

NGA PATHFINDER

Magazine of the National Geospatial-Intelligence Agency

Vol. 13, No. 4

Fall 2015

LEARNING and GROWING

Cultivating Critical Thinking

**Supporting Customers in
Their Mission Space**

**Mastering Languages
and Cultural Understanding**

I EDITOR'S MESSAGE I



In a professional field driven by high-tech satellites, big data and computer algorithms, it is sometimes easy to forget that it is actually human behavior that matters most when protecting national security. Our safety depends on how well we understand information and events, how effectively we form decisions and take action when it is needed.

We think, decide and perform best when we are prepared. It sounds simple, but it is not.

What does it actually mean to be prepared? How do we plan? What training and learning experiences are needed in order to achieve the outcomes we desire? How do we know what to do?

This issue of Pathfinder focuses on how we develop ourselves to be good stewards of national security – and to remain so as circumstances, technologies and adversaries change over time. We humans, regardless of the tools we use, must constantly learn and grow our expertise so that we can perform our best whenever, wherever and however necessary.

It starts with learning to think differently [page 22]. In our lead story about advanced analytic training, you will read how NGA is working to evolve problem-solving techniques. An increasingly complex national security environment requires challenging the status quo and exploring new ways of approaching key intelligence questions.

NGA also uses new techniques, commercial geospatial data and cutting-edge technologies to support its customers within their mission space [page 24]. NGA builds full-time situational awareness for its military customers by embedding subject matter experts in each service branch and at all major combatant command locations. The agency also supports military readiness through training and demonstration exercises, such as Red Flag and Green Flag.

The last in our trio of features gets to the heart of the NGA vision: understanding the world [page 28]. To accurately interpret global situations, intelligence officers must first understand the languages and cultures of our nation's adversaries. Formal responsibility for that resides within the National Geospatial Intelligence College, located at NGA. Perhaps most critical for the geospatial intelligence discipline is mastering accurate nomenclature for locations around the world.

Additional stories inside this issue provide inside looks at, among other things, how bomb-sniffing dogs are trained and certified, how volunteer deployers are prepared for action and how the agency partners with academia to develop the workforce of the future.

In the words of retired Navy Adm. Mike Mullen, who addressed the NGA workforce earlier this fall, it boils down to one thing: "It's about talent, making sure you have the best talent in the room."

NGA is making that investment.

V/r,
Jeanne Chircop
Editor

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through our command of
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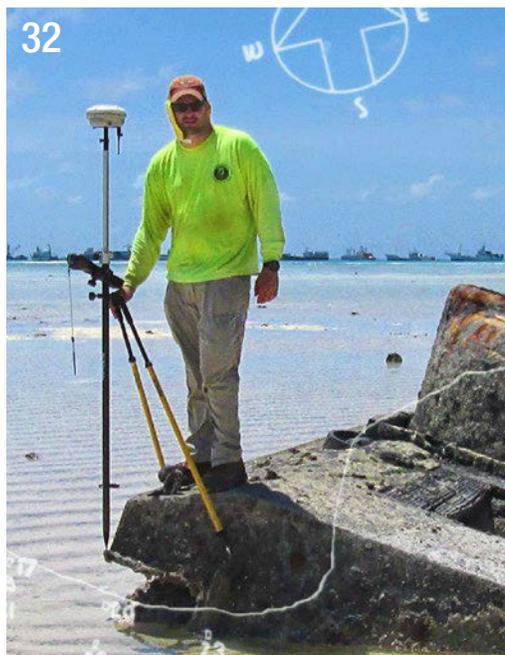
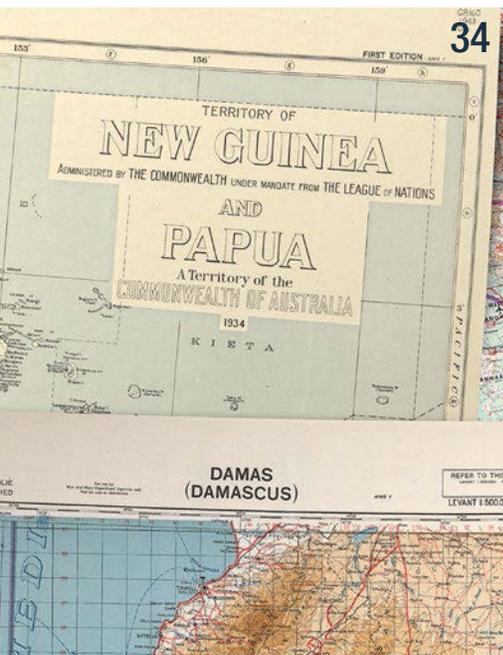


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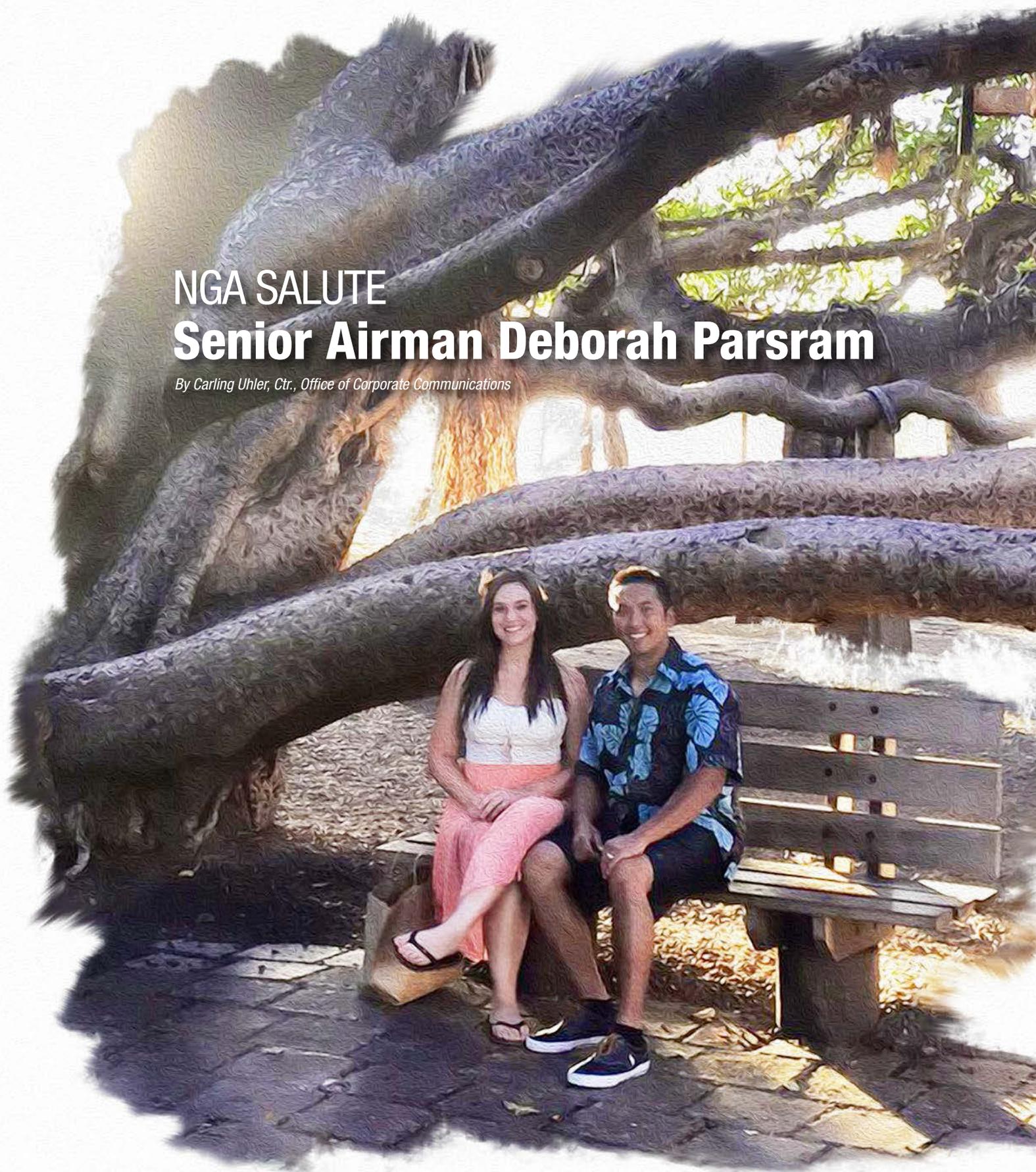
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NGA SALUTE Senior Airman Deborah Parsram

By Carling Uhler, Ctr., Office of Corporate Communications



It is all about family for Air Force Senior Airman Deborah Parsram. A kid following in her parents' footsteps is nothing new, but for Parsram, the influence wasn't based on blood ties.

"My stepdad is a retired [Air Force] senior master sergeant, and he recommended the military route," said Parsram. "That's when I went and joined the Air Force."

The family ties don't end there. Parsram's husband also serves in the Air Force, and the two joined National Geospatial-Intelligence Agency at the same time, she said.

Parsram enlisted in the Air Force in July 2010. She sought out a job in the intelligence field on the recommendation of her stepfather.

"They needed imagery analysts at the time, so that's how I got that slot," said Parsram.

The senior airman was first stationed at Beale Air Force Base in her home state of California. She came to NGA as an imagery analyst in 2014. Parsram currently conducts national-level GEOINT analysis in support of NGA and Defense Intelligence Agency integrated operations as a member of the NGA Support Team at Rivanna Station in Charlottesville, Virginia.

Parsram and her husband received orders to Rivanna Station at the same time and were excited to be stationed together. But that isn't the only perk she has working for NGA, she said.

"I really enjoy my team a lot," she said. "I have really good leadership, my teammates are always teaching me something new about my job, and I'm always learning something new here. I think that's probably my favorite part."

Strong senior leadership has helped her succeed in her work and encouraged training and mentoring opportunities, she said.

"Having good leadership allows the team to work together and be more successful in the workplace, and that's absolutely what I see here with my team," she said.

According to colleagues and supervisors, her level of mental focus, clarity of analytical thought and constant learning with effective application enable Parsram to stand out in the workplace. Parsram's colleagues say she has a 'natural gift' for intelligence, and is able to produce double the amount of analysis typically expected from a standard analyst – without any slippage in work quality.

Her efforts earned her recognition as 'NGA Junior Enlisted Member of the Quarter' for first quarter 2015.

"Senior Airman Parsram has done a phenomenal job since she arrived here in September 2014," said her Air Force supervisor, Master Sgt. Michael Phelps, who nominated her for the honor.

"Additionally, Senior Airman Parsram is involved in both the local Junior Enlisted Council and her community, all while pursuing additional leadership courses and her associate's degree in intelligence studies from the Community College of the Air Force."

Parsram will wrap up classes for her degree and receive her diploma next year. She said that finishing her studies will give her more time to volunteer with 'Loaves and Fishes,' a food pantry that packages and distributes food to those in need. Parsram said she can also continue to coordinate fundraising efforts and support for the joint enlisted council, of which she is currently a member.

After just returning from a vacation in Hawaii, Parsram also looks forward to having more time to foster her love of traveling with her husband. Most important to both of them, they continue to plan trips with family. ✨



*Know a service member worthy of an NGA Salute?
Send your suggestion to Pathfinder@nga.mil.*

**I AM NGA:
GIOVANNA
ROSADO-SILL**

By Paul Frommelt, Ctr., Office of Corporate Communications

In another life, Giovanna Rosado-Sill could have been an architect, sketching complex designs for skyscrapers, hospitals or schools. The University of Maryland graduate with a degree in architecture could even have had a hand in creating NGA's intricately designed East Coast headquarters in Springfield, Virginia, spending late nights sketching out cubicle spaces to maximize collaboration.

Rosado-Sill, who goes by Gigi, ended up going a different way with her career, but that didn't stop her from helping NGA build for the future.

As a senior workforce analyst in NGA's Human Development key component and member of the HD Strategies Office workforce planning team, she supports efforts that provide leadership recommendations to help shape the agency's workforce to reflect Director Robert Cardillo's vision.

