we must institutionalize the mechanisms we have within NGA to support our deployers. For example, we must ensure that our deployed personnel have the most effective architecture in which to execute their missions. This architecture is broadly defined and includes not only connectivity, data libraries and standardized equipment, but also how we structure reachback support operations in St. Louis, Mo., Washington, D.C., and other locations.

Vital Experience for the Next Generation of Leaders

At the same time that NGA addresses this expeditionary mission at an organizational level, every member of the NGA workforce must view and embrace this mission personally. It has become exceedingly clear that this kind of operational experience is vital to developing the future leaders of this organization and across the Intelligence Community. As we look ahead 15-20 years, the individuals who will be leading this organization and the defense and intelligence communities will be the team members who have firsthand experience with some of the toughest challenges this nation is facing. Through experiences such as overseas deployment, the workforce will develop unique tradecraft and problem-solving skills that they will use as they advance into leadership positions.

Our forward-deployed personnel are one aspect of the capabilities we push forward into the fight. Having a robust reachback capability is every bit as critical to the warfighter. Our reachback support bridges the continuity gap between NGA's in-house GEOINT talents and those of our forward-deployed representatives in theater. This support is vital to giving our warfighters the advantage they need to succeed in hostile and life-threatening situations.

GEOINT has become a critical component of our country's military and intelligence operations and a vital foundation for visualization and decision-making from the Oval Office to the battlefield. It has become a lifesaving proposition, and our forward-deployed and reachback support personnel are making a tremendous difference everywhere they are stationed, every single day. With that in mind, NGA will to continue the steady pace of improvements that we have made in our warfighter support. Our nation, decision makers, and men and women on the front line deserve our very best, wherever the nation has sent them.

Robert B. Murrett
ROBERT B. MURRETT
Vice Admiral, USN
Director



12



16



25

ON THE COVER

Warfighters fulfill a solemn responsibility, from the delivery of lifesaving aid to the application of lethal force. These men and women offer their lives to protect our lives, our country and our freedoms. Accurate and timely geospatial intelligence (GEOINT) contributes enormously to mission success. NGA analysts and personnel, whether at home or deployed, provide critical support to our warfighters, helping them perform their obligations with exactness and minimal loss of life. Everything this agency pursues points to a shared objective—to directly empower the warfighter or those deciding how they will be employed with the finest GEOINT available. NGA's support is a critical element underlying their success—a sacred compact we cannot break. Warfighter photo by U.S. Air Force Senior Airman Steve Czyz. Cover model, Glenda Jenkins; photo by Rob Cox. Cover design by Carmella Bender.

CONTENTS

- 2 Letter to Our Readers
- 3 Guest Column: Expeditionary Operations Are Now a Core NGA Mission
- 5 Up Front: GEOINT's Evolution Energizes Military Capabilities
- »» FEATURES
- 7 Empire Challenge Develops Interoperability for the Warfighter
- 8 Sidebar: Mobile Training Teams Take GEOINT on the Road
- 9 Army Brigades Learn to Utilize GEOINT
- 10 NGA Lays GEOINT Foundation of I Corps' Road to War
- 12 Pacific Team Delivers GEOINT in Paradise
- 14 Agency's Efforts Improve NAVAIR Programs
- 16 Situational Awareness Underlies Time-Dominant Support
- 18 Technical Executives Push Information Forward
- 19 Analysts Learn the Lessons of Gettysburg
- »» DEPARTMENTS
- 22 21st Century: Crisis Action Team Responds to Front-Line Requirements
- 23 Partnerships: Evasion Charts Protect Downed Forces
- 25 Partnerships: NGA Military Reservists Perform Critical Services
- 27 Our Heritage: The Ho Chi Minh Trail 1970: The Mission is the Mother of Invention

More to the Story?

The online *Classified Pathfinder*, which is accessible by members of the Intelligence Community, may include additional information and expanded sections of some *Pathfinder* articles. The *Classified Pathfinder* provides a forum for reading and discussing topics at the level of "Unclassified//For Official Use Only" or higher. For information please contact the editor, Heather Cox, at 301-227-2290.



LETTER TO OUR READERS

Our Compact With the Warfighter— Maintaining a Sacred Trust

Entering battle is an act of faith, in oneself, in one's training, in one's unit, in one's country—and in the data critical to performing one's mission.

As an intelligence producer and combat support agency, NGA maintains a solemn obligation, a bonded contract to provide the most timely, precise and relevant geospatial intelligence (GEOINT) data and products whenever and wherever our military forces and mission partners require them. We are in the business of saving lives.

In this issue, Joel Maloney discusses the expeditionary aspect of providing GEOINT to the front line. Articles that follow in this publication demonstrate NGA's deployable expertise. We then explore the common bond between the warfighter and the GEOINT producer. Maj. Stephen Kahn, U.S. Marine Corps, shares his personal experiences with the "must have" value of GEOINT in the context of three disparate missions that together illustrate the breadth of operations assigned to our military forces.

Several articles examine the essential work of NGA Support Teams (NSTs) embedded with the military services. Whether improving multinational operations through support of exercises such as Empire Challenge, preparing units from mission planning through deployment to become more insightful GEOINT consumers, or providing critical technical services, these dedicated teams exemplify the agency's commitment to provide the foundational layer of intelligence for the nation.

Our soldiers, sailors, airmen and Marines face both asymmetrical and traditional challenges. Maj. Terry Herring, U.S. Army, illuminates the role that the National System for Geospatial Intelligence Crisis Action Team plays in satisfying the urgent needs of service personnel and mission partners to help "save lives and win the fight in the front lines of battle."

Two articles by Greg Anderson speak to the variety of ways that NGA and its partners protect and empower the warfighter, from time-dominant support during operations where seconds count to the evasion chart, a celebrated product that is a critical part of the survival kit for military personnel when things go awry.

Punctuating the intimate relationship between the warfighter and NGA, Marshall Hudson discusses the rewarding efforts of reservists who fulfill their duties within the GEOINT arena as part of the Military Reserve NST.

Supporting the warfighter requires looking forward, but also looking back. Articles illuminating this need reveal how GEOINT tradecraft is informed and enhanced by studying historical lessons from Gettysburg to Vietnam.

The defense of liberty is a solemn task—a task that NGA energetically responds to at home no less than abroad. Our next issue, September/October, will discuss the GEOINT contribution to homeland defense.



Paul R. Weise
PAUL R. WEISE

Director, Office of Corporate Communications

PATHFINDER

Published by the National Geospatial-Intelligence Agency
Office of Corporate Communications
4600 Sangamore Road, Mail Stop D-54
Bethesda, MD 20816-5003
Telephone: (301) 227-7388,
DSN 287-7388
E-mail: pathfinder@nga.mil

DIRECTOR

Vice Adm. Robert B. Murrett, U.S. Navy

DEPUTY DIRECTOR

Lloyd Rowland

OFFICE OF CORPORATE COMMUNICATIONS, DIRECTOR

Paul R. Weise

INTERNAL COMMUNICATIONS BRANCH, CHIEF

Louis J. Brune

EDITOR

Jason K. Michas

MANAGING EDITOR

Kelly Kemp

GRAPHIC DESIGNER

Carmella E. Bender

CONTRIBUTING AUTHORS

Greg Anderson

Maj. Darrell P. Brown, U.S. Air Force

Lt. Col. James Cabalquinto, U.S. Air Force

Shanan Farmer

Douglas Graves

Maj. Terry Herring, U.S. Army

Capt. Marshall Hudson, U.S. Army Reserve

Maj. Stephen Kahn, U.S. Marine Corps

Joel Maloney

Garratt Meeks

Jodocus "Wayne" Prosser

David Sullivan

Scott Tabor

Peter Terzian

Dr. Gary E. Weir

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. For details on submitting articles, send an e-mail to pathfinder@nga.mil.

The Pathfinder is the medium with which the National Geospatial-Intelligence Agency enhances and promotes public awareness and understanding of the discipline of geospatial intelligence. The Pathfinder is an authorized Department of Defense publication for members of the Department of Defense. Contents of this publication are not necessarily the official view of, or endorsed by, the U.S. government, Department of Defense or NGA. Articles in the Pathfinder may be reproduced in whole or in part without permission, unless stated otherwise. If they are reproduced, please credit the author and the "National Geospatial-Intelligence Agency, the Pathfinder magazine." Any reproduction of graphics, photographs and imagery is subject to the original copyright.

GUEST COLUMN

Expeditionary Operations Are Now a Core NGA Mission

BY JOEL MALONEY, NGA DEPUTY MILITARY EXECUTIVE

Introduction

Secretary of Defense Robert M. Gates said recently when speaking of the need for greater intelligence, surveillance and reconnaissance (ISR) capabilities, “We are in the war—now. This is a critical time in the war. We need more, and we need it now.” He went on to predict that “asymmetrical conflict will be the dominant battlefield for decades to come, and procurement and training have to focus on that reality.” NGA’s mission is evolving as our threat environment has become more asymmetrical, diverse and amorphous. NGA needs to remain nimble and flexible to counter whatever threats emerge in whatever region needs our support.

From my perspective in the Office of the Military Executive, NGA’s support to the warfighter has moved beyond “surge support” into the realm of expeditionary operations. Much of NGA work and analysis will continue to occur in the footprint of our mission partners as we evolve to a structure where we are both externally assigned and forward deployed in order to provide the best possible geospatial intelligence (GEOINT) support to our full range of military and non-military mission partners. The agency will be performing at a high operational tempo for the foreseeable future, and many NGA personnel coming into the workforce now, or who have joined our workforce since Sept. 11, may spend their entire careers operating in a war footing. Expeditionary operations have now become a vital core mission of the agency and will be sustained well into the future; they are the expectation, not the exception.

Expeditionary Mission—Our New Norm

Regardless of political winds, NGA will maintain a presence in Iraq, Afghanistan, the Horn of Africa, South America, and other areas around the world for the foreseeable future. There has been an upward trend in demand as more commanders and partners are learning the significant value that GEOINT adds in operational planning and execution, and that trend may even increase. While we cannot fully predict how world events will develop, we know that GEOINT will continue to be essential to our warfighters and intelligence partners



Joel Maloney, NGA Deputy Military Executive

around the world because almost every military decision and movement relies on the geographic data that NGA provides. Superior knowledge of the battle space is one of the single most valuable tools for our warfighters. It is our responsibility to ensure that support happens and to plan for how we can best provide that support. NGA supports more than just combat operations; we are a valuable asset in civil and reconstruction projects. Our role is vital in non-kinetic missions as we cannot only track high-value targets and weapons caches, but also must illustrate power grids, map gas lines and support water projects. These sorts of competencies and skills ensure that NGA’s presence will be needed for decades to come. Maintaining a robust forward presence is a vital component of this current and future support.

