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PATHFINDER

THE GEOSPATIAL INTELLIGENCE MAGAZINE

SERVING THE FRONT LINE

July/August 2011

PARTNERSHIPS AROUND THE WORLD

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On My Mind

Partnerships—Fostering Community and Driving GEOINT Success

The National Geospatial-Intelligence Agency's (NGA) partnerships are broad, from domestic to international, from academic to industry. Partners—our allies and associates—strengthen our ability to provide geospatial intelligence (GEOINT). Our collective success in carrying out our mission demonstrates that the whole is greater than the sum of its parts.

Partnership among Intelligence Community (IC) and Department of Defense agencies was key to success in the Osama bin Laden operation. NGA applied a range of GEOINT capabilities, including imagery, geospatial and targeting analysis, along with imagery sciences and modeling—capabilities that, combined with the work of the CIA and the National Security Agency, helped ensure mission success.

To achieve this success NGA employees worked behind the scenes for more than a decade, providing crucial GEOINT for our warfighters and our nation's decision makers. We will continue to build on their work and that of our IC partners in fighting the war against radical extremism.

Many other partnerships drive NGA's mission success. Key among them is NGA's international relationships. The Office of International Affairs and Policy (OIP) manages NGA's foreign partnerships and ensures that they are operating in a manner consistent with U.S. foreign policy, with the guidance that we receive from the Director of National Intelligence and the Secretary of Defense, and with our own NGA objectives.

You will learn more about several successful partnerships in our OIP feature articles, including one that focuses on the collaborative effort by the National Oceanic and Atmospheric Administration, NASA and the U.S. Geological Survey, along with their international partners, to build the Global Earth Observation System of Systems (GEOSS). The GEOSS "system of systems" will link existing and planned Earth observation systems; it is just another illustration of one of the key benefits of partnership: Sharing information—as well as sharing the responsibility for collecting information—is advantageous to all.

NGA, along with its Canadian partners, fosters a geospatial training and development program through its partnership with the Afghan Geodesy and Cartography Head Office (AGCHO). The recent opening of a new Geospatial Production Facility in Kabul was a milestone in modernizing Afghan mapping capabilities and builds on the success of the Geospatial Training Center opened just a few years ago. Our support for AGCHO is an important part of our country's stabilization and development effort in Afghanistan.

Bilateral and multilateral agreements are critical to foundation GEOINT production. The Multi-national Geospatial Co-production Program, in which member nations are responsible for geospatial data produced for specific areas of the world, is just one of several examples featured.

NGA's support to domestic partners, as they respond to natural disasters, is an important part of our ongoing GEOINT mission. This issue touches on our work with the Federal Emergency Management Agency and others during the recent floods and tornadoes, work which demonstrates the importance of GEOINT in providing a common operating picture for first responders.

While NGA's contribution to the Osama bin Laden operation may serve as this year's most recognized GEOINT and IC success, it is the day-to-day collaboration and cooperation among agencies, among organizations and among people in our own backyard that form the basis for success in our GEOINT mission.

Letitia A. Long

Letitia A. Long
Director

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On the Cover

The National Geospatial-Intelligence Agency partnerships span the globe, from domestic to international, academic and industry. Partners—our allies and associates—strengthen our collective provision of geospatial intelligence and demonstrate that the whole is always greater than the sum of its parts.

Cover design by Amy Battison using DOD and IC images

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NGA Reaches Halfway Mark in Move to New Headquarters

The number of employees working at the National Geospatial-Intelligence Agency Campus East (NCE), NGA's new headquarters in Springfield, Va., passed the 4,000 mark in May. NGA began moving increments of the workforce into the new 2.4 million square foot campus in January 2011.

The consolidation of NGA's facilities in the Washington, D.C., metropolitan area to Fort Belvoir's North Area is due to the Defense Base Realignment and Closure Commission requirements of 2005.

NCE was designed to enhance mission performance, facilitate physical and virtual collaboration, and promote greater information sharing both internally and across the broader Intelligence Community.

The move will be completed in September 2011 and will accommodate 8,500 NGA employees and contractors.

NGA Photo by Tony Boone

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NGA Aids Relief Efforts

The National Geospatial-Intelligence Agency (NGA) is supporting the Federal Emergency Management Agency (FEMA) and other agencies in responding to the flooding and tornadoes that have caused catastrophic damage in the United States.

In the aftermath of the tornadoes, NGA has provided damage assessments and other geospatial intelligence products crucial in disaster response and debris cleanup in Alabama, Arkansas, Georgia, Mississippi, North Carolina, Tennessee and Virginia. NGA is providing daily updates in support of FEMA requirements.

In connection with the Mississippi River flooding, NGA has been producing both predictive analyses and damage assessments as water levels rise and diversion efforts proceed along the river.

NGA supported FEMA, the Department of Homeland Security and the U.S. Army Corps of Engineers by producing models predicting the effects of releases from the Morganza Spillway in Louisiana.

NGA's analyses include predicted and actual effects on critical infrastructure including roads, railways and airports; hospitals, Red Cross and other emergency facilities; power plants; pier and port facilities; petroleum refineries and other industrial facilities; schools; and water supplies.

"NGA provides a common operating picture that enables FEMA and emergency responders to work together more effectively and efficiently," said Philip J. Plack, NGA liaison to FEMA.

S, P Offices Merge to Improve GEOINT Support for Customers

Over 1,000 NGA employees from the Analysis and Production (P) and the Source Operations and Management (S) directorates merged May 1 to form a one-stop shop for geospatial information aimed at providing greater, more efficient access to GEOINT.

The new Foundation GEOINT Group (S2) combines the mission responsibilities of the former Foundation Based Operations Group, the Office of Global Navigation (PV) and the Political Geography Division of the Office of Targeting and Transnational Issues (PRP) and provides a single infrastructure aimed at eliminating redundancies in product development and day-to-day administration.

"We're always looking for ways to improve NGA's efficiency in both our day-to-day operations and in the GEOINT support we provide," NGA Director Letitia A. Long said. "This consolidation is another way we are strengthening our impact and support to our customers by making it easier for them to access and meet their GEOINT needs."

Acting Director of S2 Jack Fahey added that the new group will maintain and improve both NGA's safety of navigation and foundation-based operations products and services. The group will reside under S.

"Combining these missions into one organization will enable our workforce to better meet our mission needs," Fahey said. "Our new organization will also give our workforce many opportunities to broaden their careers."

NGA Highlights Vision at USGIF Technology Day

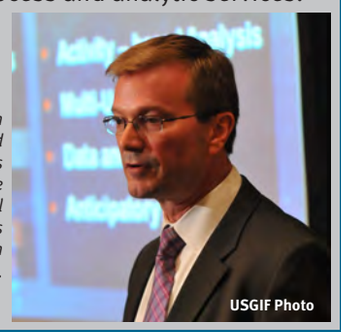
National Geospatial-Intelligence Agency (NGA) members discussed the agency vision and what it means to geospatial intelligence (GEOINT) users from across the GEOINT community during the U.S. Geospatial Intelligence Foundation's (USGIF) May 12 Technology Day in Reston, Va.

Keith Barber, lead for the online, on-demand services goal, talked about the new user experience for the National System for Geospatial Intelligence (NSG) members. He described the future state environment and how it will change the community's interaction with NGA.

Evelyn Thai, GEOINT officer and lead for the Ender's Battle School team, and Chris Rasmussen, lead for the Living Intelligence team, walked through their respective presentations from the NGA Vision Online Services Contest. They provided audiences with a range of interesting concepts that may be translated into the operational space.

Marshall Harper, then lead for the vision business operations team and presently chief of the Program Analysis and Evaluation Division, Financial Management Directorate, shared how vision implementation is impacting business operations right now.

John Goolgasian, lead for the analytic depth goal, and Barber, additionally participated in Friday's USGIF Workshop on Analytic Transformation. Joining Goolgasian and Barber from NGA were Ted Cope, director of GEOINT Research, InnoVision Directorate, and key members of industry representing tool development, commercial satellite providers and information, process and analytic services.



Keith Barber, the NGA vision lead for online, on-demand services, talked about goals for the new user experience at the U.S. Geospatial Intelligence Foundation's May 12 Technology Day in Reston, Va.

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Christchurch, New Zealand, Earthquakes—A GEOINT Perspective

By Rupert Dash, Deputy Director, Geospatial Intelligence Liaison and Partnership, New Zealand Defence Force Geospatial Intelligence Organisation

Sept. 4, 2010 at 4:36 a.m.: A 7.1 magnitude earthquake centered 10 kilometers (6.2 miles) beneath Darfield shook Christchurch, New Zealand, approximately 40 kilometers (24.8 miles) away.

