NGA PATHFINDER

KNOW THE EARTH ... SHOW THE WAY ... UNDERSTAND THE WORLD.

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THE YEAR OF THE CUSTOMER...14

GEOINT SOLUTIONS AT THE SPEED OF NEED...20

GOING THE EXTRA 10,000 MILES TO SERVE CUSTOMERS...26

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EDITOR'S MESSAGE

When we think of legendary customer service, the usual suspects come to mind – Amazon, Zappos, Disney and other commercial enterprises. Government agencies rarely pop up on their own as good examples.

The federal government is driven to deliver superior customer service, however; it's just that the stories can be more difficult to spot and are often much harder to tell. That is especially true for an intelligence agency like ours.

It is also true that we government folks don't always think of what we do in terms of providing customer service. We use words like 'capabilities' and 'requirements,' and think in terms of program management rather than in value of program output.

But what better value can any organization provide than to strengthen the nation through support of its security interests? NGA, as a combat support agency, is a customer-service organization by its very nature! We serve the nation, our customer, by providing its leaders, warfighters and decision makers with critical information about where and when things of interest are happening in the world.

We are built for customer service. Our challenge is to evolve and maintain the mindset of customer service.

So how does a government agency like NGA nurture a customer-service mindset among its workforce? It starts by recognizing the many ways the agency currently serves customers. Articles in this issue focus on how the agency provides geospatial intelligence to its customers at the speed of their need [page 20], empowers international partners to conduct GEOINT in their local arenas [page 26], and collaborates with other agencies to provide maps and charts of top quality and value to a host of customers [page 32].

Secondly, it works to ensure its workforce understands that customers increasingly have a choice of where and how they obtain services. While federal agencies never compete to provide services, they must nonetheless strive to keep up with standards of quality set within the larger community. A General Services Administration spokesperson interviewed for our cover story contends that public-sector customer expectations are now heavily influenced by standards of service in the private sector [page 14]. She says it is only natural that GEOINT users expect a high level of service from the government, because they are accustomed to it from the commercial geospatial information providers who also serve them.

Finally, agencies such as NGA must actively train their workforces to have a customer-focused mindset. Through programs like Lead with your Customer and agency agility training, NGA is working to create a customer-centric culture [page 25]. It is also working to enhance the quality of its services by engaging approaches such as Lean Six Sigma [page 24].

In the final analysis, no one else can provide customers with the quality, scope and depth of our GEOINT services. That's a customer-service story worth telling.

Jeanne Chircop

V/r,
Jeanne Chircop
Editor

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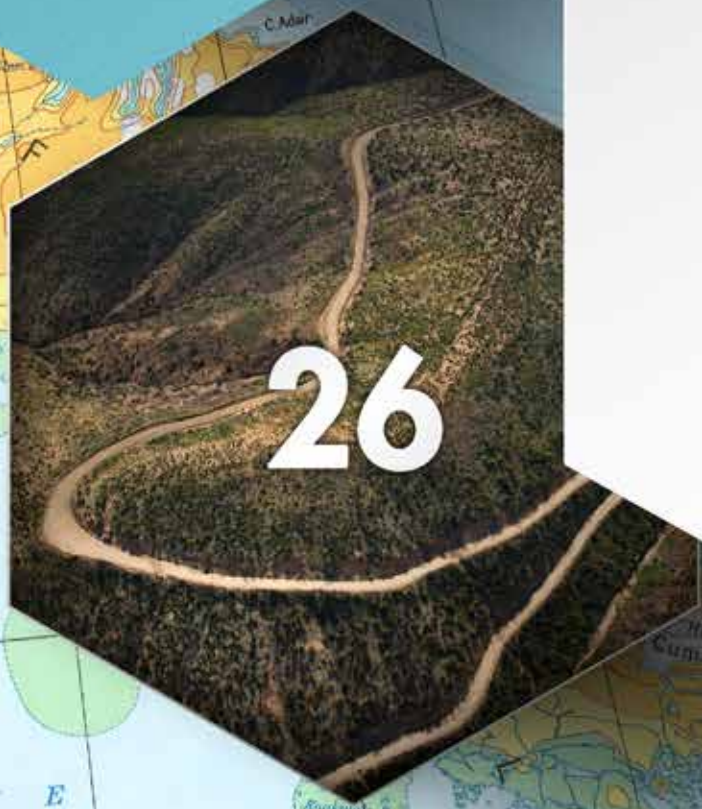