We must focus on institutionalizing the tremendous progress we have made toward this growing expeditionary mission. This forward, flexible posture has become the new norm for how NGA operates. The entire agency must embrace the notion that forward-deployed or

interagency joint duty assignments are a crucial part of developing a well-rounded NGA officer and are a requirement for future leaders. Intelligence officers need to understand battle rhythms, they need to see the power of their work first hand, and they need to always remain flexible—our enemy is.

Global Threats—Our New Reality

This trend is not unique to NGA. We are a part of the larger movement across the Intelligence Community (IC) and Department of Defense (DOD) that calls for transforming beyond our Cold War positioning into a more agile, forward-leaning posture. In our era of globalization, commerce, people, information and threats can travel around the world instantaneously. We must be prepared for almost any eventuality, in any corner of the world. The best way to do so is to be situated around the globe to know the Earth, physically and culturally. NGA can show the way for our mission partners by providing the best GEOINT to policymakers and those at the “tip of the spear.”

The Secretary of Defense and the Director of National Intelligence have repeatedly called for improvements in institutional collaboration. Under Secretary of Defense for Intelligence, retired Air Force Lt. Gen. James R. Clapper Jr., outlined the future threats and the strategic goals for the Defense Intelligence Enterprise in the Defense Intelligence Strategy. There he states, “Undergoing a fundamental change is our concept of ‘engagement’ around the world. ...Our missions will be diverse and multidimensional, punctuated by persistent regional engagements requiring a range of military, humanitarian, and diplomatic capabilities and assets to be used simultaneously.... We will need to develop a sizeable cadre of immediately deployable experts with disparate skills.”

As we perfect the organizational support structures and learn more lessons, we can expect even more broad

requirements across all levels of NGA for deployable experts, both military and civilian personnel from across all elements, including geospatial analysts, imagery analysts, source officers, policy officers and others. Our past successes and the support we have provided have created a larger demand for products and efficiencies. Our missions are broad, including combat support, but also humanitarian assistance, drug interdiction and special security events. These missions unfold not just in Bethesda, Md., and St. Louis, Mo., they occur in varied locations, in differing climates and amidst diverse cultural and operational environments. These missions require cooperation and collaboration across all elements of NGA as well as the IC, DOD, other federal agencies and our international partners to ensure that we are providing the most complete picture of realities on the ground.

Moving Forward

While adapting to the new expeditionary mission is imperative, challenges remain in implementing and planning for such a shift. The IC must remain mindful of the difficult balance between time-dominant operations support and the need for longer-term strategic analysis and sound foundational data. Seg-

mented and insulated elements must be open to these new missions and structures. Training requirements will change to prepare personnel to support our partners on the full range of NGA capabilities. These challenges are surmountable with creative thinking, perseverance, dedicated personnel, collaboration and cooperation.

We at NGA are particularly well-suited to support our warfighters in asymmetrical conflicts. We must remember to learn from our experiences, to lean forward, and to always strive to improve our craft. Embracing the expeditionary mission that has become our new norm will ensure that we always provide the highest quality support possible. The men and women on the front lines are relying on us. P

**GEOINT will
continue to be
essential to our
warfighters
and intelligence
partners around
the world.**

UP FRONT

GEOINT's Evolution Energizes Military Capabilities

BY MAJ. STEPHEN KAHN, U.S. MARINE CORPS

As a major in the U.S. Marine Corps, I have used geospatial intelligence (GEOINT) in all of my assignments, from mission planning through tactical execution. During my last tour with 1st Battalion, 8th Marines, I observed firsthand how GEOINT has progressed from a tool primarily used by top-level planners to a tool utilized by tactical operators in the everyday conduct of their missions.

The evolution of GEOINT has improved its effectiveness over the past four years. The interconnected reasons for this progress form a cycle that continues today. First, the expansion of GEOINT in the planning of operations—from the strategic level to the operational level to the tactical level—has increased. Second, the reproduction capability and ability to get products down to the “last tactical mile” for use by the tactical executor have significantly improved. Third, the number of people who are aware that GEOINT exists, what it is, what it can do for them and how to procure it has increased, and end users now request the specific GEOINT products that they need instead of relying solely on their intelligence sections to provide them.

I noticed these developments during my time with 1st Battalion, 8th Marines while executing three distinct operations: Operation Phantom Fury in Fallujah, Iraq, in the fall of 2004; relief operations following Hurricane Katrina in New Orleans, Louisiana, in September 2005; and during the assisted departure of American citizens during the Levant crisis in Beirut, Lebanon, in July 2006. In particular, I noticed three trends: better-quality GEOINT reached all operational levels, GEOINT was reproduced and distributed more effectively, and the military's demand for GEOINT increased.

Better GEOINT and Better Access

As the utility of GEOINT has been recognized, its use has expanded down through all levels of the planning process. For example, for Operation Phantom Fury in Fallujah, we were provided with the standard planning products for a battalion, which included maps and imagery depicting key features and their locations, but which

contained relatively little analysis or information that would answer the question “Why?” GEOINT wasn't being pushed down to our level, and we didn't know the right questions to ask, so we executed with what we had.

A year later, during relief operations following Hurricane Katrina, we found that GEOINT had expanded from the strategic level to the operational level. We received outstanding products that showed us the key locations we needed to be aware of, how to get there, and, better yet, how and where the floodwater would impact our operations. We were smarter, too, and were able to ask better questions, like, “How would receding water flow?”, “In what order would neighborhoods become trafficable?” and “When would the water level in this area drop below five feet?”

By the time we were off the coast of Beirut with the 24th Marine Expeditionary Unit (MEU) in July 2006, we had been provided with a substantial quantity of GEOINT. We had outstanding maps and imagery, multiple solid terrain models, maps and graphics depicting cultural and religious geography, defensible terrain maps, cross-boundary route studies from potential beach landing sites, and maps of all areas known to be friendly to the United States. We knew how to ask the right questions to get products that provided us with the answers we needed to better plan at every level.

Improved GEOINT products aided relief operations in New Orleans following Hurricane Katrina.

Photo by NGA.



©2008 Jupiterimages Corporation

Beirut, Lebanon

Enough Copies for Everyone

Similarly, the ability to reproduce the excellent geospatial products that NGA generates has also significantly improved. In Iraq we generally had only whatever we could print on a standard laser jet printer. Due to competing requirements, we rarely received enough full-size map and graphic products to provide them down to the squad and fire team level. We often couldn't get sufficient copies of a single product and wound up with different units operating with different products. This proved frustrating, especially during Operation Phantom Fury, where not only were units within the same battalion operating with different products, but so were the different battalions and military services.

In New Orleans, with the arrival of the NGA Support Team, as well as the MEU's Remote Replication System (RRS) capability, we were able to produce more than enough products to provide them down to all of the small unit leaders, as well as the local, state and federal officials we were supporting.

For the assisted departure of U.S. citizens from Lebanon, we began requesting products in the quantities needed the minute we received the warning order to begin movement to the Mediterranean. Not only had we learned to purchase better printers, but the MEU's RRS played a significant role, as did NGA's ability to ship products to us directly. By the time we were off the coast, squad leaders and platoon commanders were giving

briefs on the terrain, culture, history and economics of Lebanon while standing over large multisheet maps and image products, as well as extremely detailed solid terrain models. The more information provided to the small unit leaders, the better and timelier the decisions they can make.

Users Want More GEOINT

The expansion of GEOINT and the Marines' familiarization with it became the catalyst for its exponential growth in the field. During Operation Phantom Fury, the Marines executed the missions assigned with the tools they were given. Following Hurricane Katrina, they were impressed with the products they were being handed and began asking questions and learning about the thought process behind them. By the time the Levant crisis occurred, the intelligence sections were being hounded by requests for these "enhanced" products. The value placed on these GEOINT products was at a premium. The Marines who had now "grown up" with GEOINT support wanted it all the time and knew exactly what to ask for—and they weren't waiting around for it. It was no longer viewed as a "nice to have"; it was a "must have."

Through these three operations, I witnessed the growth of GEOINT. Perhaps growth is not the correct word; maybe I witnessed the "awakening" of GEOINT. In the world we face today and on the battlefield we fight on, there is no clear picture of what is occurring. The "front lines" of World War I, World War II, Korea, and even to some extent Vietnam, don't exist. It is about the decentralized, small unit leaders out there taking action—and the weapons they are armed with are not nearly as important as the intelligence they receive. The questions of "Why?" and "How?" are now equally as important as the questions of "What?" and "Where?" As GEOINT continues to answer these four questions more effectively every day, its value will most certainly continue to increase. And, as a member of NGA's Office of Military Support, I am thrilled to be a part of the next generation in GEOINT's evolution. P

MAJ. STEPHEN KAHN

is a member of the
Office of Military Support.



Empire Challenge Develops Interoperability for the Warfighter

BY MAJ. DARRELL P. BROWN, U.S. AIR FORCE

The ability to share intelligence, surveillance and reconnaissance (ISR) between coalition forces has been a critical shortfall noted by commanders in both Operation Enduring Freedom and Operation Iraqi Freedom. Interoperability between U.S. systems in the field can be a challenge. Problems increase exponentially when attempting multinational operations. The annual Empire Challenge exercise has been addressing the challenge of interoperability since 2004.

Meeting the Challenge

The Global War on Terrorism is a coalition endeavor. Combat forces from our Commonwealth partners, Australia, Canada, and Great Britain, have fought alongside U.S. forces from the start in both Afghanistan and Iraq. In addition, the standup of the International Security Assistance Force (ISAF) in Afghanistan has significantly increased the footprint of NATO forces there.

The optimal integration of multinational forces is accomplished with an interconnected communications network, or net-centric, environment. Key to net-centric warfare is interoperability. Key to interoperability are standards. NGA's Acquisition Directorate recognized the need to test geospatial intelligence (GEOINT) sensor and data transmission standards in a "live-fly" environment, engendering the first Empire Challenge test demonstration in 2004.

Sponsored by the Under Secretary of Defense for Intelligence (USD (I)), Empire Challenge has grown into the premier ISR-focused demonstration series for the United States and its coalition partners. Subsequent exercises have built upon the successes and lessons learned from the previous years' demonstrations. The sensors and

data streams demonstrated have expanded from GEOINT systems to include those from multiple intelligence disciplines. However, the focus of Empire Challenge remains interoperability, network-enabled operations and coalition information sharing.