The earthquake sent shock waves of emotion around the country and introduced the little known and frightening phenomenon of liquefaction—a phenomenon in which earthquake shaking or other rapid loading reduces the strength and stiffness of a soil—into the everyday lexicon of New Zealanders.

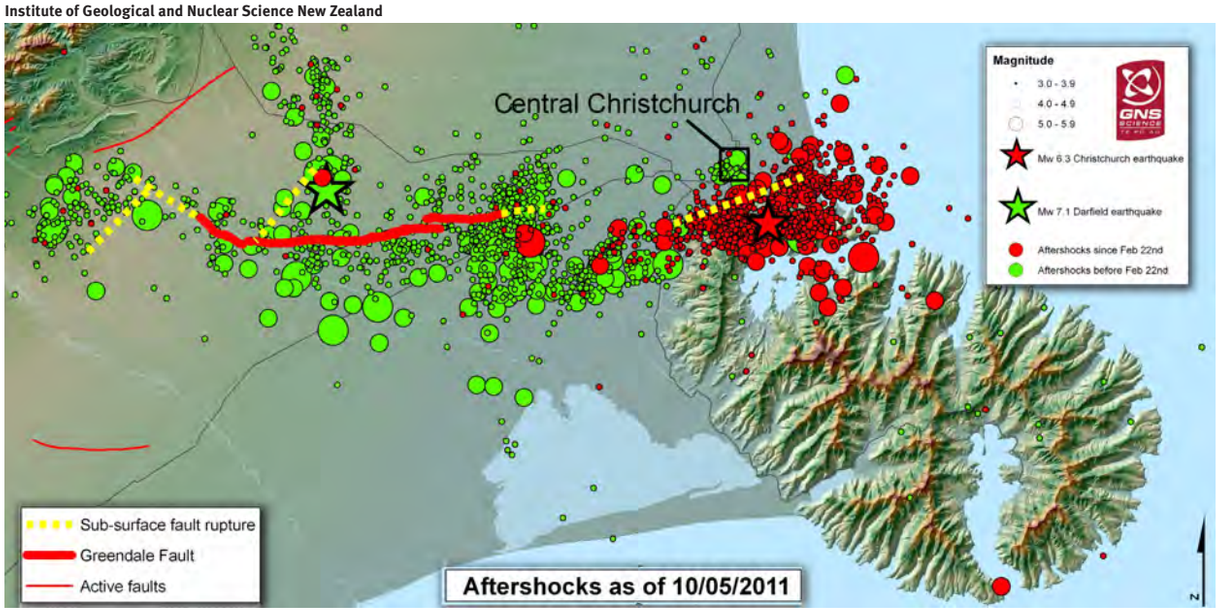
Miraculously no deaths occurred.

New Zealand gratefully received offers of assistance from all quarters, as New Zealand Defence Force's Geospatial Intelligence Organisation (GIO) stood to. Remote analysis offered no tangible benefit under the circumstances owing to the flood of information from onsite assessment activities and media coverage. However, there was a pressing need for a coordinated approach to baseline imagery provision in support of broader assessment and situational awareness. This was a void that GIO was well placed to fill with its organic skillsets and contacts across the national and international defence communities, government agencies, commercial partners and academia. In the case of the latter, access to a high bandwidth academic network played a crucial role.

Surveying the damage

Whilst New Zealand has a dynamic datum—a standard position or level that measurements are taken from—due to its underlying plate tectonics (a scientific theory that describes the large-scale motions of Earth's crust and upper mantle), with earthquake activity as an underlying norm, the fault line that led to the September earthquake was both unknown and unpredicted. Orthorectifying (removing distortions) postquake satellite imagery could only rely on arbitrary control at best, but this was sufficient for immediate response purposes.

Institute of Geological and Nuclear Science New Zealand



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The undermining effects of liquefaction on all aspects of infrastructure were clear to see, creating serious issues for central and regional administrations to address.

Aftershocks from the September earthquake were frequent. Statistical analysis of historical data supports the hypothesis that major aftershocks can occur to a magnitude of within 1.2 of the original quake, and a six-month time separation is not unusual.

Feb. 22, 2011 at 12:51 p.m.: A 6.3 magnitude aftershock shook Christchurch. The energy was one-twentieth that of the Sept. 4 quake but crucially only 6 kilometers (3.72 miles) from the central business district and during the middle of a working day. The net effect was devastating and captured global headlines for many days to come. The initial death count was 182, with damage estimated at $20-30 billion New Zealand dollars ($15-24 billion U.S.)

A similar GEOINT community collegiate response occurred as that of Sept. 4. However, unlike its predecessor, the Feb. 22 quake required a much more intense and integrated all-of-government approach. The scale of both the damage and the search and rescue operation as well as the administration of displaced persons took time to comprehend. The government declared a state of emergency and mobilized significant military resources. International offers of urban search and rescue (USAR) teams were gratefully accepted, as were offers of quick response products like National Geospatial-Intelligence Agency USAR atlases.

Fortuitously significant military forces were already on hand and appropriately prepared with geospatial intelligence and geospatial support due to a joint exercise they were conducting in the area. Had they not been in situ, the geospatial preparation in support of deploying forces would have been intense and on the critical path to achieve an effective and timely response.

Her Majesty's New Zealand Ship (HMNZS) Resolution was also surveying off Lyttleton and therefore able to confirm the safety of the main navigation channel using her new RESON multibeam system. Defence forces additionally collected GIO handheld imagery, Royal New Zealand Air Force (RNZAF) P-3 Orion surveillance aircraft imagery and full-motion video. Timely analysis by GIO and the RNZAF Integrated Mission Support Squadron provided situational awareness to agencies involved, presenting a clear view of the challenges to be addressed.

Commercial satellite providers collected imagery where cloud coverage permitted for GEOINT community-wide analysis. This provided the basis for broad area assessment until deliberate aerial collection at 10 centimeters (3.9 inches) ground sample distance could be planned, flown and processed. The end result was, as expected, excellent and in high demand for open release.

The difference in GEOINT response between Sept. 4 and Feb. 22 was marked and expected. The similarities were the need for coordinated provision of baseline information and the limited value to be gained from remote analysis, when onsite assessments are feasible. However, the thirst for information from within government and internationally was significant. Under such circumstances all foundation and analytical activities are vital. They not only provide support to operational and strategic level planners but also alleviate the pressure at the tactical level and allow ground-level activities to proceed with less interruption.

Planners are compiling lessons learned for future humanitarian aid and disaster relief operations, noting that every situation is different. Christchurch was not a remote, inaccessible location with limited government resources to respond. The availability of resources and effective cross–government coordination meant that the response to the crisis was well managed. Geospatial and GEOINT support were, as always, key enablers, and whilst collaboration was vital, there will always be room to improve coordination and information sharing for the next time—where the scale of destruction and loss of life could be significantly worse. Our thoughts are now also with the people of Japan whose struggle continues. P

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GEOINT: A System-of-Systems Approach

By Michael Hales, Technical Executive, International Group, Office of International Affairs and Policy

Imagine an architecture where 87 countries and 61 organizations pulled their Earth-observing resources and satellites together to share data and expertise to support decision making.

Imagine if these partners worked together to develop a common infrastructure, accessible through a Web-based portal that allowed them to collectively access, search and utilize the data using Web-based tools.

Imagine if they agreed to specific standards so they could increase data interoperability on both current and future missions.

Imagine if the stakeholders adopted open data policies.

Lastly, what if they worked together to build a global network of satellite-based dissemination systems designed to distribute satellite and airborne data to users in near-real time?

Does an undertaking like this seem possible? While this level of transparency would present challenges in the Intelligence Community, there is something very appealing about leveraging existing and planned space platforms on this scale. It would provide trusted users rapid access to the best Earth observation data the world has to offer.

Today, U.S. civil agencies like the National Oceanic and Atmospheric Administration, NASA and U.S. Geological Survey are working with international partners and organizations through a new intergovernmental body, the Group on Earth Observations (GEO). Together they are building the first Global Earth Observation System of Systems (GEOSS).

GEOSS is proactively linking together existing and planned Earth-observing systems to achieve specific societal benefits, such as reducing the loss of life and property from natural disasters, improving management of energy and water resources, and supporting sustainable agriculture, among other benefits.

To become a member of GEO, participating nations must demonstrate commitment at the ministerial or cabinet levels of their government. Non-space-faring countries who have yet to launch satellites contribute to GEOSS by providing in-situ data (observations made from the Earth's surface) and other Earth-observation knowledge or content.