Working in collaboration with leadership, subject matter experts and other stakeholders, she and her team "I need to know the skill sets that we [NGA] currently have and those we'll need to have in the future - drawing a path, in other words, taking us from point A to point B - in terms of competencies and readiness, demographics, aligning the workforce with the NGA strategy, goals and vision and priorities for the director," she said.

A lifelong resident of the Washington, D.C. metropolitan area, Rosado-Sill started her career with the federal government as a consultant involved in building the Department of Homeland Security workforce from the ground up, following the Sept. 11 attacks.

Her experience working on such a large and complex project was extremely enjoyable, particularly for a self-described numbers enthusiast.

"It's very exciting. I love numbers. I love logic. [I love] workforce demographics and understanding what we need in terms of the future," said Rosado-Sill, who also earned an undergraduate degree in information and computer science from Maryland. "Through schooling, you develop certain skills for precision and structure. For that, you need

to have a logical mind; you need to understand math and the various concepts. I think that helped me.... Numbers don't lie."

After her experience at DHS, Rosado-Sill knew she wanted to continue working for the federal government. When she heard about NGA from a colleague, she jumped at the chance to apply.

"I always wanted to come back to the Department of Defense," she said.

Rosado-Sill began working at NGA full time in 2013. That year was particularly transformative for the agency. Letitia Long, NGA director at the time, had released her "Future State Vision," which focused on building an agile and adaptive workforce to meet the unique demands required in a complex world. This presented an opportunity for Rosado-Sill, a workforce analyst.

She saw the vision as "making sure that we have the right people [with the appropriate skills and expertise] to steer the ship," she said.

This year, Director Robert Cardillo refined Long's vision, putting heavy emphasis on aligning talent to mission and working transparently in an open-source environment. As in the past, a change in focus requires a shift in workforce alignment. This is no easy task, akin to rearranging support beams without letting a building collapse.

Luckily, it's something that Rosado-Sill has excelled at.

"It's a big challenge. Historically, NGA has been working in classified environments," she said. To move us to open source, Gigi surmises, "it might require different skill sets, a different mindset, a different type of leadership, and a constantly evolving cadre of employees."

Rosado-Sill believes shifting to a more open environment is challenging but also doable.

"I am very passionate about the workforce. I am very passionate that we can do it. We can succeed at anything we put our minds too," she said. "We are going through a very exciting time. I truly believe that we are going through a very exciting time." ✨

Strengthening the 'Geo' in GEOINT

By Lt. Col. Chris Oxendine and Col. (R) Steven Fleming

Editor's note: The views expressed in this article are those of the author and do not reflect the official policy or position of the National Geospatial-Intelligence Agency, the intelligence community, the Department of Defense or the United States Government.

Many discussions involving geospatial intelligence, or GEOINT, focus on the collection of geospatial data or tools that analyze geospatial data or, possibly, on systems that provide a medium for visualizing this information. In this light, geospatial intelligence provides decision makers with key information that shapes foreign policy and is used in conjunction with other intelligence

sources to determine whether our nation sends its servicemen and women to war.

GEOINT is actually far more multi-dimensional. Fundamentally, it is crucial that the foundation of GEOINT involves an in-depth understanding of both physical geography and human geography. This understanding should drive how we develop GEOINT tools and methodologies that analyze and visualize spatial and temporal human-environmental interactions as well as how we train GEOINT professionals.

U.S. Code Title 10 § 467 defines GEOINT as the “exploitation and analysis of imagery and geospatial information to describe, assess, and

visually depict physical features and geographically referenced activities on the earth. Geospatial intelligence consists of imagery, imagery intelligence, and geospatial information.”

Before GEOINT officers can do this exploitation and analysis, however, they must first understand exactly what the ‘activities on the earth’ are. From this standpoint, and in preparing students for service in the GEOINT community, it is imperative that GEOINT officers understand the physical, spatial, historical, cultural and political contexts of the regions where they are or will be supporting operations.

Medina and Hepner stated in their Winter 2015 Pathfinder article, “A Note on the State of Geography and Geospatial Intelligence Research,” that the “need for geographic knowledge is greater than ever and ignoring that need will eventually lead to extreme failures in policy.”

We agree. It is imperative that academic curriculums (both education and training) properly prepare students to evaluate and understand the geographic concepts of a region, while understanding bias that may be present in data they are analyzing. We present a recommended solution to prepare geospatial information science graduates to face the world’s dynamic and varied environments. Students who major in GISc should be educated and/or trained on multiple fronts, providing them a solid foundation in understanding the impacts of both physical and human geography and how geospatial information systems and image analysis tools can be utilized to support decision making in complex environments.

Strengthening the ‘geo’ in ‘geospatial’ intelligence begins with an academic curriculum that has a solid foundation in geography. This foundation provides students with an understanding of physical and human geography. The physical geography focus includes discussing

the impacts of terrain, weather, water and vegetation on operations and intelligence. The human geography focus includes impacts of humans in different environments and, in turn, how the Earth affects human activity.

After establishing a baseline understanding of physical and human geography, academic programs can build upon these foundational experiences with enhanced understanding in geospatial information science, imagery analysis and cultural geography. This provides an integrative experience that includes courses in both basic and advanced geospatial information systems, cartography, basic and advanced remote sensing, photogrammetry, surveying and cultural geography. This integrative experience provides students with a thorough understanding of how to synthesize the aspects of physical and human geography within a geospatial information system.

The GEOINT community needs GIS professionals who are trained to analyze the physical, cultural and human aspects of a region while synthesizing this with information gathered from numerous sensors (e.g. satellites, mobile phones, social media, etc.). We believe that ensuring from the outset that ‘GEO is part of GEOINT’ is critical to the success of the students studying the discipline. ✨

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“Fundamentally, it is crucial that the foundation of GEOINT involves an in-depth understanding of both physical geography and human geography.”

Have an idea for a GEOINT or National Security Viewpoint contribution? Send your query to Pathfinder@nga.mil.

A CALL TO IDENTIFY FIRST PRINCIPLES

By Todd S. Bacastow, Ph.D., Pennsylvania State University

Editor's note: The views expressed in this article are those of the author and do not reflect the official policy or position of the National Geospatial-Intelligence Agency, the intelligence community, the Department of Defense or the United States Government.

I taught Geospatial Intelligence and the Geospatial Revolution, a free massive open online course, during January and February 2015. My intent in teaching the subject matter as a MOOC was to broaden the GEOINT discipline. MOOCs offer open access via the Web, and so participation is unlimited.

As I began preparing the course, I asked several in the community what the focus of the course should be. The common reply was, "Teach the principles."

I then asked, "What are the principles?"

More often than not I met with a 'deer in the headlights' stare or a 'you know what they are, you've been in the discipline for years' answer. I began to contemplate what the real answer might be. What are GEOINT's principles and why do we need them? My journey to find the answers has inspired me to suggest five core principles as a foundation for the GEOINT body of knowledge and markers that define the professional domain. (See "Suggested First Principles.")

FUNDAMENTAL TRUTHS

The Greeks used the term 'principles' both to express their fundamental laws and to explain their ultimate objectives. Science begins with obvious truths referred to as 'first principles.' These principles form the foundations upon which all practice rests and conclusions are based. They are thought of as both the underlying and the governing principles of a worldview. First principles are not defined; they are discovered.

First principles are critical to the practice of geospatial intelligence, because they:

- Provide professionals with an understanding of how and why things happen, or might happen, in the domain.
- Expose the tiered scaffolding of critical geospatial thinking skills to guide learning.
- Guide analysts to high-order thinking when encountering unfamiliar problems, uncertainties, questions or dilemmas typical of geospatial analysis.
- Allow the analyst to cope with rapid changes of new intelligence topics.
- Prevent a mechanistic only, box-ticking, or buttonology approach to geospatial analysis.
- Encourage responsibility and the exercise of judgment, which are key elements of professions.

PROFESSIONS AND PROFESSIONALS

It is generally accepted that the essence of a profession is its work. It is also generally accepted that professions fight for turf, especially as the work changes with new technologies or organizational restructuring. It is generally assumed, but not always the case, that changes in the work enhance the professional's role, responsibility and reward (some may say compensation, but there is usually more to consider). The forces of change can arise internally from client differentiation or externally with the creation of a new organization. NGA's development is an example of the impact organizational restructuring has had on a profession and the professional.

Control is a key aspect of professions. Many things affect the content and control of GEOINT, since it exists in an interrelated system of professional jurisdictions. Academic literature suggests that jurisdictional reach can be thought of as having the elements of a problem, a method to reason about the problem and ways to act on the results. In the case of GEOINT, these jurisdictions encompass the variety of NGA work roles and applications of public safety, homeland security, disaster management and business.

Professions maintain their jurisdiction by either controlling their practice or knowledge. Licensure and certification of the professional is a technique of controlling the jurisdiction. In a sense, certification limits an individual's access to the discipline by defining practical techniques that are specific competencies for which standards are demanded. Licensure restricts entry into professions, such as in surveying. The other form of occupational control involves controlling the abstract knowledge articulated as first principles. Here, control lies in the principles that are at the root of the practical techniques. The techniques themselves are often delegated to others, but the principles clearly identify the professional jurisdiction. In professions controlled by principles, the application of an individual's knowledge requires extensive education and cannot be applied in a purely routine fashion. In other words, application of the knowledge is case-by-case, as in GEOINT. Medicine is a common example of this.

We all appreciate that licensure or certification has the intent of ensuring quality. As typically implemented, certification follows a 'know-how' paradigm that assumes requirements can be identified, taught and observed in evaluation. This know-how paradigm contrasts with the 'knowledge paradigm,' which is governed by first principles. The knowledge-based paradigm allows the profession to redefine its work, defend its jurisdiction from interlopers, have the agility to seize new opportunities and recognize the

Suggested First Principles

Process Principles – those representing a sequence of events under the influence of human nature; those tendencies independent of the influence of culture:

- **Geospatial intelligence, rooted in the geospatial sciences, geospatial technologies and critical geospatial thinking, seeks knowledge to achieve a decision advantage.** Implication: GEOINT education and training should ultimately address how science, tools and techniques help the analyst to outthink a potential challenger. This includes speaking to the possibility of denied and deceptive information.
- **Analysis occurs as a natural human-scientific/technical-human sequence.** Implication: Build and teach methods and systems that place the human at the critical beginning and end of the sequence.

Causal Principles – those representing a cause-effect relationship (e.g., “water expands when it freezes”):

- **Geospatial intelligence reveals how human behavior is constrained by the physical landscape and human perceptions of the Earth.** Implication: The analyst must have the mental agility to simultaneously work in three spaces: (1) human behavioral (often represented as patterns of life), (2) physical (i.e., landscape), and (3) cognitive (memory, attention, perception, reasoning and decision making of the opponent).
- **Geospatial intelligence seeks to anticipate patterns of life through time.** Implication: It is essential to teach the models and tools that address the organization of human activity on Earth and how patterns changes over time.
- **Data and technical systems used by the analyst are a human creation.** Implication: We need to teach that all data contain both technical and human biases that influence the results of an analysis.