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THE ARCTIC: GREATNESS IN ITS SILENCE

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

Photos courtesy of Vice Admiral Anatoli Shevchenko

Editor's note: *This article is an adaptation of material published in "Rising Tide: The Untold Story of the Russian Submarines that Fought the Cold War" (Weir and Boyne, Basic Books, New York, 2003).*

As the ice cover in Arctic regions recedes, long dreaded competition for political and economic advantage in the far north has begun. Given our agency's authoritative knowledge of the region and our recent release of new maps, National Geospatial-Intelligence Agency strengthens the U.S. position in the Arctic.

American Arctic expertise runs deep, both above the surface of the ice and below it. The USS *Nautilus* (SSN-571), the world's first nuclear submarine, saw the underside of Arctic ice via sonar as it completed the first submerged polar transit on August 3, 1958. Many submariners have visited the North Pole in the years since, including the USS *Seadragon* (SSN-584), which collected oceanographic and hydrographic data there in 1960. Numerous accounts have appeared in books and other media.

In nearly every case the first thing that captures the submariners has little to do with strategy, tactics or the advantage it might provide against an adversary. It is the environment – its quiet, its authority and its stunning beauty. The Arctic has a formidable universal appeal. Personal accounts of the region help us to understand it, and not all stories come from Americans.

In February 2002 I sat in a Moscow hotel, across the table from Vice Admiral Anatoli Shevchenko, a former active-duty Soviet submarine commander of the Russian Navy. At one point in our oral history interview, he paused to tell me the story of the first time he took his Victor II class submarine, the K-513, to the North Pole in 1979. He explained with some emotion that he had wanted to experience the area explored by USS *Nautilus* and USS *Seadragon*. He had been determined to take his place in the exclusive club of submariners who had surfaced at the pole. The trip and the achievement became a rite of passage.

The K-513 set out for the Arctic Ocean from Zapadnaya Litza at a course and speed that placed the submarine at the edge of the ice pack August 24, 1979. After a week of careful under-ice navigation, Shevchenko informed the crew that the navigator had placed them in the land of *Nautilus* and *Seadragon*. They had arrived at the North Pole.

Finding a suitable polynya – a natural hole in the ice large enough for a submarine to pass through – Shevchenko began his ascent and continued to rise. Everything became strangely quiet once the reporting and ordering were completed. Only the boatswain's voice, calling out the depth, broke the silence, "... depth 12 feet ... the boat has stopped."

Shevchenko said he could still clearly hear the last call in his memory. Smiling, he recalled turning to the senior officer on board, Adm. Golosov, and asking permission to raise the periscope.

Nothing prepared him for this first glimpse of the polar region. He recalled that moment vividly:

I didn't expect to see what I saw through the periscope! There was pure white and serene ice around the sub. There was a wonderful rainbow stretched through the eastern part of the sky, which was shining with all the colors as if it had multi-shade diamonds. It was gorgeous! Golosov went to the periscope. A minute after, having opened the hatch, I was standing at the bridge. I really wanted the crewmen to see this beauty, and then to report to the commander-in-chief on the surfacing. Having prepared the machinery and devices for the stopover in the polynya and the communication means for the report to the base, the crewmen had a chance to admire the pure arctic beauty, to feel the terrific ice silence, and to collect memories with their cameras. We had a meeting on the bow of the submarine and raised the Soviet and Naval Flag to the melody of the Soviet hymn. Then there were salute shots to commemorate the surfacing at the North Pole. The report on the surfacing of the K-513 was sent at 1925 [7:25 p.m.].... At 2000 [8:00 p.m.] the men of the second shift went to the upper deck. The sun was still above the horizon, but the area changed daytime colors for darker and deeper ones, all the while keeping the greatness of its silence.