Empire Challenge 2007

Empire Challenge 2007 was the fourth iteration in a series of USD (I)-funded interoperability demonstrations related to the Distributed Common Ground System (DCGS), the information-sharing network used to integrate the tasking, processing, exploitation and dissemination of sensor-derived intelligence disciplines into a common system.

NGA, in conjunction with the Joint Staff of the U.S. Joint Forces Command and the Joint Interoperability Test Command, hosted over 1,400 exercise participants representing all four U.S. military services, numerous combat support agencies, Commonwealth partners, and a subset of NATO members. Participants operated at over 20 locations across six countries. The Naval Air Warfare Center in China Lake, Calif., provided the flight space for two weeks of live-fly operations by various ISR aircraft against ground forces conducting simulated opposing force operations, such as emplacements and detonations of improvised explosive devices and convoy ambushes.

A key success of Empire Challenge 2007 was standards compliance testing for airborne-derived GEOINT. Imagery collected by several aircraft was downlinked to the DCGS-Interoperability test bed, as well as U.S. Army and Marine Corps DCGS segments. Motion imagery was streamed to ground stations in China Lake and broadcast via the Global Broadcast System to participants in Brampton, England; Ottawa, Canada; and Canberra, Australia.



The China Lake Naval Air Warfare Center supports Empire Challenge.
Photo provided by China Lake VCO Department.



The DCGS rides on the DCGS Integration Backbone (DIB) information technology architecture. Through the DIB structure, Empire Challenge participants could access and share downloaded data and products derived from GEOINT, Ground Moving-Target Indicator sensors and human intelligence. Empire Challenge 2007 provided a venue for a first-ever large-scale beta testing of the DIB architecture, which entailed 19 DIBs on four separate security domains on three continents.

Empire Challenge 2008

Continuing the practice of building on past events, Empire Challenge 2008 will push the envelope in terms of interoperability and standards compliance testing. Tied directly to warfighter needs, the 2008 exercise will revolve around testing for five mission threads: persistent surveillance, joint targeting, multi-domain awareness, non-traditional ISR and strike, and joint ISR management.

The growing importance of Empire Challenge and its unique ISR-focused scenario has increased interest



across the defense community. As a result, the number of ISR aircraft involved has increased. This year's event will also see increased NATO participation via the Multi-sensor Aerospace-Ground Joint Intelligence Surveillance and Reconnaissance Interoperability Coalition, which focuses on increasing interoperability through standards compliance and new technology. Canada, France, Germany, Italy, Spain, the Netherlands, Norway, the United Kingdom and the United States make up the coalition.

Conclusion

Future Empire Challenge events will continue to respond to warfighter needs, particularly interoperability testing. Increased participation by combat elements will enhance the military concept of operations for time-sensitive targeting and increase the ability to share ISR data. P

MAJ. DARRELL P. BROWN

is a Staff Officer with NGA's Office of Military Support, Air Force Support Team. He served as the deputy NGA government lead for Empire Challenge 2007.



Mobile Training Teams Take GEOINT on the Road

NGA's National Geospatial-Intelligence College (NGC) shapes many military careers by training military members in courses required for their GEOINT-related military occupational specialties. NGC also brings training to warfighters and other NGA partners at field locations worldwide through Mobile Training Teams (MTTs) deployed from its headquarters at Fort Belvoir, Va.

NGC deployed 240 MTTs during fiscal year 2007 and is on track to deploy 280 MTTs by the end of fiscal year 2008. MTTs deliver training suitable for ranks from military enlisted personnel through senior officers. Forty training courses make up the current list of classes delivered by MTTs. The GEOINT technical courses teach warfighters to use imagery, perform imagery analysis and apply geospatial software tools using NGA's digital data.

Management courses include an orientation to the National System for Geospatial Intelligence and the overview class Geospatial Information and Services for the Warrior (GIS4W). The most frequently requested and delivered classes are GIS4W, Geospatial Information and Services 101 (FalconView™), and the spectrum of sensors courses including Remotely Sensed Imagery (RSI), Thermal Infrared Exploitation (TIR) and Synthetic Aperture Radar Exploitation (SAR).

MTTs arrive at sites completely equipped to teach, even bringing mobile computer labs when necessary. NGC gives priority for scheduling of mobile training to deployed units and units preparing for deployment. For other units, a clearly articulated training requirement linked to the unit's mission helps NGC accommodate requests. P



Army Brigades Learn to Utilize GEOINT

BY JODICUS "WAYNE" PROSSER

As the U.S. Army continues to restructure itself from a division-based force to a modular brigade-based force, its requirements for geospatial intelligence (GEOINT) capabilities are growing, particularly at the level of the brigade combat teams (BCTs)—the Army's smallest self-sufficient deployable combat units. The Office of Military Support—Army (OMSA), an NGA Support Team, is helping the BCTs establish GEOINT expertise in accessing NGA products and data, knowing how to incorporate this information into their mission planning, and understanding how to request additional information from NGA sources.

OMSA directly engages BCTs in at least three ways: at each unit's Counterinsurgency (COIN) Seminar, during exercises at Combat Training Centers (CTCs), and through additional interaction with embedded teams. In order to better support its mission partners, OMSA recently established three such teams at 1st Corps (Fort Lewis, Wash.), 3rd Corps (Fort Hood, Texas), and 18th Airborne Corps (Fort Bragg, N.C.). Each team includes a staff officer, an imagery analyst and a geospatial analyst.

During COIN Seminars, the seminar leaders guide deploying BCTs through current scenarios, mission analysis and course of action development as part of the Military Decision Making Process (MDMP). Part of this discussion centers on using GEOINT within all MDMP phases. To enhance the MDMP cycle, OMSA trains BCTs using a tailored, flexible training program that includes how to access and use GEOINT. OMSA has trained over 20 BCTs around the world. When possible, OMSA follows the training with site visits that provide real-life experiences with the BCTs' capabilities, limitations and needs.

The OMSA team at Fort Hood, Texas, nicknamed "the Armadillo Team," visits BCTs while they train at the National Training Center (NTC), a CTC at Fort Irwin, Calif. In 2007, the Armadillo team supported the 3rd Armored Cavalry Regiment during its Mission Rehearsal Exercise in preparation for deployment in support of Operation Iraqi Freedom. The Armadillo team lived and worked with the unit's analysts and staff officers as they conducted mission planning. After training from the Armadillo team, the unit immediately accessed NGA information and services to improve its situational awareness and mission planning during the remainder of the exercise.

Each OMSA team also functions as a Regional Support Team (RST) for all Reserve, National Guard and active duty Army units within their assigned geographic regions. The RSTs work with BCTs' senior intelligence staff officers to assist with identifying and obtaining needed GEOINT products, services and training. When the needs of BCTs overlap, preventing the RSTs from meeting multiple needs simultaneously, the RSTs help request imagery collection through Army channels, reach back to NGA production cells, or schedule Mobile Training Teams from NGA's National Geospatial-Intelligence College to conduct training. Additionally, the location of the RSTs at the Corps' garrison headquarters allows for specifically tailored support to individual units when time permits.

Maj. Darrell Walker of 3rd BCT, 1st Infantry Division, praises the support OMSA provides to BCTs. He states, "The NGA representatives working at 3rd Corps have been extremely beneficial to 3rd BCT, 1st Infantry Division. Their assistance proved extremely valuable as we stood up the brigade, learned to access national-level GEOINT at NTC, and prepared for deployment." Walker's comment indicates the considerable insight that NGA people and data supply. As the Army's transformation continues, NGA is helping the new brigade combat teams to be the best GEOINT consumers that they can be. P

Army brigade combat teams traditionally symbolize completion of their training at "Painted Rocks" outside the main gate of Fort Irwin, Calif.

Photo by Steven Wall



JODICUS "WAYNE" PROSSER

is an NGA Staff Officer assigned to 3rd Corps at Fort Hood, Texas. He leads the Armadillo Team within the Office of Military Support—Army.





NGA Lays GEOINT Foundation of I Corps' Road to War

BY GARRATT MEEKS

As the Global War on Terrorism continues, the U.S. Army's 1st Corps (I Corps) is preparing to be next in the "sandbox" of Iraq. In 2009, I Corps is scheduled to take over the Multi-National Corps – Iraq (MNC-I) mission from the Army's 18th Airborne Corps. To assist I Corps' geospatial intelligence (GEOINT) preparation for war, an NGA Support Team (NST) will be at I Corps' side from preparation through deployment.

I Corps, based in Fort Lewis, Wash., is on the leading edge of technology and Army transformation. The corps recently became the primary home of the Army's newest fighting vehicle, the Stryker. Fort Lewis is also the home of the Office of Military Support–Army West Region (OMSA-West), an NST. NGA has had a presence at Fort Lewis since 2000. The OMSA-West team provides regional support from Colorado to the west coast, including

Hawaii and Alaska. However, the team's priorities have changed to focus on I Corps' upcoming deployment.

The NST's plan to make I Corps "GEOINT ready" includes training and education, assisting with deployment and reachback, tactical overwatch, and a Mission Rehearsal Exercise (MRX). Five NGA Mobile Training Teams will travel to Fort Lewis to teach classes in ArcGIS™, advanced GEOINT, commercial imagery and the Requirements Management System, an imagery collection and dissemination tool. This training will teach I Corps staff how to understand and use GEOINT.



In addition, a joint NGA–National Reconnaissance Office–I Corps conference will educate the corps staff on national agency support.

I Corps will provide tactical overwatch for the 18th Airborne Corps this summer by monitoring their operations, working parallel issues and providing reachback support. This overwatch will accomplish two goals: supporting the deployed unit and training the soldiers who will soon be in the fight. The MRX will follow to establish the corps’ fighting readiness. OMSA-West will play a major part in both the overwatch and exercise. Other NGA groups are also pitching in to prepare I Corps. The NGA Office of Global Support (OGS) is providing a veteran deployer to help the OMSA-West analysts during the tactical overwatch phase. The NGA Exercise Support Branch (OMSE) will set up a GEOINT cell to mimic OGS’s in-country GEOINT Support Team (GST) during the MRX.

Transforming the level of support to a deploying corps, NGA and OMSA have classified members of OMSA-West as NGA Volunteer Deployment Team-qualified, thus providing I Corps with the option to have the OMSA-West team deploy and staff the OGS GST during I Corps’ transition period in country. OMSA-West personnel will continue to provide reachback support for I Corps. Forward-deployed units will have the capability to communicate with NGA personnel at Fort Lewis for GEOINT support.