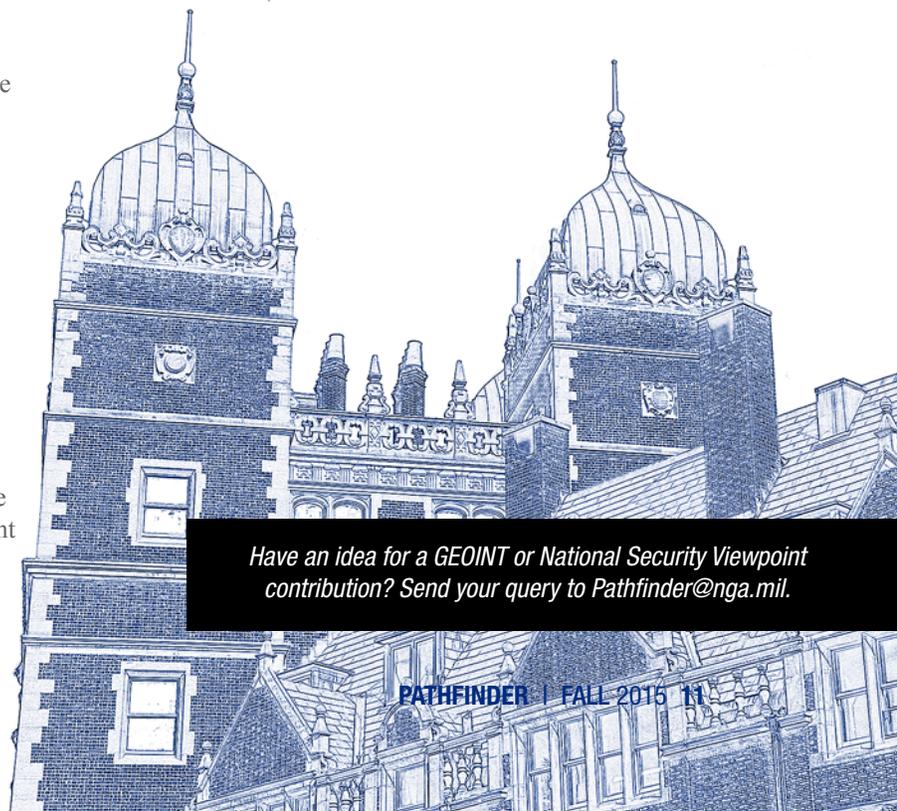
continued advancement of an individual’s expert knowledge. Importantly, principles in the form of abstractions enable survival in the competitive system of professions and the continually changing world of technologies and organizational structures. A profession’s base of knowledge represents its value to others and the currency of exchange in the world of competition. This value and currency extends to the individual within the profession.

GEOINT’S CHALLENGE

GEOINT is said to have been born in the U.S. intelligence establishment. Most in the community appreciate that GEOINT has broader international applications and also important uses in the business, academic, and federal, state and local government sectors. This broad application has resulted in universal certification for sectors and GEOINT professionals based upon a body of knowledge. Yet, while pursuing universal standards of competency, we have not yet articulated GEOINT’s first principles. Such principles are an essential guide for productive teaching and learning. Moreover, these principles are also essential for the growth of the discipline and work of the professional. To date, there has been a tremendous cooperative effort within the GEOINT community to define a body of knowledge. A base of first principles is necessary, however, for the advancement of the profession and individual as technologies and organizations continue to evolve. My goal is to establish a base of principles for the growth of the discipline to which

I owe so much. I hope that what I have proposed serves as a point of departure for further discussion. ✨

Todd S. Bacastow, Ph.D., is a professor of Practice for Geospatial Intelligence in Penn State’s College of Earth and Mineral Sciences, and the founder and lead faculty of the university’s Geospatial Intelligence program. He welcomes your thoughts and comments. Contact him at tsb4@psu.edu.



Have an idea for a GEOINT or National Security Viewpoint contribution? Send your query to Pathfinder@nga.mil.

AFRICOM AREA OF RESPONSIBILITY

Human Geography Facts about AFRICOM

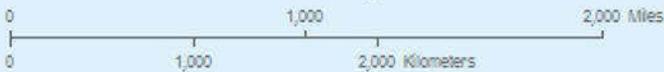
1. The United States Africa Command is responsible for U.S. military relations with 53 countries, the most of all the combatant commands.
2. As the second-largest continent, Africa covers roughly 30.2 million square km or 20 percent of Earth's total land area. It has more land area than China, India and the United States combined.
3. With more than 1 billion inhabitants, Africa accounts for approximately 14 percent of the world's population. Half of these inhabitants were born after 1990, making Africa's collective population the youngest among the seven continents.
4. Eastern Africa is widely considered to be the place of origin for modern humans, with evidence of occupation estimated to be as early as 7 million years ago.
5. According to the Encyclopedia Britannica, 45 percent of Africans are Christians, 40 percent are Muslims and 10 percent follow traditional religions. The majority of Christians live in Sub-Saharan Africa, while most Muslims reside in North Africa.
6. Continental Africa holds valuable natural resources, including 98 percent of the world's chromium, 90 percent of its cobalt and platinum, and 50 percent of its gold. The Democratic Republic of the Congo alone contains 70 percent of the world's coltan, an important mineral used in the production of electronic devices such as cell phones.
7. Despite its abundant resources, Africa remains the world's poorest and most underdeveloped continent. According to the World Bank, in 2014, 22 of the 25 poorest nations in the world (as measured by GDP per capita) were in Africa.
8. Although much of the continent is still rural and undeveloped, parts of Africa are highly urbanized. As of 2015, 47 cities in Africa have populations greater than 1 million people. This includes Lagos, Nigeria, a megacity with more than 17 million residents.
9. The current political boundaries in Africa reflect the division of the continent by European colonial powers in the 19th century, a history that continues to influence modern Africa. Only two countries on the continent avoided European colonization: Ethiopia and Liberia.
10. It is estimated that more than 1,200 different languages are spoken natively throughout Africa. Nigeria alone has over 500 languages. Languages from the colonial period, such as French, English and Portuguese, are often used in official settings. *

Information and map provided by NGA Office of Geography.

NORTH ATLANTIC OCEAN



“ We will keep working with partners to reduce deaths from Ebola, HIV/AIDS, malaria, and tuberculosis across Africa.... ”
 – National Security Strategy, 2015



Projection: Lambert Conformal Conic
 Boundary representation is not necessarily authoritative.

Continuous Training Keeps NGA's 4-legged Employees Up to Snuff

By Dale Lehner, Office of Corporate Communications

The National Geospatial-Intelligence Agency is committed to hiring, training and retaining the best-qualified employees to accomplish its mission – even when those employees have four legs instead of two.

The NGA Explosives Detection K-9 teams make up the front line of defense when ensuring delivery vehicles are thoroughly inspected – inside, outside, around and under. The teams inspect the agency's campuses with the same precision – conference rooms, mailrooms and parking lots, as well as random inspections of employee cars. They must operate at 100 percent accuracy when doing their jobs, as anything less could lead to dire consequences. There is no room for error; training is key, and there are no days off.

The Bureau of Alcohol, Tobacco, Firearms and Explosives is the primary source for NGA's canines. Dogs identified as program candidates undergo six weeks of training at the bureau's Front Royal, Virginia, site before being assigned to a permanent partner.

BASIC SMELL

Phase 1 training focuses on imprintation, which is a classic conditioning training model. The dogs are offered an explosive compound to smell, then given a food reward. Repetition is important; the smell-eat process may be repeated up to 200 times a day. Once imprinted, the dogs are then taught to sit, or alert, when the odor is smelled. The cycle of detection is complete – smell, sit, eat.

The second 10-week training phase introduces the dog to its handler, and the two begin working together to refine their search techniques in a variety of environments – cars, buses, structures and open areas. This phase is as important for the handler as it is for the dog – it's not just about walking around and waiting for the canine partner to alert on an explosive. It involves the handler learning to recognize those subtle, nuanced clues the canine partner cannot voice – clues that may lead to finding a hidden explosive or weapon.

ATF estimates there are 19,000 explosive formulations, which are based off a finite group of explosive components. The K-9 dogs can find all of them, no matter which of the 19,000 combinations is being used. Here's why: the dogs can break down complex odors into their basic components.

It works like this. A person will walk into a kitchen and smell spaghetti sauce cooking on the stove. A dog walks into the kitchen, sniffs the air but does not identify the smell as spaghetti sauce. Instead, the dog smells each individual ingredient in the sauce – the tomatoes, onion, garlic, beef, basil and pepper, as well as any ingredients the chef hopes to keep secret.

So, the canine nose does not smell the explosive formulations, just the base explosive. No matter how a bomb is assembled, the dog will always know it is a bomb.

A SERIOUS RELATIONSHIP

NGA's K-9s live with their handlers, and training continues at home. Officers have 'odor' canisters and set

up various search scenarios for the dogs to work – seek, alert, eat – to keep the training interesting and to prevent boredom.

"I have a good relationship with my neighbors," said Officer Herb, the K-9 unit's commanding officer. "They have no problem with [K-9] Frisco searching their cars – as long as I remove the odor after the search."

The units also train daily at work. Quarterly testing at NGA ensures the teams are working at peak performance, ascertains whether there are deficiencies that may need remedial training and preps both K-9 and partner for their yearly ATF certification test. The only passing score is 100 percent.

Ofc. Chris, a 13-year K-9 program veteran who began his career with a German Shepherd named Reno, is no stranger to the process. He understands from experience why living and working together cements the partnership. By cultivating a strong bond, the human and canine learn each other's mannerisms – what is normal behavior – and when one or the other is having an 'off' day.

During their time together, Chris and Reno were deployed to an overseas facility, where they were responsible for inspecting incoming vehicles. A local repairman once arrived at the gate for a day of work. His flatbed truck had two storage boxes attached underneath the bed in front of the rear wheels. The first was open; the second closed and locked.

"We started searching the truck, working around and down the side



with the containers,” said Chris. “Reno searched routinely along the first unit and on toward the second. At the second box, the only thing I noticed from Reno was a very slight change in behavior, something out of the ordinary for him, before he continued on around the truck.”

Even though Reno did not alert, the slight abnormality in

“The only passing score is 100 percent.”

his behavior caused Chris to instruct the driver to pull the truck across the street, where the driver unlocked and opened the door to the storage unit. In the second search, the now-open second box revealed two ammunition cans filled with extra parts and tools. The workman had picked the cans off a trash pile and had been using them for storage for over a year. Even still, Reno had obviously smelled residual odor through the locked container.

Chris came to NGA with his second partner, K-9 Andy. Andy retired August 1, 2015, after a seven-year career as an explosives detection officer. He had reached the maximum working age of 8.

The cycle of training is beginning again for Ofc. Chris, this time with K-9 Margie, a 19-month-old black Labrador. Chris and Margie will train every day to perfect their tradecraft – to prevent unwanted consequences – since anything less than 100 percent accuracy is simply not good enough. ✨

See NGA's K-9s in action at <https://youtu.be/jtk0AzACDU>



VOLUNTEER DEPLOYMENT PROGRAM BUIL



NGA's unmatched geospatial-intelligence capabilities and ability to quickly integrate alongside its customers has, quite literally, put the agency on the map in recent years; and not just among its intelligence community and government partners.

NGA is recognized as the global leader in GEOINT, having backed the U.S. military through numerous high-profile successes, and is increasingly in demand for support of international humanitarian efforts. While the agency's hard-earned recognition is a testament to its carefully crafted mission and relationships, infrastructure in place within its Expeditionary Operations Office also plays a vital role in the organization's ability to train, advise and assist its customers in producing top-notch GEOINT.

By cultivating key talent, the NGA Volunteer Deployment Team creates a

framework for the agency's best and brightest government civil service employees, government-sponsored contractors and military personnel to join mission partners on the front lines of their operations, whether in the United States or abroad. The NVDT team handles every aspect of deployer engagement, guiding each candidate through pre-, during- and post-deployment processes.

"The backend of deployment involves a lot more coordination and preparation than it seems at first glance," said Chad Dennis, deputy division chief of the program.

"We're structured as a one-stop shop, with the goal of making transitions seamless from start to finish for several hundred deployers annually," he said. "We manage everything from medical clearances to passport and visa acquisition, as well as completing travel orders, submitting theater/

country clearances, handling timesheets during deployment, helping [deployers] submit travel vouchers on return and organizing training."

Once prospective deployers have worked with NVDT recruiters to locate a suitable role, whether in leadership, technical, logistics, analytic or management areas, they undergo a stringent preparation process typically beginning six months prior to deployment, or sooner, depending on the urgency of the requirement. The program is designed to ensure their safety and readiness to operate successfully within a variety of environments. After passing a series of medical, dental and psychological exams, cleared deployers are guided through specialized training, which is one of the most challenging and important elements of preparation.