The crew took down the flags as darkness descended, and the submarine began preparations to submerge. Shevchenko had the hatch closed at 2130 [9:30 p.m.] and immediately gave orders to dive the boat. The crew of K-513 had spent two hours and 37 minutes they would always remember, on the surface, at the top of the world.

Today, as modern vessels infringe on the silence near the top of the world, part of NGA's mission will be to track them as closely as possible for threats or challenges. Another part will be to help monitor and preserve the remarkable environment that completely captured the Soviet sub-driver Anatoli Shevchenko on the bridge of his Victor II in the late summer days of 1979.

NGA SALUTE:
STAFF SGT. MICHAEL JACKS

By Dale Lehner, Office of Corporate Communications

Marine Staff Sgt. Michael Jacks, an imagery analyst and Washington state native, now finds himself at home in the other 'Washington' – that of the National Capital Region.

The region and lifestyle pace are different enough for Jacks, but he is also part of a first-ever program at National Geospatial-Intelligence Agency.

Jacks is stationed at NGA Campus East as part of the pilot running of the agency's military service intern program. He is midway through the three-year internship.

The NGA military service intern program provides experiences to outstanding non-commissioned officers so that they can obtain geospatial intelligence professional certifications through the GEOINT career advancement program. The MSIP is a collaborative effort that reaches across several NGA key components. Over a period of 36 months, each intern will participate in approximately 1,000 hours of National Geospatial-Intelligence College coursework in GEOINT concepts, depth-area focus and leadership. They will also spend time in four key components within the agency.

The MSIP is individualized, giving interns the latitude to choose the areas (i.e., key components) they want to explore within the agency. Jacks had no expectations of what he would find as he 'stepped' into NGA, but his drive to 'learn new things all the time' is being satisfied.

"It's crazy how much is going on in this building," he said. And having the chance of "stepping around the areas and talking with people" was an eye-opener for Jacks,

"I didn't know they did so many things here," he said.

Arriving at the Springfield campus in September 2014, Jacks started in the agency's IT component, working as a program manager in the expeditionary mission support team. The work had a familiar, tactical feel, as the unit supports deploying service members assigned to NGA.

"It [being a program manager] was something I had never done before," he said. "The learning curve was steep, but I learned a lot."

Jacks then moved to the agency's maritime group to work with the littoral planning chart team. To him, the work pace was slow – near tedious – but with good reason. The team, which is part of NGA's safety of navigation program, has the critical role of providing nautical charts to mariners. Because the team's coastal maps, which include shoreline and water, are what Marines typically use, the assignment was 'a good fit' for him. He had used these maps before. What he did not realize was the amount of time and effort it takes to review and validate the 'hundreds and thousands' of pieces of information included on the maps.

"It is amazing how much time the analysts spend ensuring the charts are as accurate as humanely possible," said Jacks. "The amount of time and level of scrutiny these charts go through before being released to our naval customers is phenomenal."

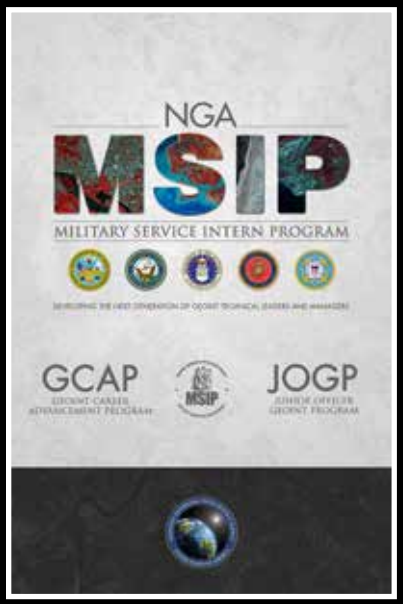
At this writing, the sergeant is spending his time in the Marine Corps Departmental Requirements Office. The office acts as a clearinghouse for imagery requests coming to NGA from Marine units. Office staffers give their recommendations to the Analysis directorate for how to best fulfill each request.