The Army created I Corps in 1918, and it is the most decorated corps in the active army. I Corps fought valiantly in World War I, World War II and Korea. Next year, thanks to NGA’s efforts to embed GEOINT into the planning, exercise and execution phases of their “road to war,” I Corps will serve in Iraq as a totally GEOINT-savvy fighting unit, making both NGA and the nation very proud. ▢

GARRATT MEEKS

is an NGA Staff Officer assigned to the Office of Military Support–Army West Region.

A Stryker fighting vehicle moves out during exercises.

U.S. Army photo by Pfc. Andrew Hillegass

Pacific Team Delivers GEOINT in Paradise

BY SHANAN FARMER

Because it is fully integrated with its partners, the NGA team supporting the U.S. Pacific Command (USPACOM or PACOM) has an extremely high operational tempo that contrasts sharply with the relaxing island atmosphere of the Hawaiian Islands. People often assume that working in Hawaii means that life is paradise and work is “a breeze.” However, though most of the NGA employees assigned to the PACOM NGA Support Team (NST) do live in paradise, their work, while exciting, is definitely not a breeze.

The NST acts as the NGA Director’s single point of representation to the combatant commander and subordinate unified and service component commands. In this role, the NST provides flexible, in-depth and predictive, regionally focused geospatial intelligence (GEOINT) analysis at PACOM Headquarters and the Joint Intelligence Operations Center (JIOC) in Hawaii, at U.S. Forces Korea in Seoul, at U.S. Forces Japan outside Tokyo and at other commands in the Pacific region.

As might be expected, the engaging work performed by NST members varies widely and changes constantly, as the following recent examples demonstrate.

Fighting the Global War on Terrorism

NGA analysts embedded in the JIOC’s Combating Terrorism Division (CTD) work closely with U.S. military forces deployed to the Philippines and Pacific Rim countries. Special Forces teams and Navy Sea, Air, Land forces support and train local militaries as they participate in the war on terrorism. The U.S. personnel instruct Philippine soldiers on small unit tactics, weapons skills, communications and medical training designed to help them defeat the enemy and assist the local populace.

NGA analysts are on call 24 hours a day to provide intelligence support for pre-operational planning and ongoing operations. Support to troops in the field ranges from providing basic maps to creating complicated, full-motion, 3-D fly-through videos covering a wide range of geographic areas. The analysts task and exploit commercial imagery of high-interest areas, providing direct intelligence support to forces of the Joint Special Operations Task Force–Philippines. The use of commercial imagery and imagery derived products provide the broadest



U.S. Air Force photo by Senior Airman Jacqueline Kabluyen

U.S. personnel instruct Philippine forces.

dissemination possible, as all field operations are conducted by the Armed Forces of the Philippines (AFP).

NGA analysts in the CTD have traveled to the Philippines on several occasions to train soldiers in forward-deployed locations on the basic use of geospatial tools to assist in mission-specific analysis and in ordering and exploiting commercial imagery. These visits improved the soldiers’ ability to do on-site analysis. Most importantly, these trips allowed NST analysts in Hawaii and soldiers in the Philippines to develop closer analytical relationships, resulting in better collaborative analysis.

In addition to real-world operational support, NST GEOINT analysts participate in all exercises that occur in the Philippines. Exploitation of exercise scenarios is completed at the JIOC and then immediately forwarded to military members participating in the operational planning stages of the exercise. Most recently, analysts assisted in identifying areas that were going to be rebuilt by joint AFP–U.S. military teams. While troops were conducting their engineering activities, GEOINT analysts provided force protection graphics and support to aid in the safe and secure completion of the mission.

Support to the Special Operations Command Pacific (SOPAC) is provided by an NGA liaison in Hawaii who extensively trains Military Liaison Element (MLE) representatives before their deployment. Because this training is often the first exposure the MLE has to working with geospatial data, MLE personnel learn the basic functions



The bird of paradise graces the Hawaiian Islands.



A sunset over Ko'Olina, Hawaii, offers a well-earned respite to hard-working NGA analysts

of FalconView™ and ARCGIS™ so they can do basic geospatial work while in the field.

The MLEs also learn how to order commercial imagery for cases when all intelligence of operational value needs to be shared with local military and police forces. The NGA SOCPAC liaison also assists in exercise planning by contributing geospatial graphics and expertise, making exercise scenarios more in-depth and realistic.

Expanding Humanitarian Assistance and Disaster Relief

NGA's Pan Pacific GEOINT Team at the JIOC leads PACOM's Humanitarian Assistance and Disaster Relief (HA/DR) GEOINT efforts. Before Cyclone Sidr made landfall on Bangladesh in November 2007, the team worked with NGA analysts and support personnel in St. Louis, Mo., and Washington, D.C., to prepare a collaborative approach for assisting with U.S. government relief efforts. NGA's HA/DR support occurred on a nearly continuous basis for almost four weeks, providing commercial imagery, situational awareness products, damage assessments, highlight reports, planning references and briefing materials to command and operational units throughout the disaster relief operations. The U.S. Navy and Marine Corps units providing direct relief assistance to Bangladesh greatly appreciated the timeliness and relevancy of the NGA support and products.

As a result of the experience with Cyclone Sidr, the NST stood up an HA/DR GEOINT center of excellence in Hawaii. The center plans, coordinates, monitors and responds to disasters in the Pacific region, enabling NGA experts, partners and civilian elements to form a virtual network to monitor and assess disasters—whether geophysical, manmade or weather-induced—and then support responders operationally. When Tropical Cyclone Nargis struck Burma on May 2–3, 2008, causing catastrophic damage and killing tens of thousands, these well-prepared virtual partners were put to the test. The PACOM NST went 24/7 and together with the HA/DR network provided over 200 GEOINT products within the four weeks following the cyclone. The defense attaché in Rangoon stated, "We really appreciate NGA's support."

Supporting the U.S. 7th Fleet

NST members deploy to unusual locations to provide direct support. For example, one geospatial analyst works on the command ship for the 7th Fleet, the USS Blue Ridge, which is based in Yokosuka, Japan. In 2007, the ship deployed to the Philippines to perform community relations and medical care projects. During the deployment, the analyst used a suite of GEOINT tools to complete many short-notice geospatial maps, force protection graphics and route studies. Security personnel used some of these products to help protect the U.S. ambassador to the Philippines and the 7th Fleet Commander. Although the deployment required long work hours, the port visits to Manila, Cebu, General Santos City, Hong Kong, Singapore, Jakarta and Port Kelang, Malaysia made for an unforgettable experience for the analyst.

These operational vignettes represent a small fraction of the support the PACOM NST provides to mission partners from its base in Hawaii. Since the Pacific region is home to several of the world's largest armed forces and has been visited by 60 percent of the world's natural disasters over the past 30 years, the NST is guaranteed to be busy supporting the warfighter for the foreseeable future. Life in the islands might call to mind the saying "It's just another day in paradise," but it's paradise enjoyed and earned the NGA way. ▢

SHANAN FARMER

is the Chief of the Intelligence Branch at the PACOM NGA Support Team (NST). Contributions for this article were provided by members of the PACOM NST.



Photos by Shanán Farmer



Agency's Efforts Improve NAVAIR Programs

BY SCOTT TABOR

The NGA Offices of Military Support (OMS), Future Military Warfare (OMW) and Geospatial Intelligence Management (OGM) have teamed up in their collaboration with the Naval Air Systems Command (NAVAIR) at Naval Air Station Patuxent River in southern Maryland. Coordinated by the NAVAIR NGA Support Team (NST), their collaboration focuses on improved geospatial intelligence (GEOINT) availability, access and interoperability in new Navy and Marine Corps combat systems under development at NAVAIR.

The NAVAIR NST provides GEOINT subject matter expertise and data critical to NAVAIR systems development programs and operations at NAVAIR facilities in Patuxent River, Md.; Point Mugu and China Lake, Calif.; Orlando, Fla.; Lakehurst, N.J.; and around the world. These traditional NST missions also extend to neighboring commands and activities such as the U.S. Navy Test Pilot School, Naval Sea Systems Command, and Naval Test Wing Atlantic.

On station, the NST attends working groups and meetings as an active member of the NAVAIR programs'

planning and integration teams. In this capacity, and in collaboration with OGM and OMW, the NST has been leading a continuing focus on the governance of GEOINT standards and interoperability, inserting GEOINT subject matter experts from the NGA Interoperability Action Team (NIAT) into the various programs' requirements and design efforts.

Throughout the Department of Defense (DOD) acquisition framework, milestone achievements for each program's critical requirements and design are carefully drafted, validated, approved and documented. These design and support documents articulate how a system will be conceived, designed and funded, documenting the systems development, operational employment, retirement and disposal requirements throughout the system's entire life cycle. It is vital that GEOINT requirements are accurately presented in these documents.

Whether supporting navigation; mission planning; targeting;



or intelligence, surveillance and reconnaissance sensor queuing, GEOINT is a key element in every existing and future NAVAIR system. The accuracy and intuitive nature of the GEOINT requirements described in design and support documents are critical to reducing cost overruns typically associated with lengthy development timelines and poor interoperability.

A notable accomplishment resulting from the collaboration between NGA and NAVAIR is the implementation of increased GEOINT governance earlier in the development cycle. This advancement is improving the efficiency of the DOD acquisition process as it relates to GEOINT. Today, three of the NIAT's top priorities—priorities set by

the directors of OGM and OMW and by the Office of the Chief Information Officer—are programs under development at NAVAIR. These important unmanned air systems, maritime surveillance and interdiction programs will impact all of DOD and the Intelligence Community. Thus, the team effort between OMS, OMW and OGM ensures NGA governance in new systems development and saves the taxpayers millions of dollars.

The obvious benefit to NAVAIR is in the risk that NGA alleviates from its programs. NGA presents itself to NAVAIR as a cost-free solution rather than an oversight burden.

Solutions to GEOINT problems come in the form of day-to-day and face-to-face GEOINT expertise, easy access to NGA and its resources, and assurance that combat systems are harmonized with the National System for Geospatial Intelligence and mission-critical GEOINT datasets. Because GEOINT is a vital element in modern warfare systems, and because it is NGA's job to govern the GEOINT advantage, NAVAIR's partnership with NGA is good for everyone. ▀

SCOTT TABOR

is a Staff Officer with the NAVAIR NGA Support Team engaged in every aspect of GEOINT governance at NAVAIR.