"There really is no 'safe' place to deploy," said Diana Schwartz, whose



DS A FORCE TO RECKON WITH

By Anne Helms, Ctr., Expeditionary Operations Office



Current Operations Branch handles all aspects of the training. “The last thing we want to do is send an ill-prepared deployer downrange where they could become a risk to themselves or those they’re serving with, so we make sure all deployers receive the same robust core training regardless of their destination.”

Every deployer must complete designated computer-based training and then qualification-preparedness training specific to the mission partner he or she will serve. Survival, Evasion, Resistance and Escape training is another crucial prerequisite. Designed as a role-playing exercise, this online training simulates enemy evasion techniques, as well as capture and rescue scenarios.

NGA also utilizes the Defense Intelligence Agency Deployer Qualification Course. DDQC includes an Active Shooter exercise and training,

plus Tactical Combat Casualty Care and Care under Fire. A Mass Casualty capstone exercise graphically instructs hands-on trauma skills in a simulated group environment.

“One of our greatest enemies in this program is time,” said Chris Jarvis, director of NGA Expeditionary Operations. “It can take weeks, sometimes months, to get deployers medically cleared, or to get an official passport and visa. And, often, we’re working with deployers who have less than two months’ notice to go out.”

Changing requirements are another challenge, according to Jarvis.

“For example, DIA revises their DDQC course every six months, and we update our mandatory pre-deployment seminar bimonthly as requirements dictate. Weapons training and authorization to carry weapons in-country change periodically, and

deployer medical requirements shift,” he said. “Flexibility is just part of our standard operating procedure.”

Don Dereberry, who deployed multiple times during his military career, said, “I can tell you there are a lot of questions, plans and new pieces of information to contend with prior to a deployment, and the focus is on getting to the assignment and gaining traction.”

Now with the NVDT team, Dereberry said, “As stewards for the agency’s deployers, the NVDT tops the IC in keeping all the moving parts oiled, so, as subject matter experts, we’re free to concentrate with a high degree of confidence on problem-solving alongside the warfighter.” ✦

Bob Upton, NVDT deployment advisor, Expeditionary Operations Office, contributed subject matter expertise to this article.

POPULAR MAPPING PROJECTION CAN MISS BY MILES

By Michael Paniccia and Craig Rollins, Office of Geomatics

Navigators who rely on mapping accuracy might find themselves off track by as much as 13 miles if they erroneously use the web-Mercator map projection. NGA's Office of Geomatics is committed to warning navigators and military personnel about possible serious consequences of using the popular projection, which the Department of Defense has declared unsuitable for military use.

Flemish cartographer and geographer Gerardus Mercator invented his eponymously named map projection in the 1500s. Map projections attempt to present the earth on a flat surface, as if a globe were cut apart and presented

flat. Distortions of distance, scale, conformality and area often occur in map projections, because the earth obviously is not flat, and distances can either shrink or stretch in the flattening process.

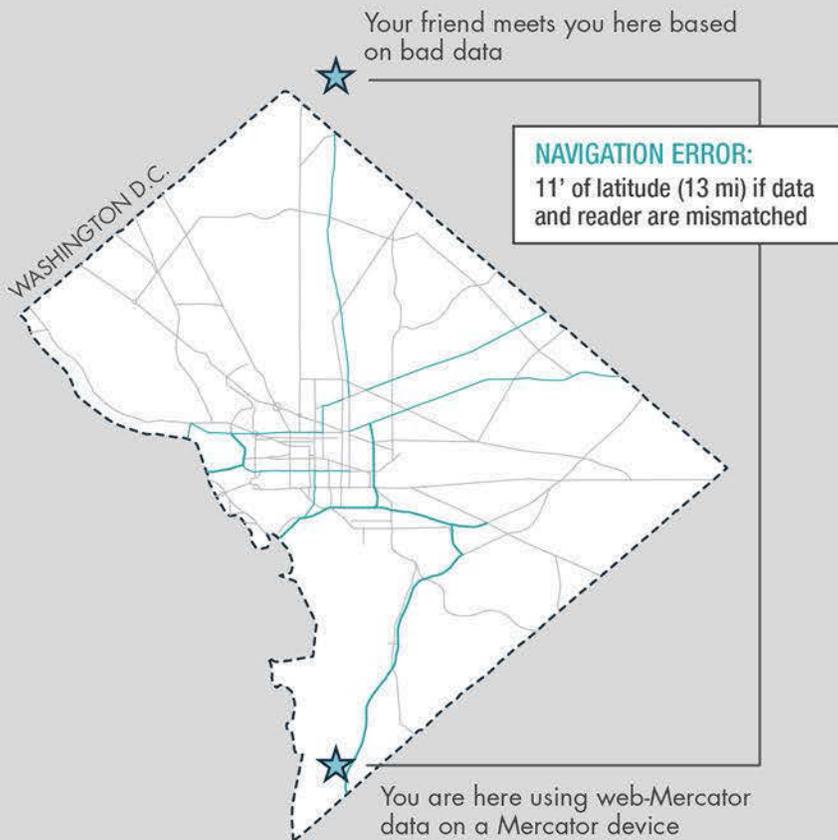
The Mercator map projection applies a mathematical formula to compensate for changes that occur when portraying the curved earth in a flat medium. As a result, the popularity of the Mercator map projection has transcended through the years, and the projection is still used today by sailors and navigators.

With rapid spread of Internet usage in the 1990s, a modification of the 400-year-old map projection was created for use on Internet-based

maps. Today, almost all online maps use the so-called web-Mercator map projection. Unfortunately, web-Mercator is not simply 'Mercator on the web,' and for GEOINT analysts, it is a poor choice for making maps or analyzing geographic information.

The problem is that the inventors of web-Mercator took the correct formula for Mercator and removed part of it. It doesn't take a Ph.D. in mathematics to know that dropping part of a math formula will give you a different answer.

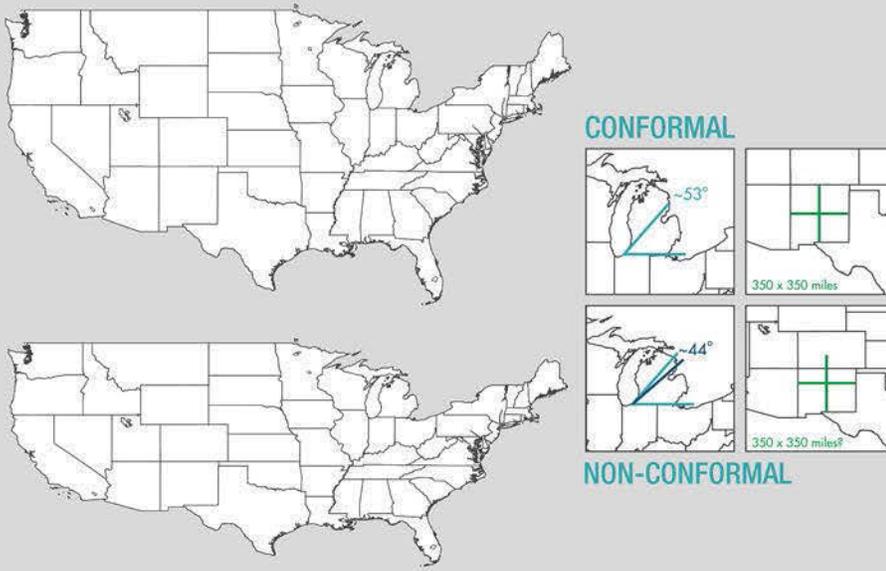
The issue stems from the state of technology at the time the tool was made. Developers took a mathematical shortcut because the



Accuracy in mapping projection has obvious relevance to navigation pertaining to national security, but implications can also extend to personal navigation. Consider the example at left. If you arranged to meet a friend at a certain spot, and he or she uses a mobile navigational device based on web-Mercator, the two of you will end up miles apart. In this example, you will be in Washington, D.C., and your friend will be in Maryland.

WHAT'S YOUR STORY?

Tell us your personal, unclassified version of the work you or your office does for NGA for possible inclusion in the next Pathfinder. Send your 600 word or less account to Pathfinder@nga.mil. Submissions may be edited for clarity and length.



On top you see a conformal map and on the bottom a non-conformal map. The conformal map has three important properties that make it suitable for navigation, targeting, or mission planning. First, the shapes are correct. The shape of Pennsylvania is true on the conformal map, but heavily distorted on the non-conformal projection. Second, angles are true. If two roads intersect at a certain angle then they intersect at that angle on a conformal map.

Third is the existence of a scale bar. A conformal map will display the same distance North/South as East/West with the same size line. Here we show

two equally sized line segments cover 350 miles in all directions. On the non-conformal map, 350 miles will be represented by a smaller line segment. This means a scale bar (to indicate x inches = y miles) can't be used since it is dependent on direction. For these reasons a conformal map is wanted for use in navigation, targeting, or mission planning, and Mercator is the best choice for a worldwide conformal map. Web-Mercator on the other hand is NOT conformal.

hardware of the day had limited computing power, and the equation modification produced a map that was considered close enough at the time.

Today, the correct Mercator mathematical equations are well within the processing power of even tiny handheld devices, such as personal smartphones. Technological advancement has flattened monitors, replaced floppy disks with external terabyte hard drives, and even abolished the need for a mouse pad. Yet, no one has fixed the map equations. Continued use of web-Mercator, as it was developed, equates to continued use of 1990s technology with all its limitations.

The web-Mercator projection appears identical to Mercator at a global scale. A mix-up of the two map projections, though, can result in navigation or targeting errors of up to 11 minutes of latitude (about 13 miles), depending on the latitude. The mismatch can happen if the device is

programmed one way and the data it ingests are produced the other way.

The only way to tell the projections apart is through metadata, but metadata can go missing. How many times have you seen map users cut off all the margin notes to piece together sheets for a nice wall display? The same thing can happen in an electronic version.

When the metadata is removed or altered, it is almost impossible to determine if the map is web-Mercator or Mercator, creating a nightmare scenario for Department of Defense usage.

Another downside to the alteration of the mathematics is that web-Mercator is not conformal, which means it lacks three very important mapping properties. The first is that local shapes, including irregularly shaped features such as county boundaries, are preserved at the large scale. The second is that intersection angles are true, and the third is that distances shown on a scale bar are

true for North, South, East, West and every direction in between.

This is a problem for NGA analysts or anyone who relies on precision targeting, such as military warfighters, or on pinpoint navigation, such as sailors and airmen. The three missing properties are important for DOD work. The fact that web-Mercator lacks them makes it unsuitable for use within DOD, which includes combat support agencies such as NGA.

So the next time you find yourself lost and consulting an Internet map for help, know that it can help you find your way back to your hotel or to the nearest restaurant, but it is not 'good enough for government work.' *

Geodetic earth scientists Michael Paniccia and Craig Rollins spend their days working with coordinate systems to help NGA ensure accuracy of navigation. They are waging an educational campaign about web-Mercator on multiple fronts within the geospatial intelligence community.

ACADEMIC PARTNERSHIPS CHART FAST TRACK TO TOMORROW

By Amelia Cohen-Levy, Ctr., Human Development Directorate

It is a two-way street when it comes to benefiting from strategic partnerships between the National Geospatial-Intelligence Agency and nearly 20 academic institutions designated as NGA Centers of Academic Excellence in Geospatial Sciences. In moving forward together, both parties are driving toward a future in which geospatial data are at the center of national well-being.

NGA Strategy 2015 outlines goals that drive NGA's commitment to developing effective academic partnerships. It calls for the agency to embrace the open geospatial community and break down barriers to academic and commercial innovation that will help the agency succeed in the open. NGA Director Robert Cardillo demonstrated his commitment by personally handing each of the academic institutions the certificate that designates them a CAE.

The CAE partners benefit from exchanging academic innovation for real-world experience. The NGA Vision – Know the Earth...Show the Way...Understand the World – holds appeal for the CAE designees. The relationship between NGA and the designees establishes a foundation for a host of fruitful interactions that advance science and technology while pushing for applications that are novel, yet practical.