For the last leg of his NGA internship, Jacks will experience providing imagery analysis at a global scale. In that capacity, he expects an increase in operational tempo similar to 'being back in the Corps.'

Jacks' NGA internship has expanded his horizons by opening new possibilities for how he can serve once he returns to the Marine Corps. He will have to choose his next military assignment carefully to fully give back to the Corps the learning and experiences he has gained.

"I have gotten tons of knowledge here," he said. "I have learned to work very independently – how to do a little bit of everything. I would be able to work in an area where there is not much support."

When asked what his biggest take away will be from his time with NGA, Jacks had an immediate reply: "The amount I have been able to learn. It is humbling that we get to do this, to see what no Marine has ever seen before."



Information about the NGA Military Service Intern Program may be obtained by emailing msip@nga.mil

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

I AM NGA: JAGDISHKUMAR BAKARANIA

By Carling Uhler, Ctr., Office of Corporate Communications

The U.S. Marine Corps has a reputation for having some of the most demanding physical fitness requirements in the nation. But what if you had heart for the challenge but a rare health condition got in the way?

That's what happened to Jagdishkumar Bakarania, or Bak, as he likes to be called.

Bakarania was always interested in engineering. While studying computer, mechanical and electrical engineering at the University of South Florida, he expanded his horizons by joining the university's Air Force Reserve Officers' Training Corps. It would prove to be only the beginning of his military career; he would experience every branch of the U.S. military, most prominently the Marines, before eventually settling in at the National Geospatial-Intelligence Agency as a civilian employee.

With no known health conditions, Bakarania decided to explore the range of military opportunities beyond his college ROTC experience. All four military service branch recruitment centers were located in the same strip mall he visited in Brandon, Florida.

"How I decided [which service branch to enlist in] was by saying, 'whichever office comes first, that's the one I'm going to go with'," Bakarania said. "And that's how I became a Marine."

Bakarania was able to thrive in the Marine Corps while continuing to pursue his love of engineering and electronics. After what he described as "three months of outstanding training at Parris Island," Bakarania went to Marine Corps. Air Grand Combat Center in Twentynine Palms, California, where he studied radio electronics fundamentals and repair. He became a telecommunications technician upon completion of the training and was stationed in Okinawa, Japan, until eventual deployment to Iraq.

Following his deployment Bakarania accepted a position as a maintenance instructor in the communications school at Marine Corps Base Quantico in Virginia, where he trained new lieutenants how to use and fix communications equipment. Bakarania recalls this as the time he had the most fun, working a hands-on job while also teaching students.

It was then, in 2008, that Bakarania started noticing issues with his physical health. He remembers that his breathing pattern changed. He was wheezing, and he would fall behind while running during physical training. He saw a host of medical personnel – primary-care physicians at Quantico, neurologists at Bethesda Naval Medical Center and muscular specialists at Water Reed Army Medical Center.

After months of exhaustive testing, his doctors diagnosed Bakarania as having a type of mitochondrial myopathies, a little known neuromuscular disease. What it means is that he experiences numbness and gets tired easily. It also takes his body longer to recover after physical activity.

The Marine Corps extended Bakarania's contract during his medical testing so that he could stay enlisted. After he was diagnosed with a physical disability, however, he knew it would be difficult to stay in the Corps. With his future uncertain, someone suggested that he talk to the wounded warrior recovery care personnel at one of the medical centers. Experts there recommended he go to the wounded warrior regiment in Quantico. Once in that regiment, he learned about the Operation Warfighter program.

Operation Warfighter is a federal internship program established by the Department of Defense in 2006. Through it, federal agencies offer temporary assignments to service members convalescing at military medical centers in the National Capital Region. Service members are matched with opportunities that use both their military and non-military skills, and thereby create productive assignments that are beneficial to both service members and their employers.

Vanessa Werts, NGA Wounded Warriors program manager, believes in the importance of the initiative.