David J. Hayes, Deputy Secretary of the Interior, said at the Nov. 5, 2010, GEO Beijing Ministerial Summit, "No one nation can bear the cost of building GEOSS alone; but even if we share the costs and risks, we will not succeed if we do not share our insights. For the Earth-observation community, this means sharing our data."

The construction of GEOSS is taking place over a 10-year period from 2005 to 2015, allowing nations to make informed decisions about their own requirements and contributions. GEOSS even supports the coordination of new Earth-observing systems among members where collection gaps currently exist or are expected.

So what does GEOSS have to do with GEOINT? Why is it important to NGA?

GEOSS is not the result of an academic exercise; it was born of and shaped by a self-evident need for data among nations whose Earth-observation budgets continued to shrink even as the challenges they faced continued to grow. GEOSS exists because nations realized they were better off sharing information along with the burden of collecting it, rather than simply keeping their data to themselves. GEOSS works because stakeholders share its governance and no single country owns the process. These lessons should not be lost on NGA.

In fact, the GEOSS model may shed light on future geospatial cooperation efforts as other nations continue to expand their GEOINT capabilities in ways that address mutual geospatial needs. For example, Canada is developing C-band radar systems optimized for northern hemisphere ocean surveillance. Germany is developing a

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The Global Earth Observation System of Systems is proactively linking together existing and planned Earth-observing systems to achieve specific societal benefits, such as reducing the loss of life and property from natural disasters, improving management of energy and water resources, and supporting sustainable agriculture, among other benefits.

Group on Earth Observations image

truly global digital elevation model from a single sensor at High Resolution Terrain Information 3, something that has never been done before. Soon to be space-faring nations like Spain and Turkey will operate their own satellites in the years to come. These capabilities and more are on the way. In a new data-rich world, perhaps NGA needs to rethink the way it has thought about its own data and systems. Perhaps this is one of the reasons the new National Space Policy encourages agencies to "…augment U.S. capabilities by leveraging existing and planned space capabilities of allies and space partners."

GEOSS partners know that gaining access to other nations' data is no easy task. Still, many GEOSS stakeholders feel that agreeing to share data is really only the tip of the iceberg, and that implementing collective decisions about standards, formats and building infrastructure that supports interoperability is more comparable to the part of the iceberg that remains hidden underwater. To make matters more challenging, one can't tell the shape of the bottom part of the iceberg by simply looking at the top part. In other words, some data may be easier to integrate and disseminate than others. Depending on the format, standards, data policies and existing architecture, a seemingly simple data set can be surprisingly more difficult to work with than a more complex data set. It all depends. That is why GEOSS stakeholders were smart to maintain strong leadership, require senior participation, share the governance burden among nations, and agree to a 10-year vision implemented through two-to-three-year work plans. Indeed, these lessons should also not be lost on NGA. P

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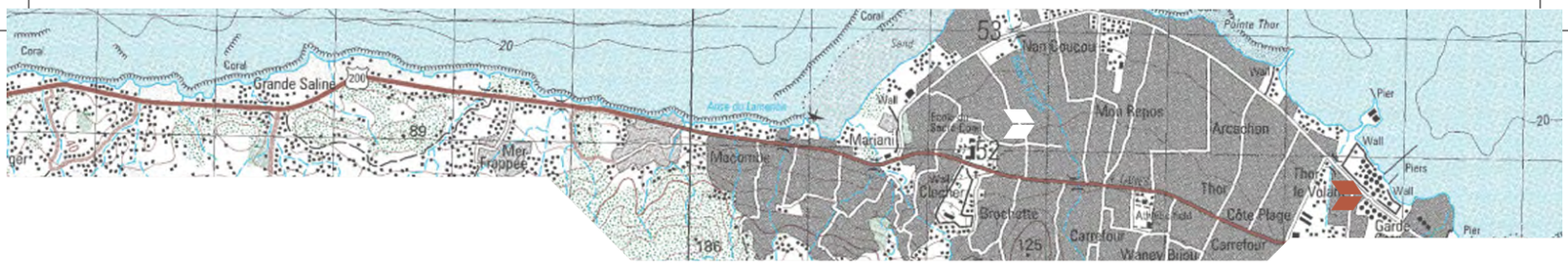

Creating Partnerships Around the World

By Joel Itskowitz, Communication Officer, Source Operations and Management Directorate

The U.S. government participates in many international relationships around the world, such as NATO, the International Civil Aviation Organization (ICAO) and the International Hydrographic Organization (IHO).

But did you know that the National Geospatial-Intelligence Agency (NGA) has many bilateral and multilateral agreements that help us leverage partnerships to produce and share data?

These agreements are critical to foundation geospatial intelligence (GEOINT) production as more and more partners create standardized geospatial data that can be shared across the community and used to create maps and charts for topographic, aeronautical and maritime domains. NGA works closely with its commonwealth partners (Canada, United Kingdom, Australia and New Zealand) in the Allied System for Geospatial Intelligence (ASG) as well as in the Multi-National Geospatial Co-production Program (MGCP), which includes 28 member countries, including the members of the ASG.

The MGCP is an important part of NGA's geospatial production plan as each member nation is responsible for specific areas of the world and the geospatial data produced over that region. Each nation that contributes to the MGCP data warehouse is eligible to use other countries' MGCP data per the rules of the agreement. For NGA, this provides substantial cost avoidance and time savings because NGA can use MGCP data to quickly and efficiently produce products in high current interest areas from readily available, high-quality standard data.

"The catalyst for Canada to participate in the MGCP program was the need for better data to support tactical operations with high density (1:50,000 or 1:100,000 scale equivalent) digital mapping with global coverage," said Canadian Army Lt. Col. Michael L. Cairns, Commanding Officer, Mapping and Charting Establishment. "In particular, the MGCP program has greatly assisted Canadian Forces' operational effectiveness in Afghanistan and in response to the Haiti earthquake and has improved interoperability and cooperation with our allies."

At a Multinational Geospatial Co-production Program (MGCP) meeting held in Italy, participants from Czech Republic, Slovakia, Greece, Netherlands, Hungary, Spain, Latvia, Sweden and Poland exchange information and ideas on the output of their data to create MGCP derived graphics. The goal of the exchange is to standardize the final product.

NGA Photo by Marzio Dellagnello

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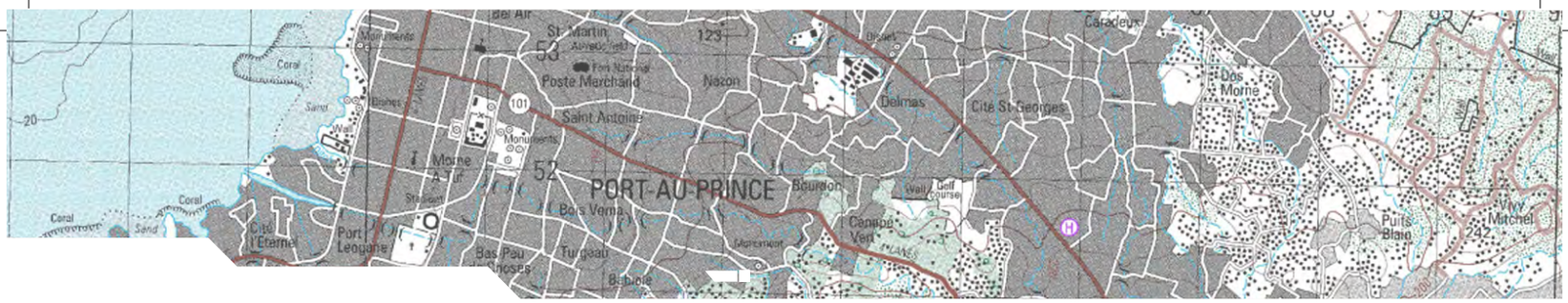

"In today's economic climate it is impossible for a single nation to take care of all the GEOINT needs on their own," said Lt. Col. Sabato Rainone, Chief, Geospatial and Meteorological and Oceanographic Section, Information and Security Division, Italian Defence General Staff. "MGCP makes it possible for participants to share the burden of production."

"The standardized MGCP data allows for a faster turnaround time to generate products which proved invaluable in recent military operations," added Rainone.

NGA is currently expanding the MGCP concept to other areas of the world, with MGCP-like agreements with some African and Latin American countries. NGA also provides tools and training to assist partner countries with producing standardized data that meet our quality requirements. Training programs are already under way in many African and Latin American countries on how to produce data to NGA specifications so they too can contribute maps and data to help fill our shared needs.