The partnerships also raise the stakes for academia, making their work “more than just a book drill, but an opportunity to do something for a customer that cares about the same work while being of service to their country,” said Ann Frelander of NGA's Analysis directorate. “NGA helps the universities' curriculums sync up with what's

happening in the field and gives them something real to look at.”

John Brockhaus, Ph.D., of West Point believes that his institution's designation as a CAE “elevates our academic credibility and demonstrates our commitment to a rigorous high-quality geospatial academic experience for our cadets.”

The experience ensures that students will be better prepared to address real-world concerns across a broad range of relevant disciplines. Geospatial intelligence relates to information technology, environmental science and policy, global health, and public and international affairs. It is far more than simply reading a map; it is interwoven into issues of vast social complexity.

“It's important to know how to find something – not just the coordinates and where it sits in the world – but to understand a particular place and a particular time requires a lot of background and knowledge,” said John Wilson, Ph.D., professor at the University of Southern California. “Intelligence is about acquiring, synthesizing and utilizing knowledge. Knowing how the world works should not come as a surprise.”

Beyond the potential for recruitment, a relationship with NGA offers the students at designated schools a great advantage. “The faculty will be better engaged and connected with those who are situated in that domain, so that we can better understand the opportunities and challenges,” said Wilson. “We would like our students to leave here capable of contributing right from the get-go.”

Most of all, NGA's academic partners offer to spend their time working on the hard problems, those things that

aren't easy to explore in the busy, task-oriented environment of a government workplace. One of academia's great strengths is that its members aren't bound to doing things the way they've always been done.

By partnering with the academic community, NGA gets to focus on the work in front of them, while also serving as what Anthony Stefanidis, Ph.D., of Virginia's George Mason University called “an articulator of the needs of the IC [intelligence community].”

In turn, Stefanidis said, academia uses its ingenuity and resources – including millions of dollars in grant and research funding – to pursue innovative efforts that meet the IC's projected needs.

Wilson anticipates that the partnership between NGA and academia will facilitate solutions to today's crises, such as those relating to environmental science and ever-increasing populations – issues that are great challenges to the global community. Academia uses geospatial sciences to understand climate change, disease spread, and situations related to crop rotations and human migrations. For its part, NGA has made valuable contributions to fighting the West African Ebola outbreak of 2014 and to rescue efforts in New Orleans after Hurricane Katrina and in Nepal after the devastating earthquake of 2015.

“There is a different tradecraft that is emerging,” said Stefanidis. “This is a way that we can collaborate so that we can grow our academic programs and help grow NGA as well. It's particularly appropriate to NGA because the “G” is what's evolving right now. We will help each other move to the future.” ✨

A large, gnarled tree trunk is the central focus, with a topographic map overlaid on its bark. The map features various colors like green, blue, and orange, and includes labels such as 'Cornside Ruffs' and 'Cornside Corner'. The background is a bright, overexposed sky.

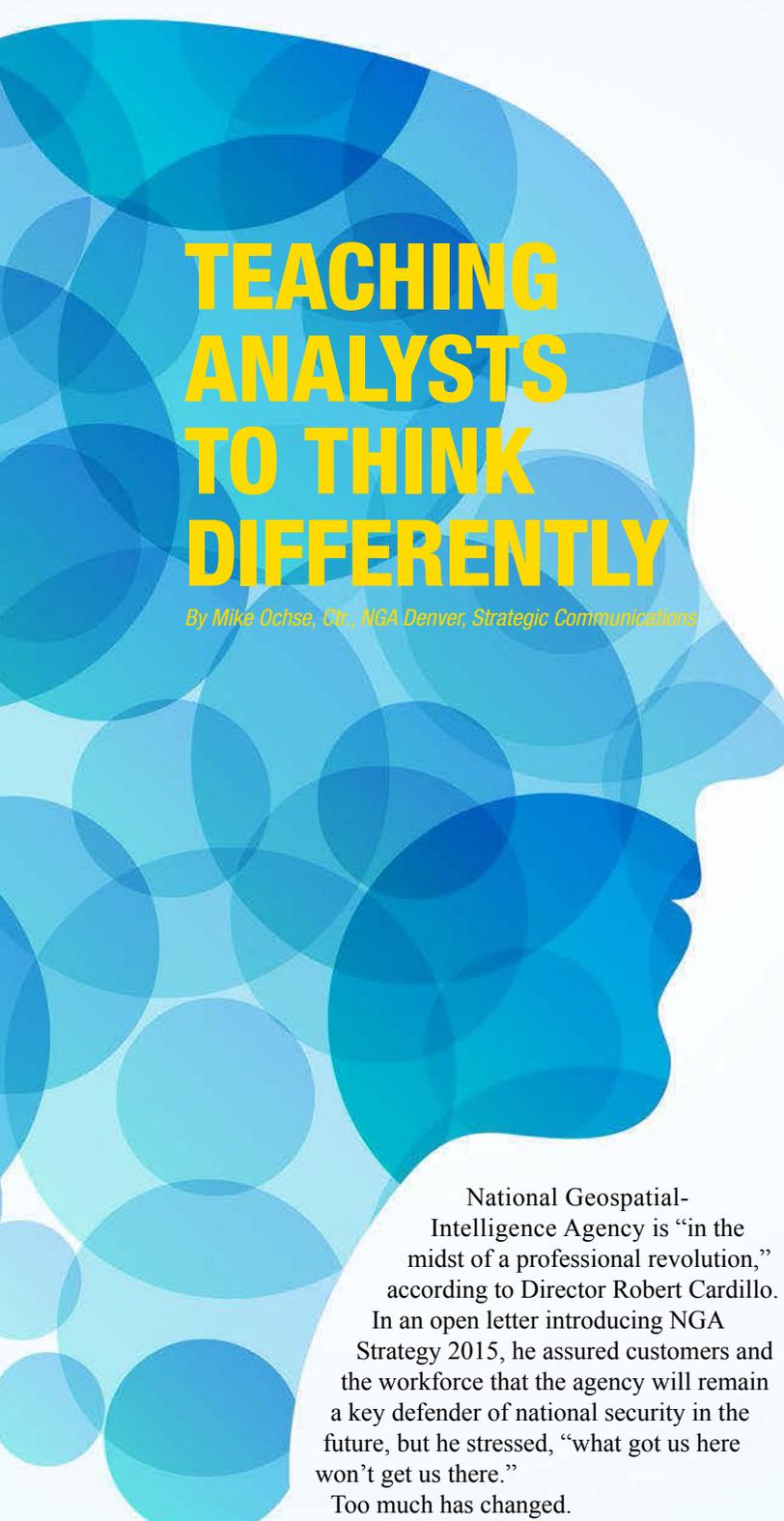
LEARNING and GROWING

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TEACHING ANALYSTS TO THINK DIFFERENTLY

By Mike Oetse, Sr., NGA Denver, Strategic Communications

National Geospatial-Intelligence Agency is “in the midst of a professional revolution,” according to Director Robert Cardillo.

In an open letter introducing NGA Strategy 2015, he assured customers and the workforce that the agency will remain a key defender of national security in the future, but he stressed, “what got us here won’t get us there.”

Too much has changed.

For starters, the nation’s adversaries are less recognizable than ever. Non-state actors can turn up anywhere in the world. They mingle with civilian populations, even within friendly nations. To keep up, the NGA workforce cannot rely on the traditional

approach of analyzing targets or images or data but rather must work to make sense of activities and trends within those targets, images and data. What do the activities and trends likely mean? What are the implications and opportunities for NGA’s customers? How do the puzzle pieces fit together?

Information sources have also changed. The sky-darkening small-satellite “revolution” is already bringing a deluge of geo-tagged open-source data. Analysts are no longer limited to using highly specialized classified assets; they now have a wealth of commercial GEOINT in the open environment that can help them solve key intelligence questions. As we move forward, geospatial data will come from all directions, and it will come fast — faster even than it does today.

“The rapid innovation in the commercial remote sensing industry provides NGA new opportunities to deliver consequence to our customers,” said John Charles, who leads the NGA Commercial GEOINT Accelerator Team.

“We need to invest and prepare the analytic workforce to operate in a data-centric, information rich, multi-stream environment supporting emergent capabilities,” said Ruth Thomas, director of the NGA Talent Management Office. The TMO guides the agency in developing workforce expertise to ensure it has the right talent for every mission.

MAINTAINING AN ANALYTIC EDGE

NGA’s support to the Ebola epidemic in West Africa and the catastrophic earthquake in Nepal prove the agency can provide customers with the power of GEOINT openly, innovatively and agilely; but the future requires that those attributes become the norm. The agency must evolve its analytic training to keep on that path of transformation.

And that isn’t simply a matter of pushing new buttons; it’s a matter of teaching analysts to think differently.

The shift in analytic thinking is perhaps most evident in Activity Based Intelligence, or ABI, which provides an alternative, non-linear methodology designed to mitigate gaps and exploit sparse datasets. NGA analysts have employed ABI since 2005, especially in the areas of counterterrorism and irregular warfare, but now the demand signal calls for training and employment of ABI principles across the agency.

“I continue to say ‘ABI is a mindset’ because, to me, mindset is analytic methodology,” said Cardillo, who has made ABI one of the agency’s top priorities. “It’s how you think about unpeeling, unraveling, understanding an enigma. In many ways, it’s an architecture to enable analysts to more freely attack a problem.”

The agency’s more robust ABI training is an instructor-led course that incorporates a mix of lecture, interactive

discussions and guest speakers into a problem-based learning approach. The course targets imagery analysts, geospatial analysts and source strategies analysts, engaging them with an ill-structured, authentic problem and challenging them to employ ABI tradecraft to develop a solution.

In November 2015 the agency piloted a new ABI training course, “Leading the ABI Tradecraft.” The new course will provide managers, technical executives, staff officers, analytic supervisors and decision-makers across the NGA enterprise a working knowledge of the ABI tradecraft and how to effectively and efficiently manage resources, officers and personnel.

NON-TRADITIONAL TRAINING

Not all current and future ABI training is instructor led. The agency has available a variety of training videos for the workforce. Additionally, the NGC is assessing a National System for Geospatial Intelligence, or NSG, training request for an “Introduction to ABI” computer-based training course.

There is also an informal element to ABI training that is nevertheless crucial, according to Mike Foster, who leads the agency’s ABI initiatives. Many of the agency’s ABI tools and tradecraft are homegrown within different analytic pockets across the enterprise, he contends, and bringing these best practices to light, indoctrinating them and spreading them across the agency is critical.

“That analyst who has worked an account for 20 years ...how do we leverage and expose the knowledge that is often tacit and that manifests itself in their reporting? I think we can do more to expose and report that information to create dialogue among communities of interest [that] work common mission threads,” said Foster.

It’s not just about information, though, said Foster.

“When you talk about transforming, you have to start with the people,” he said.

Teaching the technical knowledge and analytic skills of the future is only one of many components necessary for advancing analytic training. Holistically speaking, it begins by having and hiring the right people with the right attitude and the right skills.

“We need to focus on the core GEOINT analytic skills, such as critical thinking and problem solving; data science; advanced analytic techniques; communication — oral, written and visual; and phenomenology,” said Gary Dunow, director of Analysis. “We need to make sure the environment supports the desired behaviors by providing the right tools, technology and support for risk taking.”

The analytic training team is targeting these competencies in their current training plan, looking to strengthen them across the analytic workforce through defined and to-be-determined training offerings over the next five years.

Elements of the approach include surging course offerings related to advanced thinking and problem solving, increasing student throughput to a recently revamped analytic writing course and instituting a certificate-based data-sciences program with entry-level through advanced coursework.

The approach includes a mix of internally developed courses, in close partnership with the National Geospatial Intelligence College, as well as the possibility of leveraging external training where applicable, affordable and appropriate. It also features initiatives and forums to advance peer-to-peer tradecraft knowledge-sharing — echoing Foster’s and others’ belief that sometimes the best source of training can be the very experts within the workforce.