"Military members are trained to be mission-driven leaders from the very beginning of their career, focusing on their occupation until they know it like the back of their hand," Werts said. "Imagine the contribution they bring to the table for any organization."

Bakarania started his internship with NGA in 2011. Because he was still in the Marine Corps and undergoing medical testing and treatment, his internship lasted longer than usual.

"I learned a lot during that time, and I did not let my medical condition slow me down," Bakarania said. Meanwhile, he completed his college coursework and earned a bachelor's degree in computer information technology.

Bakarania went from NGA to intern at the National Security Agency. While there, he was medically discharged from the Marine Corps. Because of his positive experience with the Operation Warfighter program, he accepted a full-time position with NGA in 2013. He

currently works as an IT operations analyst in NGA's Chief Information Officer – IT Services directorate.

"Bak's commitment to customer service has a significant impact on the GEOINT mission," said Richard Cowans, Bakarania's supervisor, noting that his attention to detail has in the past de-conflicted two mission-critical systems being down at the same time.

Bakarania is currently pursuing a master's degree in cybersecurity and plans to work at NGA for a long time.

"I love the NGA facility, and there's a lot of opportunity here," Bakarania said.

Bakarania also volunteers as an ambassador for NGA's Wounded Warriors program and talks to potential candidates at job fairs, where he doesn't mind sharing his story with anyone curious about his physical disability.

"You can put the program manager out there, but for us, it's hands-on experience – wounded warrior to wounded warrior…. We talk to them and they can relate," Bakarania said. "I know I'm limited on some things, but I have to say, I can still do this thing."

SOCIO-CULTURAL INTELLIGENCE SUPPORT TO NATIONAL SECURITY POLICY

By Robert R. Tomes, Ph.D.

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.*

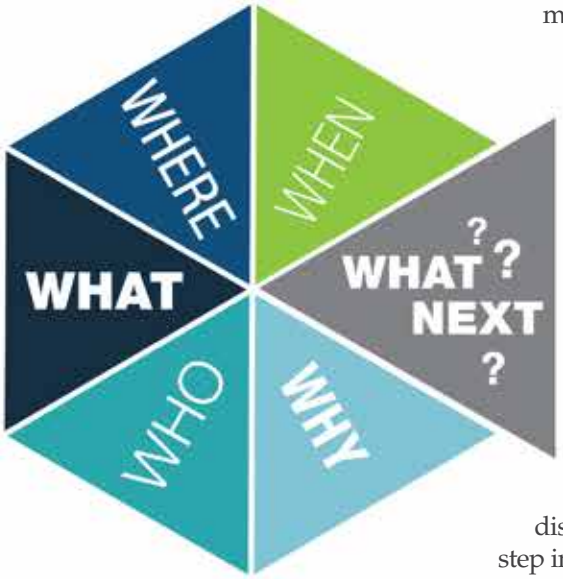
The March 2005 report of the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, better known as the WMD Commission, concluded that America's inability to discern crucial aspects of Iraq's weapons program stemmed from failures to understand "the context of Iraq's overall political, social, cultural, and economic situation."

A decade later, how far have we progressed? What stake does National Geospatial-Intelligence Agency have in assessing that progress?

Certainly, American intelligence capabilities have vastly improved in the last decade. It is increasingly difficult for adversaries to achieve surprise when we are paying attention, are focused by senior policy-maker or decision-maker interest, and have brought the requisite expertise, collection and methods to bear. When it comes to human geography or socio-cultural intelligence, however, additional work is required to advance the development and integration of relevant human geography 'content' we convey to our customers. This requires new analytic models and processes to integrate open-source data and methods with other sources to develop a deeper understanding of adversary capabilities and intentions.

Socio-cultural intelligence is, and will continue to be, critical to national security. Understanding human factors and human geography is the first step to understanding and anticipating security threats. From Russian nationalism to Islamism to Chinese expansionism to the influence of strategic culture on military doctrine, socio-cultural intelligence remains a critical bridge for translating observations and insights about adversary capabilities and intentions into actionable intelligence.