NGA has also provided significant training to the Afghan Geodesy and Cartography Head Office (AGCHO). AGCHO is Afghanistan's civil national mapping organization, responsible for national map production in Afghanistan. NGA training and mentorship helped AGCHO modernize and contribute valuable map production in Afghanistan.

Another interesting partnership NGA has for producing geospatial data is with the country of Mongolia. Much like AGCHO and the African and Latin American countries, NGA has been providing tools and training to the Mongolian Ministry of Roads, Construction, Transportation and Urban Development. In addition to producing geospatial data for map features, NGA has also worked closely with the Mongolians to share geodetic information such as gravity data over their country. This helps NGA produce more complete and accurate gravity models essential to navigation.

Although there is a Maritime ASG relationship, bilateral arrangements typically control the exchange of marine data. This is driven by a combination of intellectual property rights of the foreign hydrographic offices and the United Nations Convention on Law of the Sea prohibition on systematic collection of data within a foreign nation's coastal waters without permission from the host nation, which is seldom granted.

Until 1997 there was free exchange of data between national hydrographic offices; this ended due to issues concerning international copyright. In the interest of the safety of navigation, however, many nations continue to voluntarily exchange nautical chart data with NGA. Additionally, NGA's Maritime Office has entered into bilateral chart agreements wherein the foreign nation provides a print file to NGA which NGA uses to print charts and compile Digital Nautical Charts for U.S. government customers only. The foreign chart, which must be in English and include World Geodetic System (WGS) 84 and meter depths, is the public sale chart. NGA no longer compiles a hard copy chart for public sale.

Other maritime bilateral agreements provide for recognition of intellectual property rights through arrangements such as quid pro quo (something for something) exchange. NGA Maritime plans to transition to the new IHO S-100 data format in the post 2012 timeframe so that exchanged digital data will be in a common format and coalition partners will have the same displays both ashore and at sea. This will allow for more efficient sharing of data and increase the benefits of our partnerships.

The world is a 24/7 online, on-demand, global environment. The international partnerships that NGA participates in help meet the needs of warfighters and first responders in an efficient, cost-effective manner. Adherence to internationally agreed-upon standards and specifications enables NGA and its international partners to work in an interoperable, burden-sharing environment where all share can in the synergy of increased production. P

Map at top: Canada's Mapping and Charting Establishment produced Haiti maps from Multinational Geospatial Co-production Program data in response to the Haiti Crisis.

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Afghan Mapping Modernization Program Reaches Milestone

By Eric Sandegren, International Officer for Afghanistan, Office of International Affairs and Policy

On March 13, 2011, the Afghan Geodesy and Cartography Head Office (AGCHO) and National Geospatial-Intelligence Agency (NGA) celebrated a significant milestone in modernizing Afghanistan's geospatial capability—they inaugurated the new Geospatial Production Facility (GPF) at the AGCHO headquarters building in Kabul.

AGCHO, NGA and the Combined Security Transition Command-Afghanistan (CSTC-A) collaborated on the construction and outfitting of the facility. In April 2011, AGCHO's Afghan cartographers began producing maps and geospatial data, achieving a longstanding goal of the NGA-AGCHO relationship.

Since 2006, NGA and AGCHO have pursued a vision of Afghan production of geospatial data and maps in a modern, digital process. The shared intent is for AGCHO to deliver geospatial information to support Afghan National Security Forces (ANSF) and the ministries of the Government of the Islamic Republic of Afghanistan in providing security, stability, governance and essential services to the country.

NGA and AGCHO began planning the milestones necessary to achieve Afghan digital geospatial capability in 2006. In June 2007, NGA and AGCHO established a formal relationship through a Basic Exchange and Cooperation Agreement. The agreement promotes sharing of products between NGA and AGCHO and allows NGA to provide training and on-site mentoring to cultivate AGCHO's emerging capability.

In August 2008, NGA, AGCHO and CSTC-A opened a new Geospatial Training Center (GTC) on the AGCHO headquarters property. Since then, NGA has deployed multiple mentors to AGCHO; these mentors provide basic courses in the training center on cartographic topics, geographic information systems, geodesy and geographic names management. In addition, the NGA College has deployed multiple mobile training teams for short durations to present focused topics to the Afghans.

One key element of the mentoring program was extensive training in digital cartographic production of Image City Maps and Afghan Image Maps. After NGA training, a cadre of AGCHO personnel produced sets of these map products in Dari and English, representing an important outcome of the joint effort. AGCHO's ministry customers, particularly at the working level, use these local-language maps.

The founding of the GPF is a major milestone in the program to modernize AGCHO's geospatial capability. Renovations completed in March 2011 included upgrading the GPF room's electrical infrastructure to support the new workstations, server and plotter comprising the NGA-provided production system. Installation was a joint effort between NGA and AGCHO information technology specialists—from running cables and configuring workstations to installing software and testing the system.

NGA Director Letitia A. Long congratulated AGCHO on the occasion of the ribbon cutting in a letter stating, "NGA remains committed to our partnership and looks forward to working with AGCHO as you assume lead responsibilities for digital geospatial production in your new facility."

AGCHO is leading the GPF effort through a dedicated program manager and NGA-trained geospatial production personnel.

With the founding of the GPF, AGCHO is transforming the mission of the GTC. Previously, in the GTC a core group of AGCHO cartographers trained for more than two years on cartographic production. Now AGCHO has changed the GTC to be an á la carte training center serving a wider base of personnel from AGCHO, ANSF and other ministries.

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The GTC will operate similarly to the NGA College in providing short-term geospatial courses to a diverse spectrum of Afghans.

With the stand-up of the GPF and the transformation of the GTC, AGCHO is taking the initiative to lead production and training in accordance with Afghan objectives. AGCHO's ownership of GPF operations and the GTC training program will ensure the efforts are sustainable. NGA's way forward is to support AGCHO's leadership in the GPF and work to build an Afghan-owned training program, which can sustain geospatial development. The inauguration of the GPF and transformation of the GTC marks significant progress toward achieving AGCHO and NGA's goals.

Canadian Geomatics Specialists Join Kabul Mentoring Team

By Pierre Simard, Embedded Canadian Geospatial Mentor

From April 2010 to April 2011, Canadian Mapping and Charting Establishment civilian geomatics specialists deployed to Afghanistan alongside their National Geospatial-Intelligence Agency (NGA) counterparts.

The deployments—a first for the Charting Establishment—were in response to NGA's request for assistance with its GEOINT Capacity Development Program in Afghanistan. The Canadian Chief of Defense Intelligence, Maj. Gen. J.M.C. Rousseau, agreed to a one-year commitment of three consecutive, four-month deployments of Canadian mentors to NGA's geospatial support team in Kabul.

Mentors from throughout the Charting Establishment in Ottawa, Canada, competed for the assignments.

The NGA support team—part of the Combined Security Transition Command-Afghanistan—trains, mentors, advises and equips the Afghan National Security Forces, as well as the Afghan Geodesy and Cartography Head Office (AGCHO). With the help of NGA, AGCHO's new Geospatial Production Facility, opened in March, will introduce digital map production capabilities more widely within AGCHO.

Canada's contribution to the team mission this past year included a quality assurance specialist in the Geospatial Training Center, a lead AGCHO mentor and spatial data infrastructure advisor, and a lead AGCHO Mentor and Topographic Line Map production advisor.

"I am extremely appreciative of Canada's dedication to the AGCHO mission," said NGA Director Letitia A. Long during a recent meeting with AGCHO deployers in Bethesda, Md. "It was a critical nation-building effort that will provide Afghanistan with the mapping capabilities needed to support security and economic rebuilding efforts. The technical expertise provided by the Canadian deployers was crucial to the success of this mission."

The NGA-led Capacity Development Program contributes to helping AGCHO realize its vision of becoming the Afghan leader in the modern age of geospatial information.

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NGA supports the International Security Assistance Force Theater Map Depot (TMD) in Kandahar, Afghanistan. Pictured from left to right with NGA and U.K. products are Romanian Military Maestro 4 Olivia Simion, TMD Assistant; U.K. Sgt. Baz Barrett, TMD Chief; and Canadian Cpl. Dawn Stefanyk, TMD second-in-command.
Photo by Jessica C.M. Salter

NGA's Geospatial Partnerships

By Robert Seebald, Deputy Chief, International Group, Office of International Affairs and Policy

After the ink on the agreement is dry and the handshakes are exchanged, the real work of NGA's international geospatial partnerships begins. The partnerships are the policy foundation enabling geospatial burden sharing, co-production, capacity building and most importantly, coalition operations.