A U.S. Navy F/A-18E Super Hornet performs a high-speed maneuver over the Indian Ocean.

U.S. Navy photo by Mass Communication Specialist 3rd Class Geoffrey Lewis

Situational Awareness Underlies Time-Dominant Support

BY GREG ANDERSON

NGA analyst: “How quick do you need the point?”

Marines: “ASAP.”

NGA analyst: “We are pulling point positioning data now”

Marines: “Send me what you can when you can.”

Marines: “I appreciate your work.”

Marines: “Time over target 3 minutes.”

Marines: “Initial point inbound.”

Marines: “1 minute.”

Ground Station: “Southern side completely collapsed.”

Marines: “Thanks for the work.”

NGA’s combat reachback support emphasizes time-sensitive responses with precise geospatial intelligence (GEOINT). Four years ago, like U.S. and coalition responses to the growing insurgency in Iraq, it was reactive in nature. The preceding chat traffic from an air combat operation over Iraq illustrates how NGA’s reachback support has evolved to provide precise and accurate time-dominant information to warfighters where and when they need it. This tactical airstrike destroyed 11 tons of highly explosive material probably destined for use in enemy improvised explosive devices.

NGA’s analytical experience in Iraq and Afghanistan shows that forward deployers and reachback assets are most effective when their situational awareness is commensurate with the warfighters’ situational awareness. The operation leading to the tactical airstrike was a collaborative effort between U.S. Marines and Multi-National Forces in Iraq, and intelligence and targeting analysts and mission partners spread across nine time zones. Communication links, such as dedicated chat rooms, allowed the geographically dispersed group to share tactical airborne imagery and precise targeting experience in real time. Advances in photogrammetry, imagery science and communication networks were important; however, much of the success rested on NGA personnel demonstrating situational awareness and earning the trust of the warfighter and the Intelligence Community (IC).

For 30 years, NGA and its predecessors have tackled the technical challenges of accurately determining the target attributes of latitude, longitude and elevation. Within the last several years, the Precision Engagement Division (PRT) of NGA’s Office of Targeting and Transnational Issues, which serves as the steward of the



U.S. Navy Photo By Mass Communications Specialist 3rd Class John Skrzyniarz

Military personnel ready a Marine Corps Harrier for flight.

agency’s targeting reachback resources, has made important strides in helping NGA integrate these attributes within the fleeting dimension of time.

No Substitute for Experience

Experience gained from NGA’s robust deployment of geospatial and imagery analysts and improved collaboration within the IC has allowed the agency, its offices and the NGA Support Teams (NSTs) to become more proactive in their reachback role, for example by incorporating airborne imagery and signals intelligence (SIGINT) into time-dominant operations support.

In an earlier engagement during the summer of 2007, PRT’s mission chiefs, while monitoring airborne imagery along a supply route in Iraq, saw a convoy come under small arms and rocket-propelled grenade attack. The full-motion video of that engagement was sent forward, while at the same time PRT analysts “leaned forward” and began building a mission-specific set of precise terrain and feature data before the convoy reached its destination. The mission chiefs, many of whom are U.S. military reservists collocated with NGA targeting experts, were able to sort through the confusion of the engagement and provide the convoy with a precise viewshed analysis it used to strike back on its own terms while minimizing the risk to allied compounds in the area.

The composition and experience of regional and targeting analysis teams and mission chiefs illustrate an important facet of how NGA is leading the revolution in time-dominant reachback support. The NGA Aerospace



A Marine Corps Harrier prepares to land during a training exercise. NGA analysts provide critical support to Marine flight crews and other U.S. and allied forces during time-dominant operations.

U.S. Marine Corps photo by Sgt. Ezekiel R. Kitandwe

Target and Analysis Center in St. Louis, Mo., includes civilian analysts, active-duty military personnel, reservists and contractors who work with NSTs and regional production offices to support warfighters' requests. Military and intelligence professionals build trust through rotational assignments and deployments in theater. The mission chief on duty during the strike on the explosive material had recently returned from an assignment to the Combined Air Operations Center (CAOC) at Al Udeid Airbase in Iraq. His familiarity with the CAOC mission helped facilitate the targeting support during the airstrike and other time-sensitive missions.

Analysis Now

Since November 2007, PRT analysts have supported two fusion cells, which combine assets from multiple mission partners, serving U.S. and International Security Assistance Force (ISAF) allies in Afghanistan. In one operation, analysts with terrain, targeting and tactical imagery experience worked in unison to monitor activity around a suspected high-value target from tactical airborne assets. They then fused the intelligence gained into precise terrain and feature data used to evaluate helicopter landing zones and ingress and egress routes. The trust between the fusion cell and the PRT analysts, coupled with the situational awareness they developed

beginning in the planning phase, carried on to the post-operation phase. Full-motion video captured by the unmanned aerial vehicle during the mission was available for analysis before the aircraft had returned to base.

Working together, the NGA deployer supporting the fusion cells and the analysts and mission chiefs back in PRT were able to support more missions at a faster tempo and with a greater margin of safety. The faster operational tempo and added flexibility in mission planning enabled the ISAF to execute a more aggressive campaign, even during winter months, which allowed its forces to better dictate the tempo of operations.

The skill of agile, empowered and trusted NGA analysts, coupled with the situational awareness they develop, drives NGA's time-dominant GEOINT support. Partnered with the lethal professionalism of U.S. and allied warfighters, this support is a powerful force multiplier. ▀

GREG ANDERSON
is the Special Issues
Manager for NGA's Precision Engagement Division.





Technical Executives Push Information Forward

BY DOUGLAS GRAVES AND LT. COL. JAMES CABALQUINTO, U.S. AIR FORCE

As the demand for geospatial intelligence (GEOINT) grows within global military operations, so do the means by which NGA delivers information technology (IT) and information services (IS) that better meet that demand. As NGA's IT and IS provider, the Enterprise Operations Directorate (E) deploys technical executives (TXs) worldwide to execute its "push-forward" technique of disseminating GEOINT.

Prior to October 2006, NGA Support Teams (NSTs) collocated with military partners led the effort to move, store and process GEOINT in forward locations. However, as the technology became more complex and NGA's forward infrastructure grew, the support for technical services became more burdensome. This drove NGA to provide special technical experts in IT and IS who could address the delivery of GEOINT. Since October 2006, E has placed these TXs at almost all of the Unified Combatant Commands.

Warfighter support has become increasingly more efficient as the TXs have represented the combatant commands' technical needs across the spectrum of IT organizations that the commands depend on for GEOINT. For example, the TXs communicate technical issues to the commands, the Defense Intelligence Agency, and the Defense Information Systems Agency so that all are more effective in supporting NGA to address network provisioning, outages, scheduling maintenance and problem resolution. The TXs also work on behalf of the NSTs on systems deliveries and upgrades, discrepancy report resolution, IT incident management, IT and IS requirements generation and development, and IT/IS contract management.

NGA is committed to assigning additional on-site TXs to other NSTs and is seeking to fill TX positions at the U.S. Special Operations Command and the National Air and Space Intelligence Center and to expand the TX model at the U.S. Central Command with an additional technical professional.

As NGA's analytic and source management presence expands at forward locations, so will the IT and IS expertise. "We are seeing tremendous returns on investment to the mission as a result of our 'push-forward' capability. These include tremendous improvement in the access, discovery and utilization of GEOINT products," says David White, Director of Enterprise Operations Infrastructure Service Provider Core Services. "This 'push-forward' capability is proving to be the right concept for modern challenges." P

LT. COL. JAMES CABALQUINTO (LEFT) AND DOUGLAS GRAVES (RIGHT)

Lt. Col. James Cabalquinto is the Chief, External Support Branch, Enterprise Operations Directorate. His branch is responsible for enterprise operations at combatant command, Intelligence Community and mission partner locations.

Douglas Graves is the Chief, External Operations Division, Enterprise Operations Directorate. His division is responsible for enterprise operations for the National System for Geospatial Intelligence.