CHALLENGES

Despite plans and strong partnerships, NGA’s analytic training faces a familiar foe: time. Training development, when done properly, is rigorous and time-consuming. Finding the right experts to support development and delivery of training is hard. Often the true experts are analysts whose full-time roles preclude them from supporting development efforts or delivering training to the masses. Sometimes, when a course is finally piloted, the original requirement has gone stale. It’s a challenge that training teams commonly face, and NGA is not immune.

And there is the distance challenge as well. How do you reach a global workforce, especially when many courses are designed for in-classroom instruction? The NGC already has mobile training teams that deploy certified instructors to customer sites to deliver specific training courses. Some MTT-enabled course offerings come equipped with their own laptops, allowing for training delivery anywhere in the world.

Not all courses are mobile, however; some, including many leadership courses, still require analysts to travel to NGA’s east or west campuses or to one of the NGC’s five extended learning sites in Denver, Tampa, Dayton, Hawaii, or Molesworth, U.K. The agency is hoping its investment in video-enabled classrooms, called Enhanced Video Instructional Capabilities, or EVICs, will improve distance learning by allowing more analysts to virtually attend instructor-led courses.

Despite the challenges, those responsible for training NGA’s analytic workforce of tomorrow know they have support from the agency’s highest offices. For proof, they need look only to the same NGA strategy that lays out the agency’s goals for the road ahead. In it are the director’s own words: “We will invest in our people to develop in them the skills and perspectives that will carry us forward. We will get better at our craft.” ✦



RED FLAG

TRAINING ASSISTS MILITARY READINESS

By Muridith Winder, Office of Corporate Communications

The Department of Defense touts it as ‘the most realistic combat exercise ever developed.’ To understand the full significance of Red Flag aviation training, now in its 40th year, requires a look further back in history and beyond its Air Force sponsor.

Picture this: World War II is raging in Europe. The United States, though not yet formally involved, decides to ship cargo and fuel to England. Far from the front, and within sight of our own ports, there seems little to fear for our merchant ships and their military escorts as they embark on their transatlantic supply mission.

The Germans think differently. They decide to send U-boats to attack the U.S. convoy by night. They find the U.S. ships silhouetted against the brightly lit Mid-Atlantic coast. The ships are also running lights themselves.

Easy pickings....

America’s lack of accurate situational awareness would prove one of the most costly missteps in its military history. It took days for U.S. officials to fully understand what

had happened and weeks before they were able to take corrective action. It would also take a second and more devastating attack at Pearl Harbor before the United States would officially enter the war.

FULL-TIME AWARENESS

Among lessons learned during WWII, this one in particular is linked directly to the National Geospatial-Intelligence Agency mission: decision makers and military forces must know at all times the locations and movements of their adversaries, and must work to anticipate their strategy and likely tactics.

NGA builds full-time situational awareness for its military customers in large part through its support team system. NGA personnel are embedded with each service branch and at all major combatant command locations, serving as ready sources for analytic products and services that provide spatiotemporal context for what is happening in the world.

“We coach, train and mentor our mission partners on NGA tools and applications,”

said Army Col. Joseph Patterson, director of the NGA Readiness Office.

The NGA Support Teams comprise liaison officers and geospatial analysts who work together across service boundaries to support state-of-the-art geospatial intelligence, or GEOINT, according to Patterson. He said team members engage pre-deployment to set the stage for success in theater as well as in reach-back support to operations.

TRAINING EXERCISES

NGA also supports its military customers during training and readiness exercises and demonstrations. In addition to the annual Enterprise Challenge, which focuses on demonstrating interoperability among all branches of the U.S. military and key allied partners, NGA supports specialized training, such as the aviation-focused Red Flag exercises that are conducted several times each year.

Red Flag involves a series of simulated combat exercises conducted on the bombing and gunnery ranges of the Nevada Test and Training Range. Red Flag is one of a series of advanced

training programs administered by the U.S. Air Force Warfare Center and Nellis Air Force Base, Nevada. It is executed through the 414th Combat Training Squadron. The squadron's mission is to maximize the combat readiness, capability and survivability of participating units by providing realistic training in a combined air, ground, space and electronic threat environment while providing for a free exchange of ideas between forces. (Also see "Green Flag" box.)

Red Flag is not limited to the Air Force. Each Red Flag exercise also includes naval, marine and army aviators; sailors posted to aircraft carriers; search and rescue personnel; and the air forces of a host of U.S. allied nations. Over its history, Red Flag has helped train personnel from more than 29 allied nations.

GEOINT is a key component of Red Flag training, and NGA products and services figure prominently.

"Every exercise begins with an NGA mission brief," said John Gray, NGA's liaison officer to Nellis and Creech Air Force Bases. "This presentation provides the overview, capabilities and location of NGA resources."

Among key resources is NGA's Map of the World visualization tool, which provides access to rich geospatial content and data by location. Red Flag's naval participants rely on NGA's integrated Web-based services while onboard ship. Pilots access MoW and other NGA products and services during flight by using iPads and other mobile devices.

"We get all of the flight pubs, approaches, etc., through NGA," said Air Force Col. Jeffrey Weed, 414th Combat Training Squadron commander. "I don't want to underappreciate that, but that really pales in comparison to the other products that we get from [NGA]."

Included in the broader set of services NGA provides are imagery, GEOINT products and navigational charts that are

regularly updated and made available on all of the Red Flag mission-planning and flight-planning computers.

Because foreign air forces also participate in Red Flag, NGA must supply products, including imagery, that are releasable to non-U.S. participants, added Weed. Just as with the U.S. participants, it is important for allied forces to be familiar with and able to maximize use of the GEOINT products available to support joint missions.

NGA's commitment to use commercial imagery to a larger extent than before has proved a boon to operations at Red Flag, in large part because of the releasability issue, said Weed.

"That's probably been the most successful NGA partnership that we have," said Weed. "For the last 18 months, NGA has had a commercial imagery program in which they can provide unclassified imagery to all of our participants."



Photo by Air Force Staff Sgt. Jackie L. Sanders



Weed also said that NGA's commercial imagery program has allowed Red Flag participants to access imagery in a timelier manner. He explained that Red Flag's imagery requests typically were at the bottom of the priority list before NGA started incorporating commercial imagery, because real-world situations always take precedence over training exercises.

"Whether surveillance imagery on potential landing zones for helicopters or updated target photos, we have been able to use that imagery request process — specifically the unclassified commercial imagery — to get products into the hands of exercise participants in less than 24 hours," said Weed. "That never happened before in Red Flag."

MAKING IT REAL

Preparing for an exercise of Red Flag's magnitude takes a lot of planning and coordination, according to planners. One of the key elements to mission planning is providing realistic intelligence.

"We have a team of nearly 20 personnel who work closely with the corporate [main Red Flag] team to make sure scenario products are available to participants," said Air Force Capt. Kathryn Leach, flight commander with the 547th Intelligence Squadron.

"We support the 414th with intel scenarios and target assignments for Red Flag," she said. "[NGA] provides several Web-based services, where participants can

look up imagery. They also have a couple that they've pushed out for our coalition sites, where we have foreign participants."

Planners work to make the training itself as realistic as possible, according to Leach. This means assigning some participants to act as aggressors. The aggressors are trained to replicate the tactics and techniques of potential adversaries.

Both friendly and adversarial teams are provided with intelligence and products, which simulates a real-world scenario as much as possible, according to Leach. Participants also must work through all of the same mission-planning processes that they would in a live event.



The effort to simulate a realistic experience also includes having rescue personnel on hand.

“Our role is the same as downrange,” said Air Force Capt. Andrew Bergeris, intelligence officer for the 66th Rescue Squadron.

That downrange mission is to provide combat flight rescues and recovery of downed pilots. Using the HH-60G Pave Hawk helicopter, members of the rescue squadron also provide and assist in peacetime search and rescue operations. They rely heavily on NGA products to accomplish their missions, said Bergeris.

“We use NGA products to look at terrain features on different routes,” he said. “Since we fly so low, we look at the vertical terrain to see what might possibly be in our way.”

Having accurate terrain details is critical to the rescue pilots, said Bergeris, and NGA’s digital products usually provide the most up-to-date information because they are constantly updated.

“Terrain can change from year to year,” he said. “With paper products we have to wonder if power lines are where we think they are, or did they take them down? Or, did they add a new vertical obstruction to this area? There are so many different reasons why we look at more updated imagery when we’re actually going out the door.”

Paper products are still the preferred format for fighters, according to Weed.

“Hard-copy charts can survive an ejection and be useful on the ground with the pilots,” he said.

Describing NGA’s contribution to Red Flag and military readiness, Weed had nothing but praise.

“This has been a great partnership. I think it’s been one of the most successful parts of my command,” he said. ✦



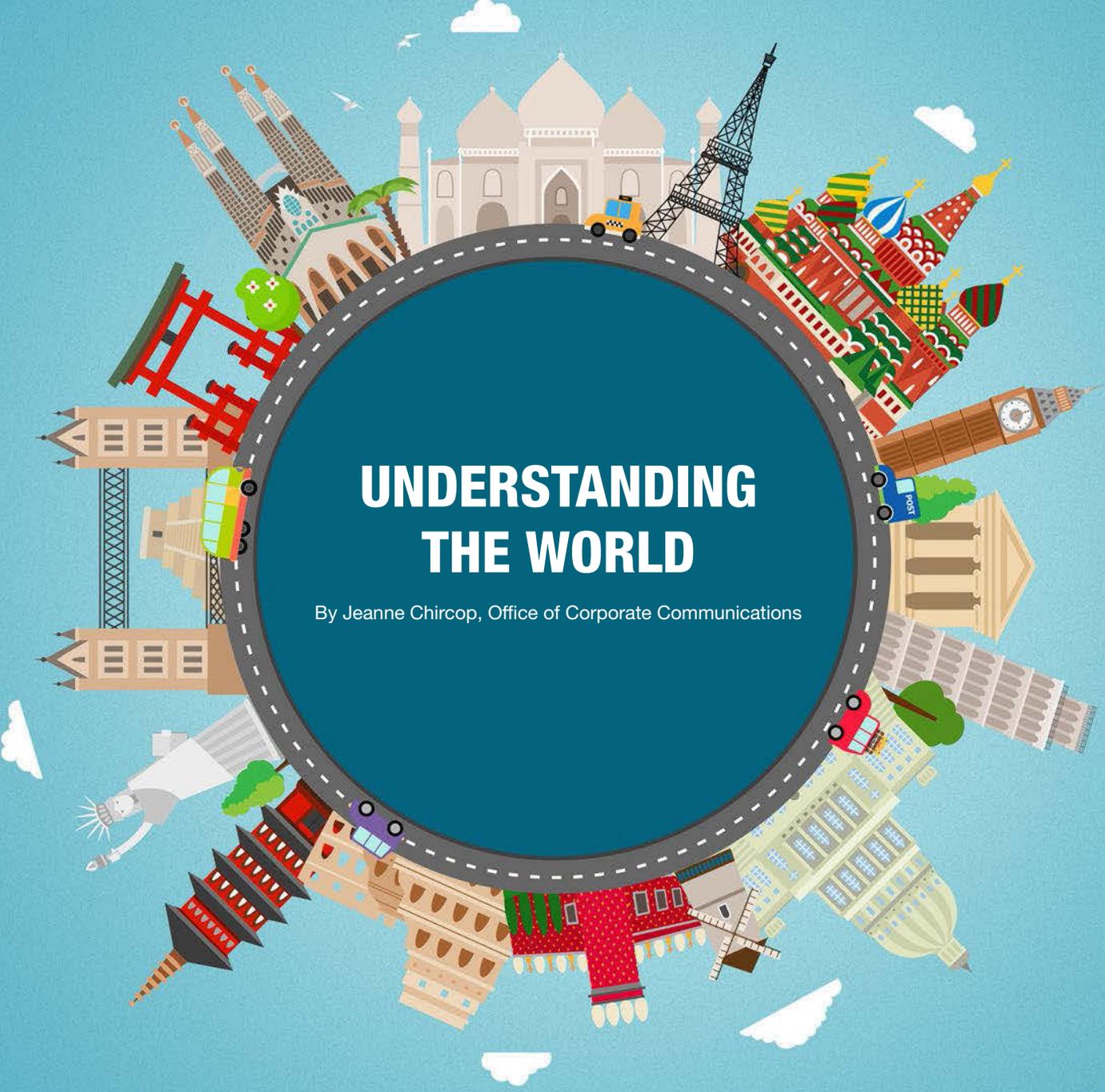
The U.S. Air Force Warfare Center and Nellis Air Force Base conduct related training in conjunction with U.S. Army National Training Center Exercises at Fort Irwin, California. Administered through the 549th Combat Training Squadron, Green Flag exercises prepare joint and coalition warfighters to support surface forces through air, space and cyber operations. Green Flag exercises typically involve unmanned and electronic aircraft in addition to fighter and bomber squadrons. U.S. Army Combat Brigade teams, and U.S. Navy air and sea forces also participate.