From NGA's most adept geospatial partners to nations only beginning the transition to geospatial intelligence, agreements allow a wide range of cooperation and support.

How do NGA and the Office of International Affairs and Policy (OIP) take international agreements and make them beneficial to NGA and the partners? What is the process for making Basic Exchange and Cooperation Agreements (BECAs) operational? And what are the challenges that lie ahead as NGA moves from a hardcopy based inventory to a knowledge-based cloud of digital data?

While OIP's International Group (OIPI) vets requests from NGA partners for products, many organizations have a hand in filling them. The international group ensures the geospatial request falls within the general scope of the agreement. If yes, they check product information databases for factors that determine releasability. Did another NGA partner—a third party—produce the product? What is its classification? If these conditions are favorably met, the OIPI officer will generate a military standard requisitioning and issues procedure—or MILSTRIP—complete with specific stock numbers, quantities and delivery instructions. He or she passes the MILSTRIP to NGA's mission partner for geospatial distribution—the Defense Logistics Agency (DLA)—who fills the order.

NGA also works with DLA to determine what quantities of partner-produced maps and charts to keep in stock. A partner nation will issue a "notice of intent to print" or "NIP." This is NGA's opportunity to influence the print quantities for a particular map or chart. NGA also works with DLA's Defense Logistics Information Service in Battle Creek, Mich., to request and assign national stock numbers to the foreign-produced sheets. Without NSNs, these products would essentially be lost to the distribution system, without a means to inventory or ship them efficiently.

Another critical NGA mission is support to the International Security Assistance Force Theater Map Depot (TMD) in Kandahar, Afghanistan. The TMD is NATO's central map depot, used to resupply NATO forces within theater and serve as a transshipment point to further move maps to the forward map depots. Along with thousands of standard geospatial products, the TMD also stocks tactical products such as the large-scale compound maps warfighters use to conduct operations. OIPI ensures they have the latest editions of maps and charts and communicate their support requirements.

Now, as NGA moves to deepen analytic expertise and build new technology to ease access to this new data, how do international partners contribute? Again, BECAs give the foundation policy framework to continue to exchange geospatial and geographic knowledge and deepen understanding of the Earth. OIPI also exchanges new software and applications for viewing and exploiting the data through the agreements and engages with partners to evaluate best practices as all parties work to modernize.

It starts with a paper agreement, but an international agreement endures long past the ceremony. International geospatial partnerships enable closer coordination, better use of resources and more effective operations. They are the realization of the signatures and commitments of NGA's leaders. P

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Nobody Gets Left Behind

By Dennis Mesina, Corporate Communicator, Analysis and Production Directorate

Intelligence consumers in the United States and allies abroad have come to expect significant contributions from geospatial intelligence (GEOINT) in formulating actionable intelligence analysis for combat support. The NGA Support Team (NST) to the Defense Intelligence Agency (DIA) is no exception, providing timely and accurate GEOINT to mission partners in the battlefield, the Pentagon and the White House.

Former GEOINT analyst Ed Bauer, now retired, as well as current analysts George "Sandy" Sanford and Jim Angelakos, use their tradecraft to give new meaning to combat support. They use GEOINT in support of the mission to recover U.S. service members deemed prisoners of war (POW) or missing in action (MIA).

From World War II to current combat operations in Iraq and Afghanistan, the U.S. government has pursued the solemn mission of ensuring that all those who serve come home. The DIA NST has used imagery, geospatial data and analysis in efforts to identify numerous U.S. combat aircraft crash sites, grave sites and overrun fighting positions from the Vietnam War. GEOINT has located numerous grave sites, destroyed or abandoned U.S. equipment and fighting positions near and around the Unsan and Chosin Reservoir battle sites—where about 1,500 service members remain missing from the Korean War. Their work has also helped find several previously uncharted cave entrances into Hill 362 on Iwo Jima, where World War II MIAs may have been left. The leads on Iwo Jima appeared in imagery the team analyzed in recent months.

Said Bauer about his former team's mission, "We are a two-person operation and the only office in NGA that supports America's post-conflict accounting mission using historical imagery. So far we have met our responsibility to leave no stone unturned in our efforts to find those who made the ultimate sacrifice. I hope that with my retirement this past January, I will have left, to my more than able successors, a lasting impression of how significant this mission is for thousands of American families."

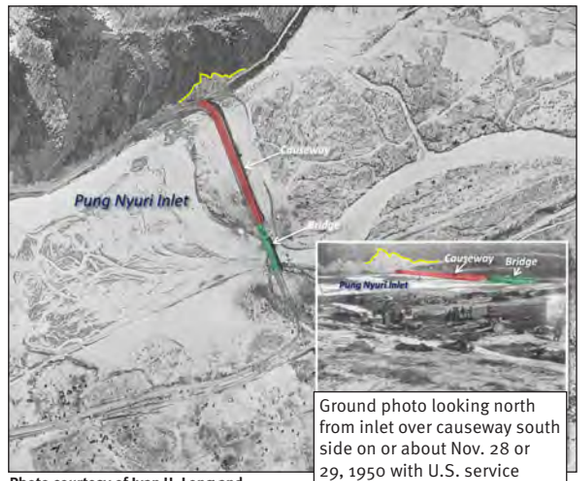

Photo courtesy of Ivan H. Long and the Army War College

Ground photo looking north from inlet over causeway south side on or about Nov. 28 or 29, 1950 with U.S. service members in the foreground

The primary mission partners for the POW/MIA mission are the Defense Prisoner of War (DPMO)/ Missing Personnel Office and the Joint POW/MIA Accounting Command, both Department of Defense elements. In conjunction with them, the team aids in the recovery of remains from around the world. Team members carefully analyze hardcopy and digitized historical air-breather film to conduct this mission. While the primary focus is to locate the area of interest, mission partners also need to know if the surrounding terrain has changed or remained the same over time. To show this comparison, the team uses commercial satellite imagery extensively.

Few can contest that the unswerving dedication of GEOINT analysts keeps the troops safe during combat in Iraq and Afghanistan, but the team's POW/MIA mission serves as a reminder that the U.S. mission continues long after combat ends. GEOINT is committed to the DPMO vision to achieve "the fullest possible accounting of those who become missing due to hostile action while pursuing U.S. national objectives abroad."

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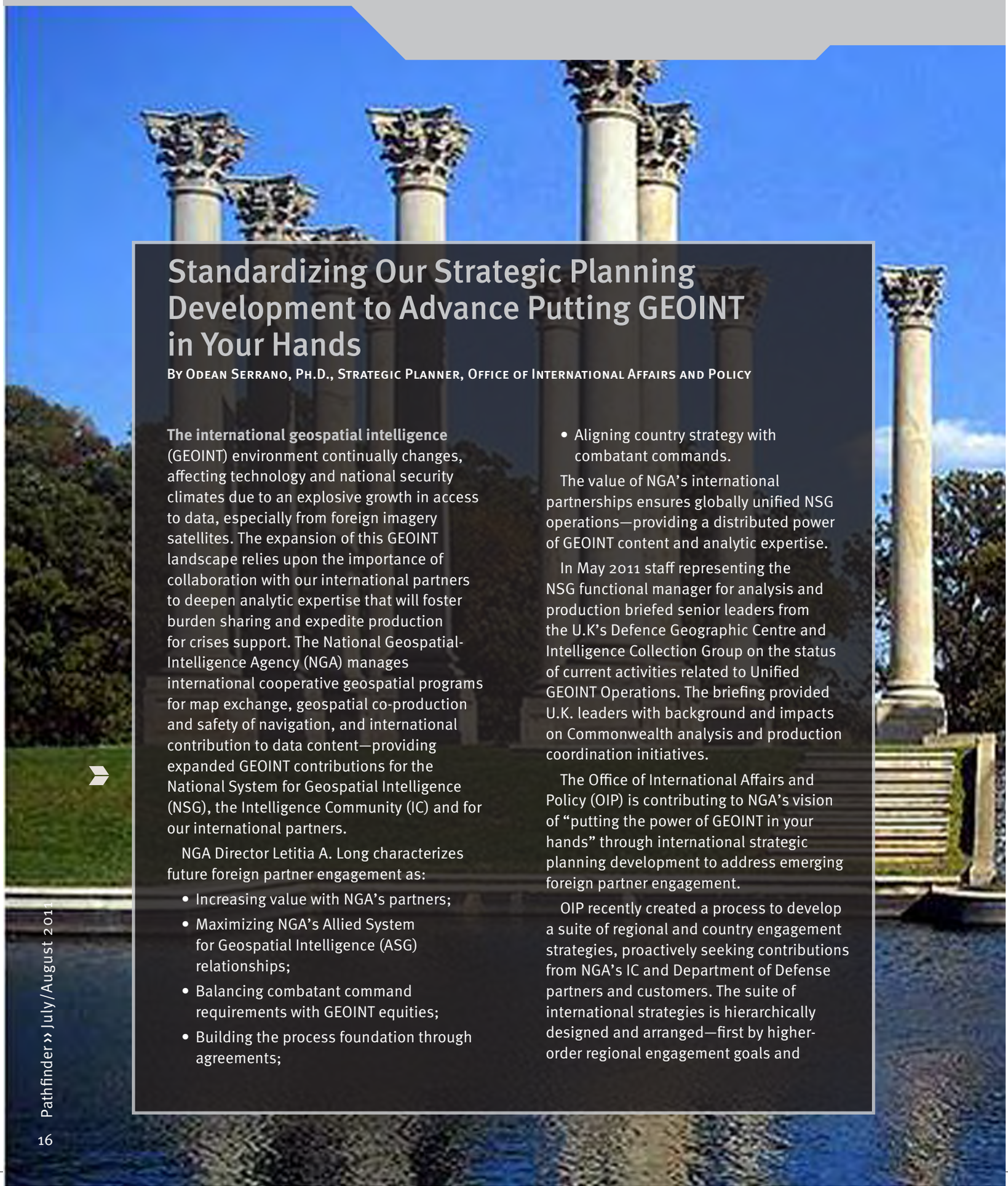