Analysts Learn the Lessons of Gettysburg

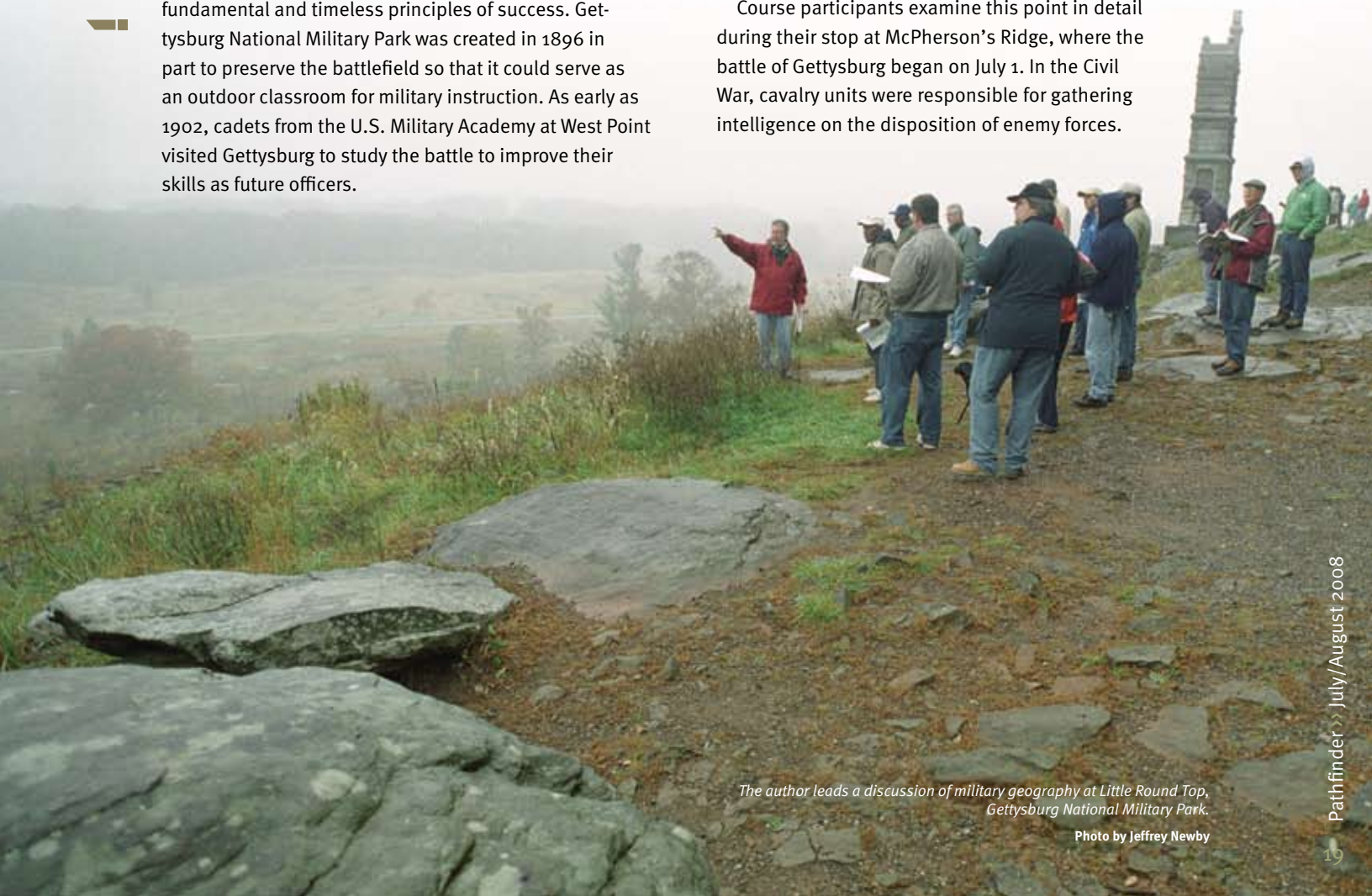
BY DAVE SULLIVAN

To enhance their ability to provide today's war-fighters with the latest and most advanced geospatial intelligence (GEOINT), many NGA analysts are drawing on valuable lessons learned from studying an American Civil War battle. Since 1998, over 700 agency personnel have participated in the two-day Gettysburg Staff Ride, taught by senior GEOINT analysts from the agency's Analysis and Production Directorate. During a day on the battlefield, students learn lessons on the value to military forces of timely, accurate intelligence and the impact of military geography on combat operations.

Staff rides and the broader study of military history enjoy a long tradition. Gen. Douglas MacArthur wrote that "the Army extends its analytical interest to the dust-buried accounts of wars long past ..." to illuminate fundamental and timeless principles of success. Gettysburg National Military Park was created in 1896 in part to preserve the battlefield so that it could serve as an outdoor classroom for military instruction. As early as 1902, cadets from the U.S. Military Academy at West Point visited Gettysburg to study the battle to improve their skills as future officers.

According to Chuck Norville, lead instructor for the course, the Gettysburg Campaign is ideal for teaching the importance of GEOINT, which played such a crucial role in determining the outcome of this pivotal battle fought between Confederate and Union armies during July 1–3, 1863. "It is no coincidence that the side with the most timely, accurate and complete intelligence and geospatial information won the battle. Union forces entered the battle with a very good picture of the enemy facing them and of the terrain over which they would have to fight—an advantage they retained throughout the three days of battle at Gettysburg. Conversely, Confederate forces stumbled blindly into battle on unfamiliar ground and with little idea of the strength, disposition or nature of the foe they faced."

Course participants examine this point in detail during their stop at McPherson's Ridge, where the battle of Gettysburg began on July 1. In the Civil War, cavalry units were responsible for gathering intelligence on the disposition of enemy forces.



The author leads a discussion of military geography at Little Round Top, Gettysburg National Military Park.

Photo by Jeffrey Newby



Photo by Jeffrey Newby

Detail of the Virginia Memorial, Gettysburg National Military Park.

During the latter stages of their advance into southern Pennsylvania in June, Southern cavalry under Gen. J.E.B. Stuart became separated from the rest of the Confederate Army, forcing Gen. Robert E. Lee to operate without his “eyes and ears.” Lee’s senior Corps commander, Gen. James Longstreet, felt that with Stuart absent his advance was someone walking “over strange ground with his eyes shut.” With no cavalry units available to gather intelligence, the Confederate Army sent a large infantry force towards Gettysburg on the morning of July 1 with no knowledge of the distribution of Union forces in the area.

In contrast, the Union Army had cavalry performing the reconnaissance role that it was designed to do. Gen. John Buford commanded a cavalry division at Gettysburg on June 30 and July 1. He provided a steady stream of intelligence reports to his superiors on the disposition of the Confederate Army and their move towards Gettysburg. Norville emphasizes that in reviewing the opening moves for both armies in the battle, “Students can plainly see how much a commander’s decision-making process benefits from having the right information at the right time. Timely intelligence literally saves lives.”

The staff ride does not attempt to tour the entire battlefield. Dave Sullivan, Norville’s fellow instructor for the last 10 years, emphasizes that “we stop at locations that provide some of the better examples of how intelligence and military geography affected the battle. At these stops we discuss not only what happened there, but more

importantly why events unfolded as they did.” At each stop, students read aloud accounts written by individuals who participated in the battle in order to understand what the situation was like during the fighting and what individual soldiers and officers knew or did not know about what was happening around them.

On the battlefield, course participants benefit from the extensive research they do before beginning class. Students prepare by reading almost 200 pages of background material about the Gettysburg campaign, military geography, logistics, military organization, types of ground operations and the principles of war. The first day of the staff ride is spent in the classroom reviewing and preparing for the trip to Gettysburg the next day. Sullivan indicates, “This review serves to maximize the value of our time on the battlefield. Once we arrive at Gettysburg, we generally don’t have to answer a lot of basic questions.”

The three days of fighting at Gettysburg provide dramatic examples of the effect of geography on combat. In addition to hills, streams or other features, even something as mundane as the type of fence bordering a road can affect how armies operate in the field. “Military geography is just as important today as it was in 1863,” emphasizes Scott Kenepp, a cartographer who last year joined Norville and Sullivan in presenting the course. “Union Commander George Meade, a one-time topographic engineer, ordered the concentration of Northern troops to Gettysburg on July 1 after receiving reports that the Union position was on good ground to fight a battle. Students stand on the same ground as the soldiers and better understand the decisions made based on military geography.”

One of the highlights of the staff ride is the time spent on the slopes of Little Round Top. A brigade on the left flank of the Union Army brought in to defend this hill was attacked late in the afternoon of July 2 by Southern troops unfamiliar with the terrain. Confederate Brig. Gen. Evander Law later wrote that the “thick woods, which in great part covered the sides of Round Top and the adjacent hills concealed from view the rugged nature of the ground, which increased fourfold the difficulties of the attack.” In discussing the failure of his men to capture the hill, Lt. Col. King Bryan indicated that they were thwarted by “the rocky nature of the ground over which we had to pass, the huge rocks forming defiles through which not more than 3 or 4 men could pass abreast, thus breaking

up our alignment and rendering its reformation impossible.” The Confederate Army’s lack of knowledge about the difficulty of the landscape undoubtedly contributed to its failure to defeat Union troops on Little Round Top—a lesson that resonates with virtually every student.

The discussion on Little Round Top also brings out the role of Brig. Gen. Gouverneur K. Warren, the Union Army’s chief engineer officer, in securing that key ground for the Union Army. Arriving on the summit of the hill on July 2, Warren found it virtually unoccupied. Recognizing its importance, he took immediate steps to have units brought in to defend it. Because of his actions, Warren is frequently called the Savior of Little Round Top. After the Civil War, Warren oversaw the production of a detailed map of the Gettysburg battlefield that is still used by the National Park Service. One of the most highly regarded topographic engineers in the U.S. Army, Warren is also the namesake for one of the original buildings at NGA’s Bethesda headquarters complex.

NGA’s Gettysburg Staff Ride stresses the critical importance of the GEOINT products and services that the agency provides to the military and other customers on a daily basis. In their end-of-course critiques, students consistently mention how effectively the course links the lessons from Gettysburg to NGA’s mission. A 2007

participant summed up the opinion of many when he reflected that the “lessons learned at Gettysburg make it absolutely clear why our work is so important.” Bruce Heater, the director of NGA’s Office of Asia Pacific, believes that this course provides “fundamental instruction on a variety of pertinent issues to military analysts—the value of reconnaissance, understanding terrain, knowing your opponent, controlling lines of communication, sustaining logistics and concentration of force—and all within walking distance of some of the most important historical terrain in American history.” P

DAVE SULLIVAN

is an Imagery Analyst in NGA’s Analysis and Production Directorate, Office of Eurasia-Africa. Chuck Norville of the Office of Asia-Pacific and Scott Kenepp of the Workforce Development and Tradecraft Office contributed to this article.



The actions of Brig. Gen. Gouverneur K. Warren earned him the designation “Savior of Little Round Top.” A statue of this Union officer surveys the terrain within Gettysburg National Military Park.

Photo by Rob Cox



21ST CENTURY

Crisis Action Team Responds to Front-Line Requirements

BY MAJ. TERRY HERRING, U.S. ARMY, AND PETER TERZIAN

Throughout history, the ability to respond quickly to intelligence needs has tipped the balance of military operations in favor of those who are most agile. The National System for Geospatial Intelligence (NSG) Crisis Action Team (NCAT) has proven its ability to rapidly respond to national security requirements and deliver geospatial intelligence (GEOINT) capabilities to the warfighter.

The NCAT was activated in February 2007 to respond to crisis requirements submitted by forward-deployed personnel in support of increased troop levels in Iraq and Afghanistan.

The team directly supports the operations of warfighters, forward-deployed NGA personnel and agency partners who are engaged in the Global War on Terrorism.

Recently, Vice President Dick Cheney, while in Iraq, remarked on the war saying, "If you reflect back on those five years, it's been a difficult, challenging, but nonetheless successful endeavor. We've come a long way in five years, and it's been well worth the effort." The NCAT has actively contributed to this success.

To accomplish its mission, the NCAT must perform rapid triage on crisis requirements that come in from the front. The capability to exploit GEOINT underlies these requirements and directly assists troops in tracking and defeating enemy elements engaged in battle.

The team has processed over 100 requests since its inception. These have ranged from very small needs, such as furnishing desk and laptop computers, to very large multipartner and multiplatform initiatives to provide the best time-dominant GEOINT possible.

The NCAT's technical expertise and facilitating skills, and its close coordination with the combatant commands and other mission partners, have resulted in the development and integration of numerous solutions for GEOINT consumers. For example, as the use of unmanned aerial vehicles (UAV) increased in Iraq and Afghanistan, analysts required the capability to process and manage streaming video feeds. The NCAT immediately implemented a solution to address the rapid increase in UAV collection. The team's expertise and focus have helped save lives and win the fight in the front lines of battle.