A dizzying array of terms exist to describe the focus and outcomes



of socio-cultural intelligence, including human terrain, human socio-cultural behavioral modeling, human factors, social media monitoring, human geography, patterns of life analysis and, more recently, activity based intelligence. Definitional quibbling aside, we must constantly rethink and redefine how geospatial intelligence can enrich the provision of a baseline understanding of activity and behavior and aggressively pursue innovation in the conveyance of insights into our adversaries' intentions, motivations and decisions.

In response to increased requirements for socio-cultural information there have been numerous, albeit fragmented, efforts to collect data about humans, groups, activities, behavior and perceptions; to analyze that data using open-source methods, tools and techniques; and to report findings or conclusions focused on the actions or behaviors of both specific individuals as well as groups (i.e., clans, tribes, sects), entire regions, and seemingly non-geographic or global networks. Placing foreign military developments and innovations in context, and informing American policy options in response, is an underappreciated and often overlooked benefit of integrating socio-cultural intelligence into more traditional intelligence reporting.

Socio-cultural intelligence must be treated as a critical baseline focus of intelligence production. NGA's addition of human geography as a foundational GEOINT discipline is an important step in addressing collection gaps. Yet, as a nation, we have not provided the funding for human geography collection and analysis required to leverage available data, analytics and expertise. Too often the available resources for socio-cultural intelligence collection and analysis fall between the traditional intelligence organizations or, because they are deemed unclassified or open source activities, are relegated to lower priority.

This paradigm must change, and NGA is poised to lead the intelligence community in doing so. Human geography is the cornerstone of socio-cultural

intelligence, and geospatially referenced human geography data remains a core GEOINT capability. A number of NGA initiatives have the potential to fundamentally change the future of socio-cultural intelligence collection and analysis.

The current vision for NGA includes transforming GEOINT into the most open and transparent intelligence discipline and the most prolific user of open-source data, methods and services. Among the opportunities inherent in this vision is, for the first time, enabling analysts to leverage every relevant source through a GEOINT enterprise that privileges the utility of information over and above its source or level of classification. Initiatives such as GEOINT Pathfinder are necessary but not sufficient to usher in the cultural and enterprise-level changes required to enable NGA analysts to provide the deep context required for delivering customer consequence. The emerging GEOINT Services construct creates an unprecedented opportunity to integrate data, innovative sources, analytic services and visualization methods.

The majority of relevant socio-cultural intelligence sources are unclassified and difficult for analysts to access on their normal production networks. Engaging in the open is critical for the continued relevance of GEOINT. This requires incentivizing our analysts to collaborate with experts outside of the intelligence community and enabling them to search, discover and use open-source data from their desktops.

From both sources and methods perspectives, activity based intelligence and structured observation management provide important opportunities for analysts to provide GEOINT narratives that place observable events or activities into policy- and decision-relevant contexts, adding important 'why' and 'what next' information to baseline 'what,' 'where' and 'when' fact finding. We cannot ignore the need to integrate all available sources of socio-cultural intelligence into the ABI and SOM efforts. Additional work is required to assure that SOM efforts are indeed 'structured' in terms of methods, data capture and discovery.

Additional work is also required to integrate and socialize tradecraft for using what NGA often labels 'nontraditional GEOINT' despite the widespread, accepted use of these same analytic methods in the open-source community. The inherent power of GEOINT is its ability to integrate and fuse all other data sources and analytic approaches into spatially and temporally relevant narratives that provide context.

While the 2000s witnessed an increase in the open, unclassified resources available to help policymakers understand foreign cultures, movements and peoples, these sources were not considered as part of the baseline data collected and analyzed for defense, development, and diplomacy missions. Policymakers did not have access to the best assessments, data or experts available to inform intelligence analysis, estimates or policy formulation. In 2016, many of the open, unclassified resources for understanding foreign cultures, movements and peoples are still not considered as part of the baseline data to be collected and analyzed.