Standardizing Our Strategic Planning Development to Advance Putting GEOINT in Your Hands

By Odean Serrano, Ph.D., Strategic Planner, Office of International Affairs and Policy

The international geospatial intelligence (GEOINT) environment continually changes, affecting technology and national security climates due to an explosive growth in access to data, especially from foreign imagery satellites. The expansion of this GEOINT landscape relies upon the importance of collaboration with our international partners to deepen analytic expertise that will foster burden sharing and expedite production for crises support. The National Geospatial-Intelligence Agency (NGA) manages international cooperative geospatial programs for map exchange, geospatial co-production and safety of navigation, and international contribution to data content—providing expanded GEOINT contributions for the National System for Geospatial Intelligence (NSG), the Intelligence Community (IC) and for our international partners.

NGA Director Letitia A. Long characterizes future foreign partner engagement as:

- Increasing value with NGA's partners;
- Maximizing NGA's Allied System for Geospatial Intelligence (ASG) relationships;
- Balancing combatant command requirements with GEOINT equities;
- Building the process foundation through agreements;
- Aligning country strategy with combatant commands.

The value of NGA's international partnerships ensures globally unified NSG operations—providing a distributed power of GEOINT content and analytic expertise.

In May 2011 staff representing the NSG functional manager for analysis and production briefed senior leaders from the U.K's Defence Geographic Centre and Intelligence Collection Group on the status of current activities related to Unified GEOINT Operations. The briefing provided U.K. leaders with background and impacts on Commonwealth analysis and production coordination initiatives.

The Office of International Affairs and Policy (OIP) is contributing to NGA's vision of "putting the power of GEOINT in your hands" through international strategic planning development to address emerging foreign partner engagement.

OIP recently created a process to develop a suite of regional and country engagement strategies, proactively seeking contributions from NGA's IC and Department of Defense partners and customers. The suite of international strategies is hierarchically designed and arranged—first by higher-order regional engagement goals and

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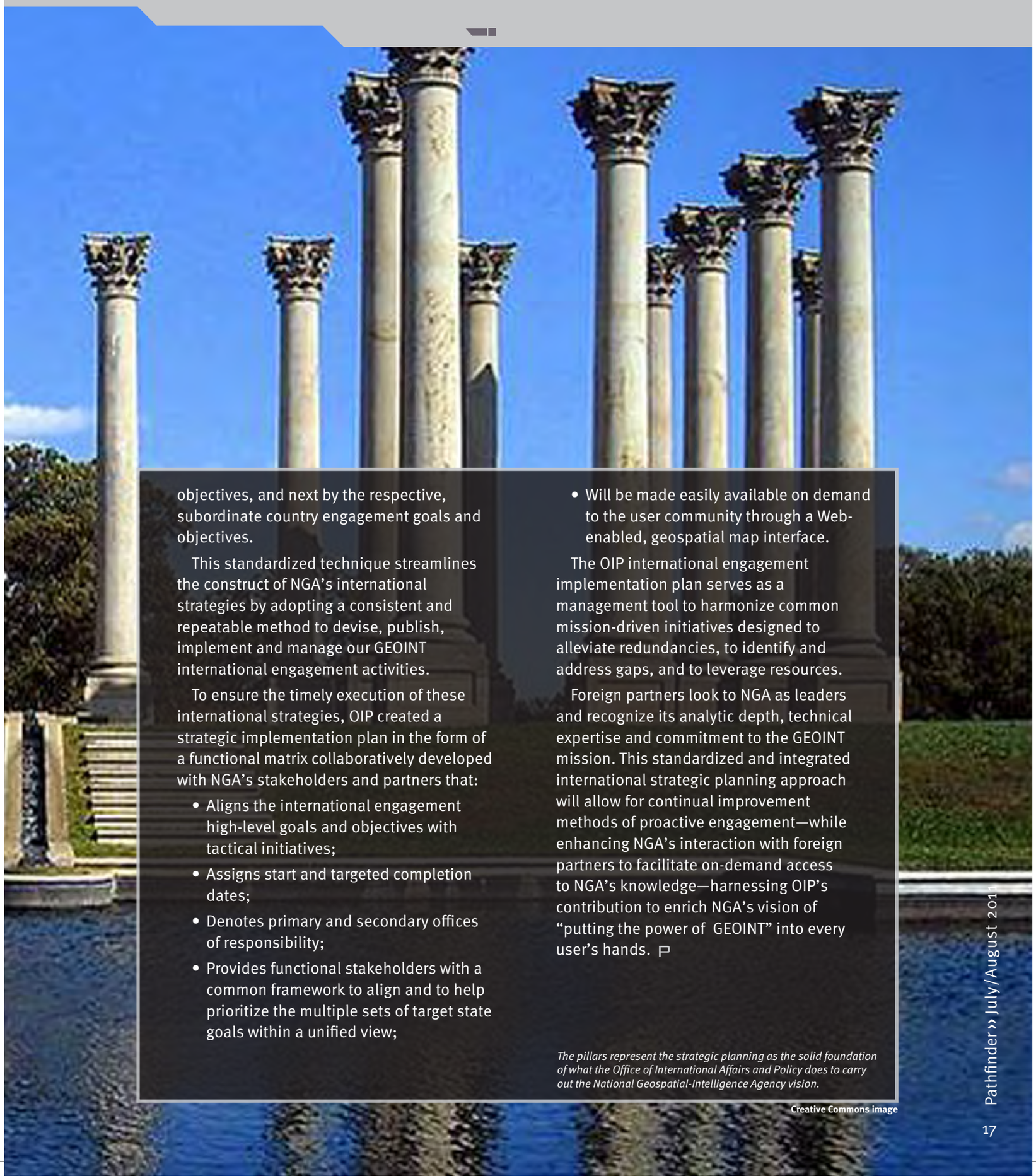

objectives, and next by the respective, subordinate country engagement goals and objectives.

This standardized technique streamlines the construct of NGA's international strategies by adopting a consistent and repeatable method to devise, publish, implement and manage our GEOINT international engagement activities.

To ensure the timely execution of these international strategies, OIP created a strategic implementation plan in the form of a functional matrix collaboratively developed with NGA's stakeholders and partners that:

- Aligns the international engagement high-level goals and objectives with tactical initiatives;
- Assigns start and targeted completion dates;
- Denotes primary and secondary offices of responsibility;
- Provides functional stakeholders with a common framework to align and to help prioritize the multiple sets of target state goals within a unified view;
- Will be made easily available on demand to the user community through a Web-enabled, geospatial map interface.

The OIP international engagement implementation plan serves as a management tool to harmonize common mission-driven initiatives designed to alleviate redundancies, to identify and address gaps, and to leverage resources.

Foreign partners look to NGA as leaders and recognize its analytic depth, technical expertise and commitment to the GEOINT mission. This standardized and integrated international strategic planning approach will allow for continual improvement methods of proactive engagement—while enhancing NGA's interaction with foreign partners to facilitate on-demand access to NGA's knowledge—harnessing OIP's contribution to enrich NGA's vision of "putting the power of GEOINT" into every user's hands. P

The pillars represent the strategic planning as the solid foundation of what the Office of International Affairs and Policy does to carry out the National Geospatial-Intelligence Agency vision.