The team's support of key strategies and critical functions contributes to its focus on delivering the best resources to those who need them most. The consistent message of the NCAT is a reflection of NGA Director Vice Adm. Robert B. Murrett's directive to "retain our sense of urgency and work as a unified community of experts, producers and partners, providing the data and knowledge our nation needs." The team has showed exceptional dedication to this goal and has ensured the delivery of critical capabilities needed by our forward-deployed analysts and warfighters to successfully accomplish their missions. P



MAJ. TERRY HERRING (LEFT) AND PETER TERZIAN (RIGHT)

Maj. Terry Herring is an Army Signal Officer who recently returned from an Operation Iraqi Freedom deployment, bringing with him extensive experience in field craft and operations.

Peter Terzian is a Senior Systems Engineering Contractor assigned to the NSG Crisis Action Team who is certified in enterprise architecture and has extensive software engineering experience.



PARTNERSHIPS

Evasion Charts Protect Downed Forces

BY GREG ANDERSON

The slow, methodical sweep of the Marine sniper team's scopes sought out a pattern, reflection or movement against the woodlands that would give away the target. Although the target evaded detection, the retired Air Force master sergeant commanding the team grinned in satisfaction. With survival, evasion, resistance and escape (SERE) experience dating back to Vietnam, and with a drawl that hinted at his Louisiana roots, he thanked the Marine snipers and reminded them that they, along with a small group of NGA cartographers and printing professionals, had helped improve a product that most military personnel hoped they would never need to use—the Evasion Chart (EVC). The retired master sergeant is now the program manager for EVCs for the Department of Defense's Joint Personnel Recovery Agency (JPRA).

The EVC program traces its roots to the silk escape and evasion charts used by the U.S. Army Air Forces during World War II. In the early 1980s, JPRA and NGA predecessor organizations began producing EVCs in partnership. NGA's geospatial intelligence mission dovetails with JPRA's mission to enable the recovery of isolated personnel to friendly control. These two agencies continue to collaborate with military elements, such as the Marine snipers, to build better EVCs and a more efficient production process—in direct support of the Global War on Terrorism.

EVCs were originally designed so that downed aircrew members could determine and radio their position to recovery personnel or travel to a better location from which to signal or even to a preselected recovery point. If necessary, they could use the EVC to navigate out of a hostile environment during an extended evasion. EVCs also include tips on which plants to eat or avoid, travel

techniques, first aid, signaling, camouflage and other items. Printed on Tyvek®, a tear- and water-resistant paper, EVCs can even help users stay warm and dry.

The EVCs and the SERE training programs offered by the military services received a degree of public acclaim when U.S. Air Force Capt. Scott O'Grady was shot down in Bosnia in 1995 and used an EVC to help evade capture. That moment is represented by an EVC, signed by O'Grady with a note of appreciation, displayed at the NGA facility in St. Louis, Mo. The displayed EVC, which post-dates O'Grady's experience, represents NGA and JPRA's commitment to listen to the needs of the warfighter community and to strive for excellence.

By the late 1990s the EVC program had slowed as the combatant commands felt that EVC coverage was then adequate. At the same time, NGA was transitioning from manual to digital compilation and reproduction processes. As the new century approached, the need for a revitalized EVC program became clear. NGA and JPRA rose to the challenge.

The situation presented an opportunity to solicit evasion chart users for ways to improve the EVC design, while incorporating new compilation, lithographic and printing processes. These advancements helped NGA and JPRA create a more agile production process, which proved invaluable in meeting the influx of new requirements in the post-Sept. 11 environment.

One of those changes was in the camouflage design used to make the nearly 20 square foot EVCs disappear into the background. Camouflage patterns had been incorporated into the modern EVC since 1980. However, conversations with the SERE community indicated that





Photo by Tom DeCleene

Evasion charts help conceal downed forces, as in this training exercise.

the original color pattern, similar to the one then used on military battle dress uniforms, was too large to effectively hide the EVC. JPRA and NGA designed a series of new patterns that incorporated smaller color elements, matched customized colors to unique environments, and increased the feathering of different chart elements. These new patterns were tested by the Marine snipers at Quantico.

The original pattern and layout of the EVC used by O'Grady in 1995 was picked out by the sniper team in a few minutes. The new pattern that brought the smile to the retired master sergeant has now been incorporated into all newly compiled EVCs used by fellow Marines and U.S. aircrews, including those in Iraq and Afghanistan. Other U.S. military personnel have also begun to recognize the value of the new EVCs.

While the design advances move forward, NGA and JPRA also pursued a parallel effort regarding the utility of the chart source used to build EVCs. To incorporate lessons learned by the warfighter community, project managers worked with NGA support teams at the U.S. Transportation and Special Operations Commands, past and current military aircrew members assigned to NGA, the Air Force SERE training program, and the Joint Readiness Training Center, which trains brigade combat teams for war.

Feedback from this energetic collaboration, along with newer production processes, has allowed NGA cartographers to expand the chart and map sources used

in EVCs. Previously, the selection of geospatial sources was biased toward the aeronautical charts used by pilots and navigators in flight, rather than the type of maps needed by a downed pilot, like O'Grady, looking up at his wing man. A key change was to exploit a wider range of cartographic sources, in some cases customizing EVCs to specific operational areas. For example, NGA incorporated topographic line maps at the most suitable scales as the cartographic sources in recompiled EVCs over Iraq produced in time for Operation Iraqi Freedom and for EVCs over the Sulu Archipelago used to support Operation Enduring Freedom—Philippines. Additionally, the increased detail and currency of terrain and culture data made the Iraq and Sulu EVCs better evasion aids, while the customized camouflage patterns used made the charts safer for the evader.

During one SERE training course, the JPRA program manager met members of a unit that had flown over the islands of the Sulu Sea. They were impressed with the detail of the new charts and felt reassured that the EVCs would help get them rescued in an evasion situation. They asked the program manager to pass their appreciation to the people at NGA as well. NGA and JPRA continue to gather input from those who complete SERE training programs. The agencies have designed special EVCs over key training areas to facilitate the sharing of information and allow SERE students to train like they would evade.

EVCs are currently produced by cartographic analysts in NGA's Source Operations and Management Directorate, GEOINT Foundation Office, working hand in hand with JPRA to ensure timely delivery of this hardcopy product. Approximately 400 EVCs covering regions around the world have been developed through this partnership.

The story behind the revitalization of the EVC by JPRA and NGA is a great example of the importance of building and maintaining close working relationships across the combat support and intelligence communities. As this case illustrates, in the pursuit of excellence it is imperative to reach out and listen to the warfighter. ▀

GREG ANDERSON

is the Special Issues Manager for NGA's Precision Engagement Division. He served previously as the Chief of the Evasion Chart program.



PARTNERSHIPS

NGA Military Reservists Perform Critical Services

BY CAPT. MARSHALL HUDSON, U.S. ARMY RESERVE

Reserve soldiers, sailors, airmen and Marines with the Military Reserve NGA Support Team (NST) in the Office of Military Support serve in offices throughout the agency and with NSTs across the country. These reservists contribute to NGA's mission, as well as the nation's defense and military readiness, by updating potential targets, developing intelligence products and providing situational awareness to warfighters in deployed areas. They do so at very low cost to the agency, since in many cases the military services provide their salaries.

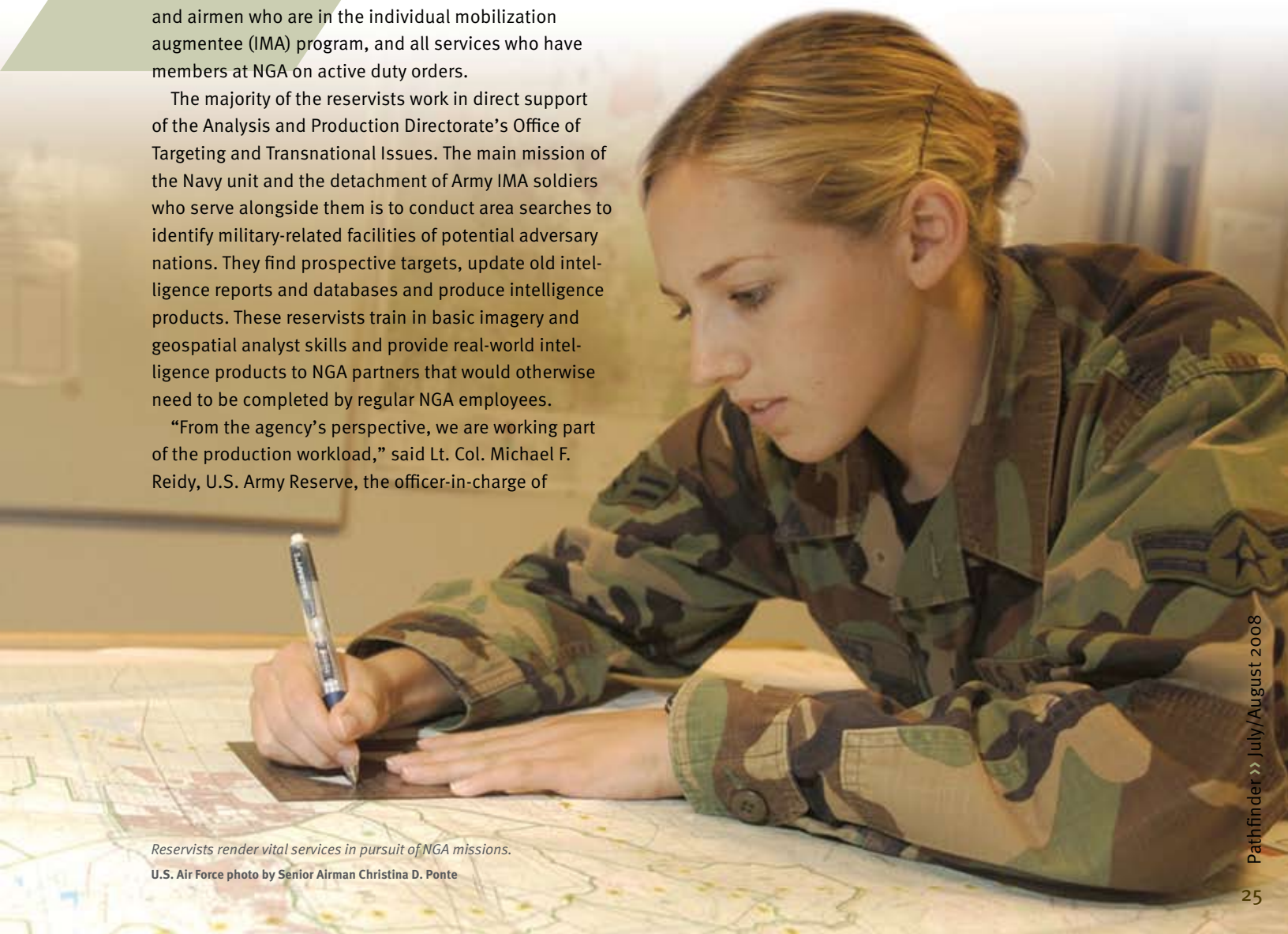
The NST reserve contingent is composed of sailors who are part of the Navy Drilling Reserve Unit, soldiers and airmen who are in the individual mobilization augmentee (IMA) program, and all services who have members at NGA on active duty orders.