Critical to the success of future socio-cultural intelligence programs will also be building data science and data analytics capabilities. Understanding how to leverage all of the data, to what effect and for which users is not a new problem. What is new, perhaps, are orders-of-magnitude increases in expectations for fusing or integrating all of this data in a fashion that satisfies requirements for accelerated timelines, and more detailed and accurate predictions about complex events or trends. More automation in analytic workflows is a significant part of the solution. Quite simply, automation will enable analysts to spend less time finding and retrieving relevant information from disparate databases, and more time doing analysis to decipher what it really means.

NGA and its strategic partners are poised to fill the void. Essential for success will be to understand the full range of requirements for human-domain analysis and then to harness the technologies and methodologies necessary for meeting those requirements. We must do more than 'map' the human terrain in static PDF products. Socio-cultural intelligence analysis is best conveyed through dynamic visualization services, multi-dimensional graphics and data-driven analytic methods. We are collecting huge amounts of data that can provide enormous insight when combined with appropriate analytic methods and visualizations. An important next step in the evolution of GEOINT is already underway – revamping NGA standard products and services to include analytic visualization services native to analysts' desktops. It is not enough to add 'visualization' or 'graphics' staff to the editing and production workflow. We need analytic visualization experts with domain expertise and knowledge of customer requirements integrated into the analytic process.

Robert R. Tomes, Ph.D., is sole proprietor of Liminal Leadership, LLC, adjunct professor of security studies at Georgetown University, and president of the MapStory Foundation. This article is adapted from "Socio-Cultural Intelligence and National Security," *Parameters* (Summer 2015). Dr. Tomes can be reached for comment at tomesdc@yahoo.com.

A SEAT AT THE TABLE

By Jack O'Connor

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.

The National Photographic Interpretation Center, a predecessor to the National Geospatial-Intelligence Agency, shaped U.S. strategy throughout the Cold War and ultimately produced more intelligence community leaders than any other office. Success did not come easily, however; NPIC had to continuously work to ensure its position and grow its influence in the intelligence community.

More than fifty years later, NGA can still learn from NPIC's early struggles to earn a proverbial seat at the intelligence table. The agency can benefit from nurturing some of the same cultural attributes as NPIC did to increase its capacity to serve its geospatial intelligence constituencies. Those attributes are most visible in the areas of workforce energy, expectations of effort and engagement with the IC at large.

WORKFORCE ENERGY

NPIC started as a gamble. When the idea for such a center was conceived in December 1954, no one knew if the U-2, an as-yet unbuilt aircraft with an untested camera, would be able to obtain intelligence over the Soviet Union. The Central Intelligence Agency nevertheless entrusted one of its aerial photography experts, Arthur Lundahl, with creating an organization to produce intelligence from U-2 film. Lundahl insisted, against some CIA resistance, that the new organization's workforce be drawn from across the military services as well as CIA.

From the beginning Lundahl knew his fledgling organization, which was originally known as the CIA Photographic Interpretation Division, would need to compete for influence and resources. He had to justify and compete for every position and every budget allocation from CIA. His decision to create blended teams and share management of the new organization among all the contributing organizations built a healthy competitive nature into his workforce. Healthy competition meant team members were constantly striving to improve and do things better.

What really fueled the organization's initial success, however, was its youthful energy. Lundahl himself was not yet 40 when given responsibility for establishing the center. He, in turn, consciously staffed his new organization with young people, because he anticipated hard, stressful and unceasing work.

Lundahl's expectation came to pass when U-2 missions began. By January 1961, when the U-2 program was in full swing and his organization officially became known as NPIC, its workforce averaged 29 years old. These early pioneers of the national reconnaissance business worked around the clock, and their efforts required extensive energy. It was energy fueled by fierce curiosity about Soviet secrets.

EXPECTATIONS OF EFFORT

A young workforce provided energy and hard work, but clear expectations were needed to focus NPIC's efforts. The idea of focused expectations began with

the very launch of the center and the establishment of blended teams. Lundahl clearly expected collaboration, and it developed naturally within the structure of blended teams.

Another desired attribute – the ability to effectively tell the story – was ingrained as NPIC grew. The values attached to the discoveries from the search mission, the calls made after target comprehension grew, and the corrections and saves made by the support people all were reinforced by the storytelling capabilities within NPIC's culture.