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Penn State's Geospatial Revolution Features NGA Experts

By Bianca Barr, Public Information Officer, and Christine O'Brien, Spring 2011 Public Relations Intern, Pennsylvania State University Outreach

Penn State Public Broadcasting interviewed members of the National Geospatial-Intelligence Agency (NGA) for the third episode of the Geospatial Revolution Project, an integrated public media and outreach initiative about the impact of digital mapping. The four-part, Web-based series explores how geospatial technology is changing the ways we think, behave and interact—both as individuals and as institutions.

Geospatial experts and professionals from all aspects of the industry provided insights for the series. Filmmakers included interviews with various members of NGA in the third episode and featured NGA Director Letitia A. Long.

Kristian Berg, writer and director of episodes three and four, said he became aware of the full spectrum of what NGA does after talking to Long.

"The consultants and contractors from the NGA not only had vast experience and knowledge about this cutting-edge technology, but also an understanding of how that technology has evolved," Berg said. "I couldn't imagine doing a series about geospatial technology without them."

The NGA informed the producers on how the agency is involved with national and domestic security, human rights and diplomacy. In the video, NGA representatives focused specifically on the Dayton Peace Accords, route planning, human geography and the identification of improvised explosive devices.

"The NGA is the premier agency in the federal government that supports the warfighter when it comes to gathering and disseminating geospatial intelligence," Stephanie Ayanian, producer and co-director of the Geospatial Revolution Project's short films, said. "Perhaps the work of the NGA and other geospatial intelligence agencies will be easier for the public to understand with these videos."

Producers at Penn State Public Broadcasting said involving the NGA was a natural fit for the project because of the NGA's leading research and application in the field.

Long appeared several times in the third episode, which focused on modern precision warfare, law enforcement and privacy issues.

"If you're going to use precision-guided ammunition, you need very precise coordinates," Long said in the video. "We use geospatial information for route planning. Special forces need to know the best way to get into a compound and get out."

The video shows how geospatial information is a vital resource for the military, both in combat and in understanding human and cultural geography. The video highlights how digital mapping helps soldiers on the ground in Afghanistan understand the differences in education, economic systems and cultural aspects of different tribal regions in order to better serve those communities.

"You have to understand the hearts and minds," Long said. "Often what is important to the people relates to the Earth and the Earth's features and geography."

The ultimate goal of the project is to help make the public more aware of how these technologies are being used not only in cell phones and automobile GPS receivers, but also in science, business, government and international crisis management, affecting every aspect of society.

In addition to increasing public awareness about these technologies, the series aims to inform students by making available free outreach resources, including videos and accompanying learning materials for K-12 teachers that will help students understand how geospatial technology is changing the way people navigate, do business, communicate and get information.

Note: Penn State Public Broadcasting, licensed to Penn State, produces non-commercial television, radio and online media. To watch the Geospatial Revolution and access learning materials for teachers, please go to http://geospatialrevolution.psu.edu/.

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Geospatial information is more than just a handheld GPS receiver used to navigate personal travel.
Penn State Public Broadcasting image

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NGA Shares Home with Protected Flora and Fauna

By Barbara Horton, Environmental Protection Specialist, Security and Installation Operations Directorate

Several protected species call the land around the National Geospatial-Intelligence Agency (NGA) Campus East (NCE) at Fort Belvoir's North Area (FBNA) in Springfield, Va., home. There are one plant and one reptile considered threatened (i.e., likely to become endangered in the foreseeable future) and/or endangered (i.e., in danger of becoming extinct), in accordance with the Endangered Species Act of 1973.

A second reptile is considered a species of concern in Virginia, a lesser status for which there is insufficient information to list it under the act.

Contract and government employees at NCE worked to protect these species and their habitats before, during and after construction.

"Protection of threatened and endangered species is a priority in all of our construction projects," said Mike Rogers, U.S. Army Corps of Engineers Program Manager for the NCE project. "During the National Environmental Policy Act process we consulted the U.S. Fish and Wildlife Service (USFWS) regarding protected species in the vicinity of the NCE site. Once in construction, we coordinated land-disturbing activities with Fort Belvoir to ensure we minimized disturbance to important wildlife habitat in the area. In addition, every construction worker (over 2,000 of them) received an indoctrination that included how to identify the species of concern and what to do if he or she encountered one."

The first protected species on the site was the small whorled pogonia (Isotria medeoloides), which is a very small orchid that is federally listed as threatened and state listed as endangered. The plant is light green, reaches about 8 inches in height with a hollow stem and a whorl of five to six leaves. The solitary bloom is greenish-yellow and forms at the center of the whorl. It grows in older hardwood stands of beech, birch, maple, oak and hickory that have an open understory, and the plant prefers gentle to moderate slopes near small streams and decaying vegetation. This ideal habitat is found on FBNA.

Individual plants or colonies (typically 20 plants or less) have been found in 17 eastern states and Ontario, Canada. In Virginia, specifically, it has been recorded in 20 counties. One more county—Fairfax, home to Fort Belvoir—was added to the list as a result of the work on FBNA.

According to Doug Chapin with Wetland Studies and Solutions, Inc., his company found the small whorled pogonia plant within the construction disturbance limits for the final segment of the Fairfax County Parkway. Chapin's company coordinated with the USFWS, prior to construction of NGA's Remote Inspection Facility, to preserve the small whorled pogonia habitat. The USFWS established a zone around the plant in which no work could occur and maintains the protected area today.

High-quality habitat of the state-threatened wood turtle (Glyptemys insculpta) is also prevalent on FBNA. According to a 2008 report of the Endangered Species Coalition, "the wood turtle is one of the most in-need species for protection under the Endangered Species Act." It is a semi-aquatic turtle, living near flowing water, such as creeks and streams. It can reach up to 9 inches in length and has orange legs and tail. The bottom half of the shell, called the plastron, is not hinged, like a box turtle, and the top of the shell, called the carapace, is flattened but with a sculpted appearance.

The wood turtle is an omnivore, eating both plants and animals such as slugs and earthworms, and can live up to 45 years. Prior

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to any clearing and grading within 300 feet of Accotink Creek and its tributaries, Fort Belvoir staff conducted weekly turtle walks to locate any wood turtles. Although none was ever found, staff continue to protect the habitat.

The last species might come as a surprise: it's the Eastern Box Turtle. According to John Kleopfer, Wildlife Diversity Biologist/Herpetologist for the Virginia Department of Game and Inland Fisheries, "the Eastern Box Turtle (Terrapene carolina carolina) is a Tier III 'Species of Greatest Conservation Need' in Virginia's Wildlife Action Plan, but has no official status or formal recognition in Virginia." The habitat of the box turtle is rapidly declining. Unlike the wood turtle, the box turtle prefers dry ground such as the underbrush of hardwood/pine forests. They have a domed carapace and hinged plastron, which allows them to completely enclose themselves. They reach a length of 5 inches, with yellow or orange mixed with dark brown or olive-colored shells.

The box turtle is also an omnivore. Staff training for contractors on the NCE project included instructions on moving box turtles to an area beyond the limits of disturbance. Workers typically found them at dawn—from the spring to fall seasons—sunning themselves on the newly paved construction roads.

Construction operations at NCE ensured protection of these species, and NGA will continue to protect them in the future. Employees looking out from the windows of the NCE can appreciate that within the hardwood and pine forests and Accotink Creek are the homes of the rare small whorled pogonia, the rarer wood turtle and even the Eastern Box Turtle.

Staff training for contractors on the NGA Campus East project included instructions on moving box turtles to an area beyond the limits of disturbance. Workers typically found them at dawn—from the spring to fall seasons—sunning themselves on the paved roads.
Photo by Mike Fountain

Contractors found the solitary small whorled pogonia on the southwestern portion of Fort Belvoir's North Area. The federally threatened orchid is less than 2.5 inches tall.
Wetland Studies and Solutions, Inc., photo

Picturesque Accotink Creek, home to several protected species, runs through Fort Belvoir's North Area.
Photo by Paul Bachmann

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Remembering Vietnam 3: Dealing with Anti-Aircraft Batteries

The Ho Chi Minh Trail 1972

Dr. Gary E. Weir, Office of Corporate Communications

On the 50th anniversary of the first direct American military involvement in Vietnam, the Department of Defense has called upon U.S. citizens to remember with respect and gratitude those who served in Southeast Asia. This series of six articles—of which this is the third—will illuminate the significant role played in Southeast Asia by people in the tradecraft communities that now comprise the National Geospatial-Intelligence Agency (NGA).