As it does to Red Flag, NGA provides GEOINT products, services and expertise to Green Flag.



U.S. AIR FORCE GREEN FLAG





UNDERSTANDING THE WORLD

By Jeanne Chircop, Office of Corporate Communications

At NGA we say, “Know the Earth . . . Show the Way . . . Understand the World.”

To grasp the full meaning of the National Geospatial-Intelligence Agency vision, however, one must look deeper than the agency’s traditional imagery, mapping and navigational services.

Understanding the world means understanding the world’s people. At its core, intelligence is about knowing what adversaries are saying and doing, and where, when and why they are doing whatever it is they are doing.

Geospatial intelligence has long answered the ‘where’ and ‘when’ parts of the equation. The growing practice of integrating GEOINT with other intelligences, in particular human intelligence and signal intelligence, helps to better uncover the ‘what’ and ‘why’ aspects.

“GEOINT looks at places, but we need to understand what’s going on in those places,” said Karen Finn, chief of NGA’s Foreign Language and Culture program office. “We especially need to be able to provide the cultural context that helps put activities into perspective.”

Doing that becomes possible only by understanding the languages, cultures and accurate place names of the adversaries under study.

Cultural context can have a big impact on understanding, according to Monique Yates, NGA’s senior language authority and head of the National Geospatial Intelligence College, or NGC, which houses the FLC program office. An obvious example, she said, is the need to understand the traditions of local tribes or religious sects. People of different heritage may engage in vastly different behaviors within the same geographical area.

Language differences can sometimes have an unexpected impact, said Yates. She harkened to her own experience living in Germany to illustrate her point.

“I shared with my friend that my baby was ‘cranky’ one day, and she gasped and was very concerned,” said Yates. “I finally realized she thought I was referring to the German word ‘Krankenhaus,’ which means hospital. I had to explain that my child was simply out of sorts and not seriously ill in the hospital.”

Yates also cited an example of how language differences and cultural savvy can inadvertently cause potential harm if they are not properly understood.

“As an American, I should not assume the word ‘gift’ means a good thing,” she said. “The German word ‘Gift’ means poison.”

Instead of using ‘gift,’ an American speaker would choose ‘present’ or even the German word for present, ‘Geschenke,’ she said, in order to avoid confusion.

“Understanding foreign language and culture helps us communicate and understand each other precisely,” said Yates.

AN EVOLVING LANGUAGE CAPABILITY

In many ways it was easier in NGA’s early days. Cold War adversaries were fairly well defined. A degree in Russian studies was a ticket to the top of the hiring pool, and Russian language experts were in high demand.

These days, NGA’s FLC program office arranges instruction for employees in more than 50 languages and world cultures, and even more when regional dialects are considered. Among them are Uighur, Kyrgyz and Azeri, as well as rare African dialects that most people outside of the intelligence and diplomatic communities are less likely to have heard of, much less studied.

Mastery of foreign languages and cultures has always been critical to the IC. Recorded history is sprinkled with examples of people traveling to other lands to gather intelligence. Globalization of the modern world has made the study of languages and cultures even more necessary. Factors such as the global reach of the Internet, closer collaboration with coalition forces and the sharing of international documents, and the need to communicate with work locations around the world make bi- and multi-lingual employees valuable assets to the IC and our nation’s security.

Director of National Intelligence James Clapper, speaking at a conference in White Sulphur Springs, West Virginia, in October 2015, cited the 9/11 terrorist attacks as the impetus for increasing foreign language training across the IC.

“And so after 9/11, we found that we lacked and needed people with unique skills in areas like terrorism analysis, *critical languages* [emphasis added] and cyber,” said Clapper.

The Foreign Service Institute under the U.S. Department of State is the leader in foreign language studies for government employees. FSI provides more than 600 courses in 70 languages to as many as 100,000 enrollees each year from State and 40 other government agencies and military service branches.

Foreign language and culture studies at NGA are based in the NGC, which offers services to members of the entire National System for Geospatial Intelligence and not just to NGA employees. The NSG includes NGA partner organizations, military services and fellow members of the intelligence and defense communities.

The FLC program office within the NGC conducts language proficiency testing and provides some basic language and culture instruction, but mostly it arranges – and pays for – proficient linguists to take part in external training to maintain their proficiency, even if it means traveling abroad to do so. Several NGA employees have taken part in immersion programs in other countries to attain a level of language and culture proficiency that is beyond the potential of traditional classroom instruction.

“We do less in-house training than we used to, because we’ve taken the emphasis of the program deeper,” said Finn. “We pay for different types of training, including programs at the State Department, theater-level training for deployers and focused learning at other government agencies and even some universities.”

“Globalization of the modern world has made the study of languages and cultures even more necessary”

This strategy is consistent with the U.S. Intelligence Community Foreign Language Strategic Plan (2012-2016) developed under DNI Clapper. The strategy states, “A renewed awareness now exists that mastery of a foreign language alone often does not meet intelligence needs. Regional knowledge, cultural awareness, and specialized domain expertise must be integrated into foreign language training and daily work for the IC to understand, track and thwart our enemies.”

BROADER APPLICATION

The FLC program office has evolved as NGA’s focus and work have become broader and more sophisticated. Prior to the current program, NGA offered the Language Area Studies in Training for Analysts, or LASTRA. Obviously intended for a specific segment of the NGA workforce, LASTRA was a contracted two-week course and was replaced by a year-round FLC program in 2004. The FLC program office still provides training, tools, opportunities and incentives that optimize analysis, but its offerings are much broader and are offered on a continual basis.

“At NGA, we want to preserve, maintain and bolster the foreign language capability that we have,” said Finn.

There are programs for employees interested in becoming interpreters or translators, as well as support for sign language interpreters to be able to interpret foreign language speech for employees who are deaf or hard of hearing. NGA also administers oral proficiency interviews and Defense Language Proficiency tests. NGA employees who obtain a high enough score on the DLP test, receive Foreign Language Incentive Pay, regardless of whether their full-time responsibilities involve foreign languages.

“Some employees work in totally unrelated fields, but they are resources when needed,” said Finn. “In light of the terrorist attacks in Paris, for instance, we have a list of employees around the agency who are proficient in French, and we called upon them as needed to help translate news articles, documents, etc., to better understand the situation.”

The agency also calls on language-proficient employees to step in and help with NGA leadership outreach and meetings with international partners as needed. For instance, NGA Director Robert Cardillo has had NGA Strategy 2015 translated into 35 languages to date for overseas visits and strategic meetings with foreign dignitaries.

Sometimes reaching proficiency in a foreign language leads to a new opportunity within NGA, especially if the employee desires the change.

“I became aware of a gentleman who worked in our financial management directorate who could speak up to seven languages,” said Yates. “He told me that he liked the financial area but that languages were his real passion. After he tested as proficient in three of those languages, I worked within the career service construct to move him into a position involving language translation on a full-time basis.”

In addition to helping that employee transition into a position he wanted, Yates said the example illustrates how NGA is working to match talent to mission.

“It’s a great example of how our career services framework works, especially as we implement our Mission-Talent Alignment strategy,” said Yates.

FUTURE DEVELOPMENT

The National Geospatial-Intelligence College is working to enhance its FLC offerings in 2016 and beyond, according to Yates.

“We’ve started by blending together the list of top languages needed in the DOD and IC to come up with new NGA priority languages,” said Yates.

Other plans include initiating the use of the Blackboard virtual learning environment for language training on the World Wide Web. Through this medium, she said NGA employees will have online access to education and training wherever they are. The service will also be available to IC and DOD partners within the GEOINT community.

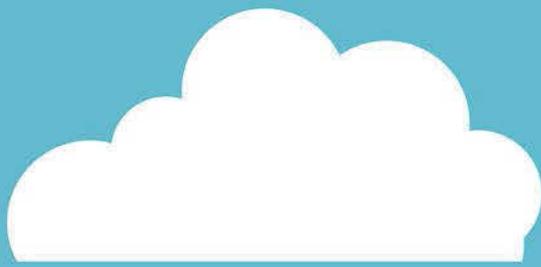
In fiscal year 2016, employees will also be able to take advantage of online culture courses offered by major universities, such as the University of Montana, that can be streamed directly to their desktops. Online courses will help employees refresh their language skills in Korean, Japanese, Iraqi Arabic and Italian, to name a few.

“We are also working to finalize funding to complete a Foreign Language and Culture Resource Center at NGA Campus East,” said Yates. “This center will serve as a hub for foreign language and culture training, events, activities and language roundtable meetings.”

Yates also cited plans to collaborate with partners to share college space and training expertise around the world, and to examine the software licenses needed to provide computer-based language and culture training across the NSG community.

“It’s exciting for me to see the benefit of foreign language proficiency in the agency,” said Yates. “It’s all about ensuring that NGA has the foreign language capabilities and the regional and cultural expertise to support our mission both now and in the future.” ✦



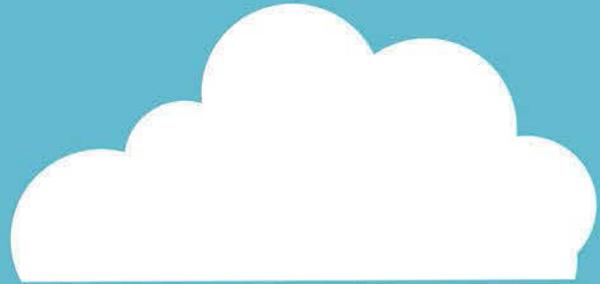


Sometimes it's all about a name

National Geospatial-Intelligence Agency provides the executive secretary and lead staff supporting the U.S. government in maintaining uniform usage of place names outside of the United States. NGA maintains the foreign names portion of the GEOnet Names Server, often called GEONames for short. The GNS is the official repository of more than 10 million place names. The geographical database lists all names in various languages, as well as provides variant names.

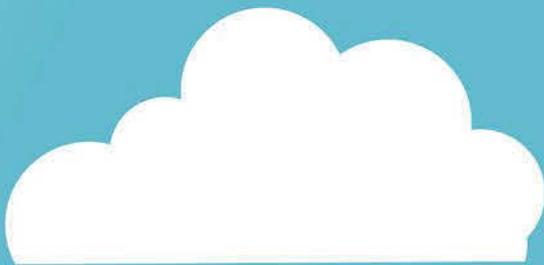
GNS is governed by the U.S. Board on Geographical Names, which was established in 1890. Its current structure, which provides for a separate database of foreign names, dates to 1947. In addition to the Foreign Names Committee, the BGN includes the Domestic Names Committee. The U.S. Geological Survey provides staff support for the DNC.

By providing staff support to the BGN Foreign Names Committee, which oversees the foreign names portion of the GNS, NGA ensures that maps and navigational charts are accurate and



reflect the correct names – and correct spelling of names – for cities, towns and even countries, in whatever language needed. Because city and country names can change, some even frequently, the continuously updated GNS helps ensure that analysts, policymakers, warfighters and first responders always have access to the most current information regarding place names.