The majority of the reservists work in direct support of the Analysis and Production Directorate's Office of Targeting and Transnational Issues. The main mission of the Navy unit and the detachment of Army IMA soldiers who serve alongside them is to conduct area searches to identify military-related facilities of potential adversary nations. They find prospective targets, update old intelligence reports and databases and produce intelligence products. These reservists train in basic imagery and geospatial analyst skills and provide real-world intelligence products to NGA partners that would otherwise need to be completed by regular NGA employees.

"From the agency's perspective, we are working part of the production workload," said Lt. Col. Michael F. Reidy, U.S. Army Reserve, the officer-in-charge of

the Army detachment that works in support of targeting. Reidy said that it is good for the agency and also for the soldiers in that it gives them a chance to get great training and add value. "Soldiers don't want to sit; they want to contribute, and that's what we do here," said Reidy.

Soldiers and sailors in the program do their two-week annual reserve training working in the NGA offices they support, often working on issues of high interest to U.S. policy makers. They also serve as watch officers at the NGA Command Center, participate in exercises on behalf of NGA, take training courses and support the Office of Geospatial Intelligence Management.



Reservists render vital services in pursuit of NGA missions.

U.S. Air Force photo by Senior Airman Christina D. Ponte



Additionally, Army and Air Force reservists work at the Counterterrorism Airborne Analysis Center (CTAAC). Their mission is to develop products to provide situational awareness to warfighters in deployed areas about high-value targets using real-time, full-motion video from Predator unmanned aerial vehicle (UAV) feeds. The center is staffed with NGA civilians and contract employees, as well as military personnel. According to an analyst who did a tour at CTAAC as a reservist, one's ability, rather than rank or badge color, is all that matters.

An Air Force National Guard staff sergeant on a one-year tour at CTAAC, who used to work with Global Hawk UAVs, stated, "I liked working Global Hawk for the Air Force, but here you get to see the end result of your work and the impact you are making to the mission." A California Army National Guard soldier also on orders

at CTAAC agreed.

Trained as a human intelligence specialist, he had never worked with imagery before but had served a tour in the theater he was supporting. According to his branch chief, this soldier quickly picked

up the necessary skills and knowledge he needed and became a big asset for his team. "There was a learning curve, but when someone from in-theater calls you to ask what you are seeing, you understand how important this is. I have been that guy on the ground, so I did whatever I could to become self-sufficient as fast as I could," the soldier said.

Numerous NGA reservists have mobilized to support Global War on Terrorism missions, including a captain in the U.S. Navy Reserve who just completed a tour as the NGA lead in Iraq, and a lieutenant colonel in the U.S. Army Reserve who is the agency's country lead in Afghanistan.

While some of the reservists work as NGA civilian employees in their regular jobs, the majority do not. The program allows former military imagery and geospatial

analysts who do not work for NGA to stay in the field of geospatial intelligence as reservists supporting the agency, which also creates a pool of qualified analysts for NGA. A sampling of three reservists found an analyst with an Intelligence Community agency who is grateful for the opportunity to broaden his skill set, another who works as a contract instructor at the NGA college and appreciates the opportunity to keep her skills current, and a third who works for the U.S. Postal Service and just enjoys the challenge of being an imagery analyst.

The newest mission for the reservists is a joint Army and Navy initiative to support "soft copy" search efforts in South America. According to Lt. Cmdr. Charles Maluzzi, the NGA Navy unit's executive officer, this new mission is an important step forward for the reserve program because of the investment in training required by NGA and the trust the reservist's full-time counterparts have shown in sharing the search mission. "It highlights the good reputation and relationships the program has built," he said. Reserve leaders credit the success of the reserve program to the support it receives from NGA. From the support of the Director and the Military Executive, to the leadership of the Analysis and Production Directorate and other key components, to the cooperation of branch chiefs whose spaces the reservists fill, the NGA reserve program has received great assistance and support, allowing reservists to provide great support in return.

Information on the NGA Military Reserve program can be found at www.nga.mil/reserve. P

CAPT. MARSHALL HUDSON

is an individual mobilization augmentee assigned to NGA's Office of Military Support. In regular work he serves as a Staff Officer in the Office of Corporate Communications.



Reservists contribute to NGA's mission, as well as the nation's defense and military readiness.



OUR HERITAGE

The Ho Chi Minh Trail 1970: The Mission is the Mother of Invention

BY DR. GARY E. WEIR

Was the sortie successful? The United States' aerial effort in the 1970s to interdict the massive amounts of supplies rolling down the Ho Chi Minh Trail from North Vietnam needed regular and reliable evidence of success or failure. Did our mission succeed? That question needed a timely answer, daily.

Air Force and Navy reconnaissance aircraft routinely flew over the primary entry points into Vietnam from southern Laos at Tchepone and the Mu Gia and Ban Karai Passes. The road networks running north and south drew the camera's attention at least once a week. The reconnaissance aircraft focused twice as often on the transit points into Vietnam and Cambodia from Laos. In early daylight, these flights sought to confirm the pilots' visual estimate of the damage inflicted by night raids on North Vietnamese trucks running in near-dark conditions through Laos, down the trail to logistics staging areas and to truck parks serving as rest stops for continuing journeys. This reconnaissance effort sought to define both mission effectiveness and possible targets for the next day's work.

In spite of these assets, in 1970 the needed assessments did not come easily. In one case, the crew of an RF-4C reconnaissance aircraft flying early morning missions during the 1969-1970 dry season could confirm only seven of 103 trucks reported destroyed during the first six weeks after the intense rain ceased. Given the proven effectiveness of the AC-130 gunships and repeated pilot reports of success, the inability to verify the damage inflicted became a critical problem. Did the missions fail? Were the pilots mistaken? Did the North Vietnamese road crews clear the debris away and repair the bomb craters quickly enough to cover up any sign of the attack?

Upon careful consideration, it seemed that the answer rested with the standard charts then in use by planners. In 1970, detailed and accurate charts of Laos proved hard to find. Photointerpreters gradually discovered that the maps and charts of Laos used for the Ho Chi Minh Trail interdiction missions, as well as other efforts, regularly demonstrated errors of a few thousand meters. If the



Photo from *The War Against Trucks*, an official U.S. Air Force publication.

A truck park along the Ho Chi Minh Trail photographed by aircraft reconnaissance, c. 1968.

RF-4C reconnaissance and assessment teams had been flying to flawed coordinates to monitor the effect of night missions accomplished just a few hours earlier, that would explain a great deal.

To address this problem, the Air Force introduced the long-range navigation (loran) system into the equation. Loran defines the location of any strike site by determining its distance from a known location via the elapsed time of a dedicated radio signal between two or more points—providing much greater precision. The promise of using loran led the Air Force and the Aeronautical Chart and Information Center (ACIC) in St. Louis, Mo., an NGA predecessor, to take this possible solution a step further. The cartographers at ACIC took high-altitude photographs of Laos, Cambodia and Vietnam and broke them into sections, 10 miles square. Loran-directed RF-4Cs photographed each block, and the cartographers transferred the loran data to a series of photo maps, combining the high altitude work with the need to have accurate maps and charts.

The loran control points on the photomaps then went into a growing database along with other significant mission locations identified by the Air Force using those very same points. By 1971, the database became available for use at the 12th Reconnaissance Intelligence Technical



Photo from *The War Against Trucks*, an official U.S. Air Force publication.

Aircraft reconnaissance captured this image of an open storage supply dump along the Ho Chi Minh Trail, c. 1968.

Squadron at Tan Son Nhut airbase near Saigon. With accurate fixed points both on the photomaps and retrievable from the computer, the reconnaissance squadron could within 45 minutes accurately confirm the location of any strike point along the trail with a radio fix that related that location to the nearest known loran control point.

With this available combination of talent and technology, the photointerpreters began working with forward air controllers to address the immediate needs of any mission in progress with the new loran-driven tools. The controllers would have the photomaps in hand, with a special grid superimposed. They provided the location of a target or a successful strike as portrayed on their photomap to the technical squadron at Tan Son Nhut, along with the information supplied by the grid. The technical squadron could then supply the pilot with his loran position, both for his purpose and to revisit the point of attack later for evaluation and lessons learned.

Necessity truly is the mother of invention. In this case, a powerful innovation emerged from a creative combination of tradecraft skill and technology. Over the jungles of Laos and Vietnam nearly four decades ago, advanced communications came together with the imagery skills of the photointerpreter and the deliberate precision of the cartographer to fulfill the critical mission needs of the moment. Therefore, for NGA today as well as for its predecessors, I say that the *mission* is the mother of invention. P

DR. GARY E. WEIR
is the NGA Historian.



NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

GEOINT

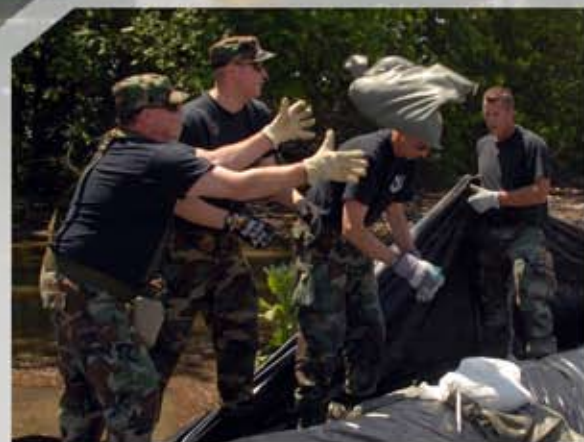
IT MAKES THE DIFFERENCE



U.S. Air Force photo by Master Sgt. Paul Gorman

MIDWEST FLOOD RESPONSE

Delivering a common operating picture to
FEMA and emergency responders



U.S. Air Force photo by Master Sgt. Bill Wiseman

WWW.NGA.MIL



U.S. Air Force photo by Staff Sgt. Oscar M. Sanchez-Alvarez



www.nga.mil