In 1972 the North Vietnamese placed a bounty on AC-130 gunships. Previously reluctant to target these formidable aircraft for fear their muzzle flashes from the ground would bring swift retribution, the North Vietnamese anti-aircraft gunners began to take a chance at engaging AC-130s at night because of the potential rewards. The offer of cigarettes, food and various privileges now led to increased aggressiveness toward any aircraft, but the AC-130s brought the greatest attention. In his excellent history of the Air Force's efforts against the Ho Chi Minh Trail, historian Bernard Nalty noted that their first success against an AC-130 took place on March 30, 1972. This would not do.

Despite the fact that missiles had already begun to overshadow anti-aircraft guns as the primary threat, the enemy employed weapons both primitive and formidable. With their Chinese and Soviet allies providing war materials, the North Vietnamese more than doubled their inventory of heavy guns from roughly 700 to 1,500 in the early 1970s. Until 1971, the 37 millimeter weapon predominated, but by 1972 the 57 millimeter gun dominated the scene with both often mounted on trucks to address incoming American aircraft. During the Commando Hunt air campaign against the Ho Chi Minh Trail and other logistics supply avenues from November 1971 to March 1972, the power of these guns increased to 85 and 100 millimeter calibers.

Aware of the changes in North Vietnamese armament, the Air Force began guarding the AC-130s more closely, realizing their slow speed and size made them increasingly vulnerable. Personnel on these aircraft could watch for ground fire from only two positions: behind the starboard window and from a position that required the lookout to dress in cold weather gear and partially hang out over the edge of the rear cargo ramp in the slipstream of the aircraft. The lookout called back to the pilot with the origin and relative threat of ground fire by directly observing the tracers ascending from the anti-aircraft batteries. F-4 Phantom fighter-bomber aircraft now accompanied the AC-130s and, given a positive sighting of a tracer stream, could use their laser-guided bombs to home in on a gun position, destroying it or at the very least demonstrating to its crew the extreme hazard of attacking an AC-130.

The Air Force also employed high explosives dropped on identified anti-aircraft emplacements by C-130 Hercules transport aircraft. In some cases the explosive packages consisted of 15,000 pounds of explosive mounted on a pallet and sent down to the target via parachute. Amazing explosions and mixed results followed, not because of flaws in the explosive devices, but due to maps of southern Laos and Vietnam not yet corrected by loran (long-range radio navigation)-controlled photographic systems. Placing the explosives at the correct coordinates would make all the difference. The need for more efficient cartographic production and distribution led to the creation of the Defense Mapping Agency in 1972, an NGA-predecessor organization.

By the early 1970s only the few AC-130s equipped with the 105 millimeter howitzer and escorted by F-4s could duel with the North Vietnamese anti-aircraft batteries. The others needed assistance

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that only imagery interpretation could provide. Close collaboration with photo interpreters eventually helped the Air Force locate and effectively target the anti-aircraft sites attacking the AC-130s. Beginning the previous January, RF-4C reconnaissance aircraft had initiated an effort to locate—through photo interpretation—as many of these anti-aircraft sites as possible. Now the forward site controllers, the AC-130 pilots, photo interpreters and the reconnaissance pilots who flew the RF-4C's began to meet regularly to closely examine the photography of essential areas of Laos and Vietnam to determine exact or suspected locations of anti-aircraft gun emplacements.

The process came together so well that in less than 12 hours after a reconnaissance flight touched down, the air controllers and pilots received imagery of the targets. The laser-guided OV-10 aircraft carried the forward air controllers to the targets along with the F-4s equipped with laser-guided bombs. The OV-10 crews used the latest imagery, as well as binoculars and a starlight scope, which acted as another source of magnification. In spite of the difference in magnification power between the two optical devices, the F-4/OV-10 missions accounted for the destruction of 12 percent of all anti-aircraft sites identified during Commando Hunt VII.

While the statistics on success seem rather meager, effective imagery penetration of the heavily forested Ho Chi Minh Trail proved a nearly insurmountable challenge. Photo interpreters continuously assaulted this challenge during the Vietnam War. Many of the interpreters who eventually found their way to the National Photographic Interpretation Center (an NGA predecessor agency) after the war became imagery analysts, and their expertise emerged from their work on photographs of the intricate North Vietnamese logistics network. In this case, however, they not only helped define a tradecraft and destroy deadly anti-aircraft guns, but they also helped account for many of the gunners and expert personnel who made the north's anti-aircraft effort a formidable opponent.

Very much like the success of American Pacific forces in World War II against the front-line cadre of Japanese fighter pilots, the north could not readily replace these assets or risk keeping them in the same place for very long without certainly losing them. This improved greatly both the opportunity to conduct successful AC-130 missions and the chance of returning the crews safely to base. P

NGA Photo

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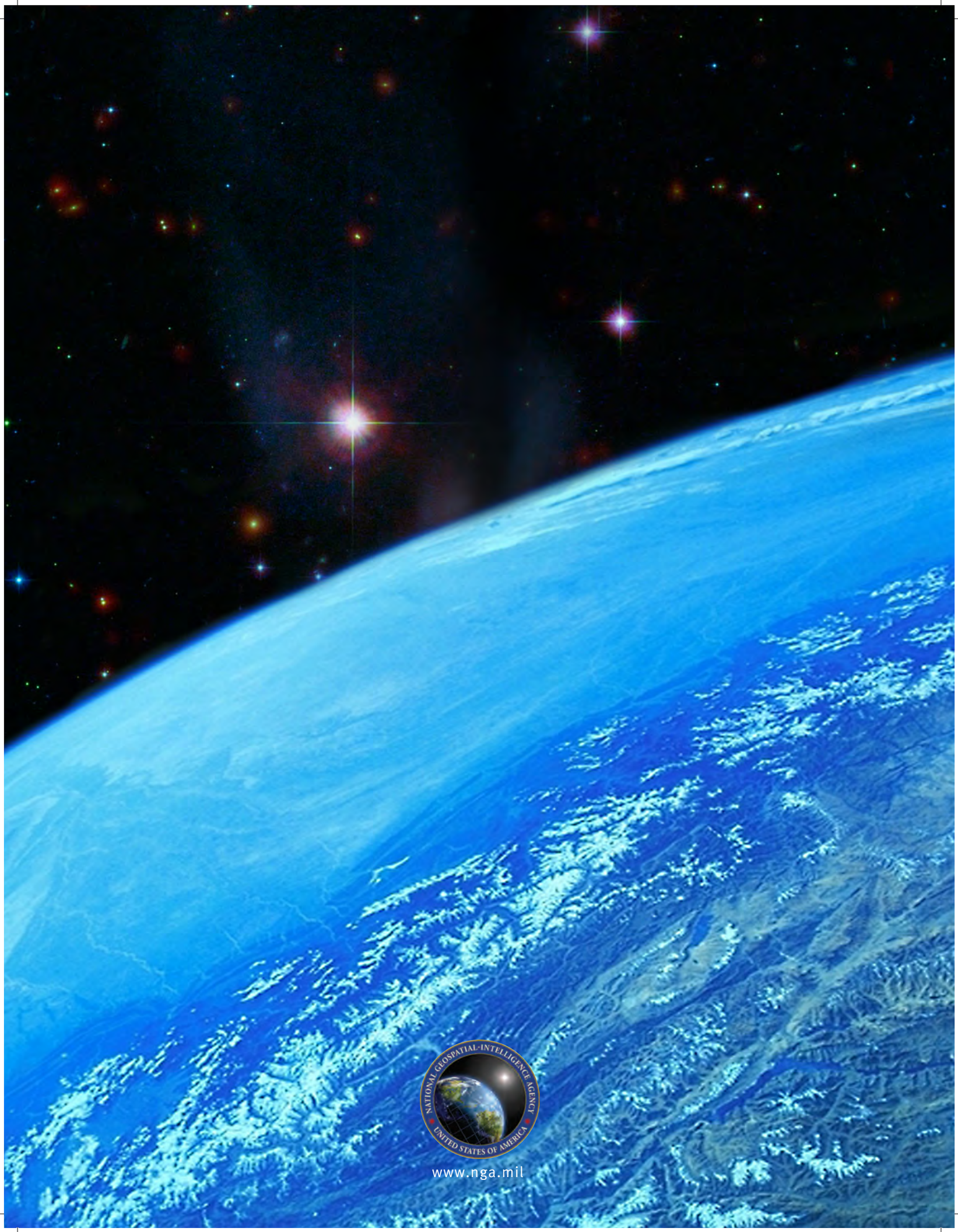

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