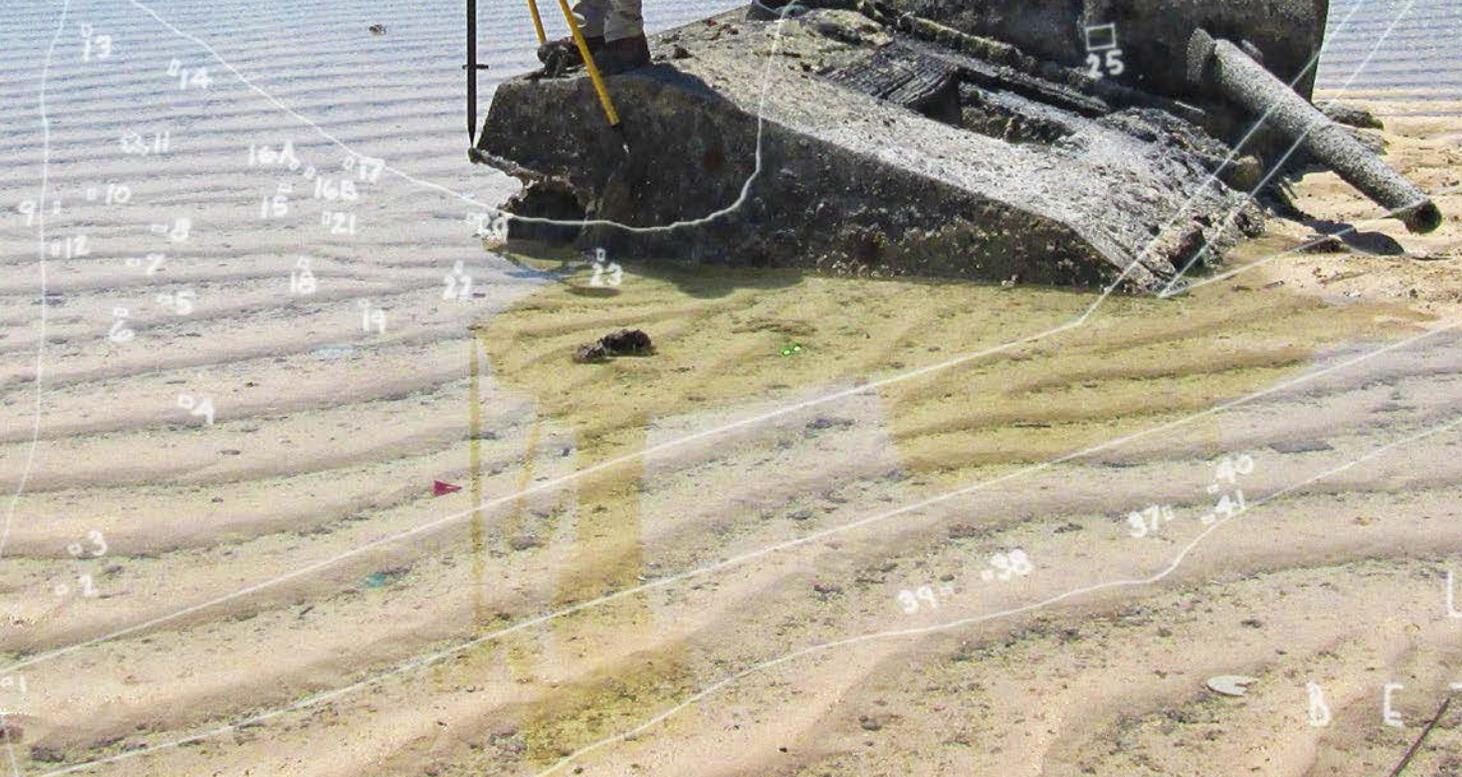
NGA's Foreign Language and Culture program office provides key training to the agency's GNS staff. Employees who are proficient in foreign languages contribute to the GNS through their ability to read, write and discern place names in a variety of languages. Their understanding of cultural nuances, including the intricacies of local politics, often helps to discern which name and spelling to use when a place is called by multiple names. —JC



| SHOW THE WAY |

NGA EXPERTISE

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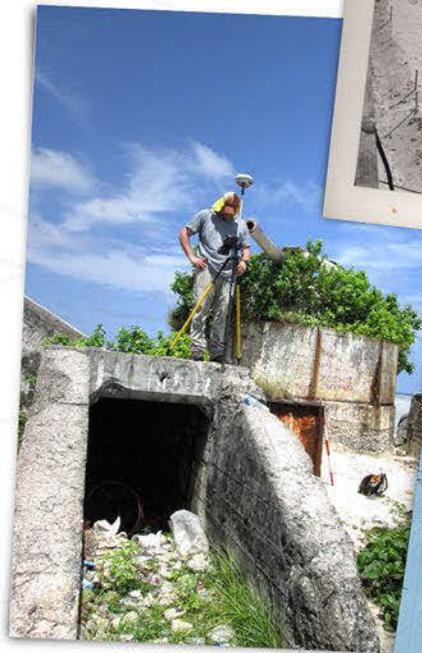
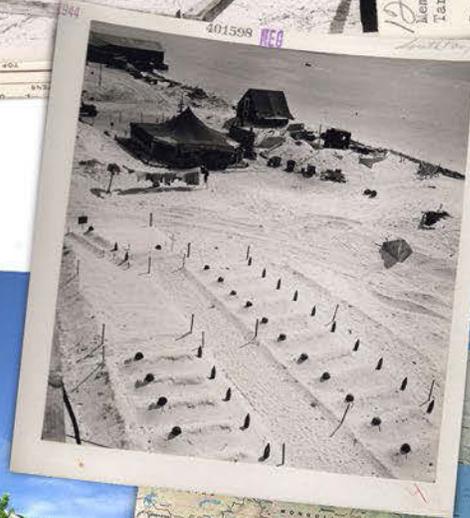
Dear Colleagues,

It is important to not leave anyone behind. That's why I volunteered with NGA to go to a remote island in the central Pacific to help the Defense POW/MIA Accounting Agency locate the graves of missing Marines from World War II.

There are many still left behind on this tiny island of Betio within the Republic of Kiribati. Most are nameless fighters buried here for over 70 years – unidentified and largely forgotten in their makeshift graves that each year fade farther into the jungle or sink deeper under the ocean tides. They are the graves of U.S. Marines, Japanese Special Naval Landing Forces (marines) and Korean slave-laborers, who fought the Battle of Tarawa in November 1943. Tarawa was the first American offensive in the central Pacific, as well as the first time the United States faced fierce resistance to an amphibious landing. It was a brutal battle that resulted in more than 6,000 deaths.

The Marines were given proper burials, but records of many grave locations were lost. Some graves on the cramped island have been built upon in the years since the war. My task was to establish geodetic control, survey imagery tie points for georeferencing historic and modern imagery, and to stake out likely grave sites. If my efforts ultimately result in identifying just one missing Marine, or hundreds, I know that volunteering with this NGA effort meant I helped pay back something to those who sacrificed their lives for our country.

Steven "Rick" Bradshaw
Geodetic Surveyor, NGA



LOCATION OF GRAVES ON ISLAND - TARAWA ATOLL

CAPTURING OUR HISTORY

NEWLY ACQUIRED MAP COLLECTION CONTAINS 18,500 ORIGINAL CLASSICS DATING FROM 1939

By Gary E. Weir, Ph.D., NGA Historian

Never underestimate the power of correspondence to capture history. Simple inquiries often present some unique opportunities to capture the best historical sources.

During this past summer, sheer chance and modern correspondence — a series of emails — presented NGA's history staff with an opportunity to get a first-hand glimpse of the past. We now have a selection of, among other items, captured German World War II maps, briefing maps from Vietnam, extensive maps of Asia and the Pacific islands, and pre-World War II maps of the United States. We now have original work with which we can visually demonstrate NGA's deep roots in the cartographic world.

Just weeks before preparation of this issue of Pathfinder began, 18,500 maps arrived at the NGA Campus East loading dock to become part of the collection held by our Historical Research Center. For the first time, we have original classic maps produced by the Engineer Production Plant, the Army Map Service and the Defense Mapping Agency between 1939 and 1996.

We discovered the maps completely by accident. The public inquiry e-mailbox monitored by the NGA Office of Corporate Communications began receiving inquiries over the summer from university libraries around the country. The libraries once belonged to a map depository program initiated by AMS after World War II. The Army intended to place the best maps produced by their cartographers and printers at research institutions nationwide, and not only for educational purposes. Living in the long shadow of a nuclear Cold War, the possibility of attack led planners to place critical maps produced by leading government cartographers in multiple locations, for both accessibility and preservation.

The Army redesignated AMS as the U.S. Army Topographic Command in 1968, and it continued as an independent organization until 1972, when it merged into DMA. DMA continued the map depository program, which by then boasted 250 member institutions.

The map depository program operated under a set of strict rules. AMS, and later DMA, would send the latest and best maps to each institution on the program list. If a library no longer wished to receive maps it could be replaced with another institution on the program list, but it had to ship all of the products received to date to the replacement institution. The collections at each site would thus remain intact, and the cross-country array of depository libraries would always make the maps available to students, faculty and national authorities.

Times and technologies changed. In the emails sent to OCC over the summer, several libraries asked if they might

dispose of the maps they held. They explained that students rarely used them any longer and that those frequently consulted now existed in a scanned format.

Our history staff consulted with corporate counsel and discovered that NGA could not enforce the rules set down by our predecessor agencies, AMS and DMA. As the NGA historian, I began to give permission to dispose of the maps.

In the process, we realized that each of the libraries in the program had a better historical map collection than we did in the Historical Research Center. The retention of classic maps fell to a low priority at NGA over the years, and consequently, the history staff has found very little available to collect. If we acquired the holdings from just one of these libraries, we reasoned, we could immediately have one of the best classic map collections in the National Capital area.

Opportunities like this rarely come along, and we knew we must act quickly. We wrote to one of the inquiring institutions, Bowdoin College Library in Brunswick, Maine. We asked if the college might consider shipping its depository collection to NGA rather than destroying it. We worried, because we knew our request represented considerable cost, both to prepare the collection for shipping and then to actually transport it to NCE from Maine.

Barbara Levergood, Research and Instruction librarian at Bowdoin College Library, was open to the idea and said she would present the request to Marjorie Hassen, the library's director. After some discussion, Hassen agreed to the donation. She generously offered for Bowdoin to absorb the cost of preparing the maps for shipment if NGA would arrange for transport. Judy Montgomery, associate librarian, supervised the logistics involved with the shipment at the College, and the maps arrived at NCE Sept. 30.

As of press time, the NGA archivist has processed more than 8,000 of the maps in our new Bowdoin College Collection and discovered true treasure. Some of our precious acquisitions illustrate this article. We cannot wait to see what the other 10,500 maps have to offer!

Our long-term plan is to digitize some of the best samples from the collection and post them for our customers to examine. We also plan to place a sampling on the NGA public website in the future to demonstrate the agency's rich tradecraft heritage. These historic maps represent work by our predecessor agencies and some of the best cartographers in the federal government. Thanks to our collaborators at Bowdoin College, and the correspondence that brought us together, we captured this history just in time. ✦

KNOW THE EARTH

BY GARY WEIR, PH.D.,
NGA HISTORY PROGRAM

HOW WELL DO YOU KNOW THE EARTH?

The Army Map Service, one of our legacy commands, acquired this map of the French Sudan from our allies in the United Kingdom and made adjustments to it in 1943 and 1944. During this period the French Sudan formed part of their imperial holding in West Africa.

The most recent adjustments made to this map by AMS, which the NGA History Program acquired as part of the recent arrangement with Bowdoin College in Maine, took place in 1958.

WHAT CIRCUMSTANCES IN NORTHWEST AFRICA MIGHT HAVE RENEWED AMERICAN INTEREST IN THIS REGION UNDER FRENCH CONTROL?

Answer: pg. 35