NPIC's performance expectations were reinforced by the expertise of its leaders. Lundahl himself was one of the best briefers in the IC. As NPIC grew, John Hicks, its next director in the late 1970s, created an internal imagery analysis school and a management development program for the agency. Rae Huffstutler, the third NPIC director in the mid-1980s, documented his expectations for success in the Competitive Evaluation process, described in the NPIC supervisors handbook and the NPIC employee handbook. Even still, Huffstutler used to tell young analysts and their managers that it wasn't enough to just meet a supervisor's expectations. He told NPIC analysts that they had to earn their 'seat at the table,' and they had to do that through satisfying the intelligence community's expectations, answering the IC's questions and solving or helping to solve its problems. In other words they must provide good customer service.

ENGAGEMENT WITH THE COMMUNITY

The work done at NPIC was important only if it met the needs of the IC, according to Huffstutler. He insisted that all NPIC analytic products be designed to serve their customers. He supported an analytic initiative for video reporting. He changed the style and format of the reports to be more useful to customers, and he pushed the NPIC workforce to meet its customers and understand their intelligence questions.

Huffstutler enabled NPIC analysts and managers to learn more broadly about IC needs by serving rotational assignments in all-source units in other agencies. He also obtained rotational positions in arms-control staffs and in collection-management organizations.

The price of delivering customer support at NPIC was the expectation of providing analytic briefing and writing that anticipated and met customer needs. It was a high and unrelenting price, but NPIC analysts earned their seat at the IC table by supporting customers with new discoveries, knowledge of new issues and the burgeoning ability to track targets and issues with imagery.

More than 50 years later, NGA, the imagery interpretation agency that evolved from NPIC and related legacy agencies, has the same need for intellectual energy and hard work, clear performance expectations and engagement with the IC at large. NGA must continue to earn its seat at the table, and like NPIC, its cultural development will be key to its continued success.

Jack O'Connor is author of *NPIC: Seeing the Secrets and Growing the Leaders*, a cultural history of the interpretation center published in 2015. He retired from the CIA in 2013 after more than 30 years of service. He began his career at NPIC and later served at the National Imagery and Mapping Agency and NGA. He can be reached for comment at jpkoconnor554@gmail.com.

DID YOU KNOW?

Thirty-five years after officially becoming the National Photographic Interpretation Center, NPIC became one of several agencies to form the National Imagery and Mapping Agency, which later became NGA. Congress established NIMA October 1, 1996, to blend imagery analysis with cartography, mapping and charting. The new agency merged together related capabilities from across the intelligence and defense communities. Follow *NGA Pathfinder* throughout 2016 to learn more about our 20-year history serving the geospatial needs of these communities.

GEOINT On the Rise 20 1996 NGA 2016

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

FEATURE

THE YEAR OF THE CUSTOMER

By Jacquelyn Karpovich, Ctr., Office of Corporate Communications

When National Geospatial-Intelligence Agency Director Robert Cardillo spoke at the International Consumer Electronics Show in Las Vegas in early January, it was a bellwether of change.

The event marked the first time an intelligence community leader ventured into a truly consumer-focused venue to invite broad collaboration from the industry that supplies the world with mobile devices, GPS products and big-data analytics.

It also signaled Cardillo's firm commitment to transforming NGA into a more customer-centric agency.

"We exist for our customers, so that our customers do understand the world, and then succeed because they have a deeper understanding than anyone else does," said Cardillo.

It was a well-timed statement. At the outset of 2016, an article on Forbes.com billed this year as the "Year of the Customer."

Gone are the days of frustrating wait times, long lines or digging through outdated websites for contact information. Customers are smarter, connecting to companies and organizations in more ways than ever, and looking for tailored solutions delivered right to their mobile devices.

These shifting customer service trends aren't just limited to commercial or hospitality industries; consumers want their federal services streamlined and efficient, as well. They want their tax returns directly deposited into their bank accounts. They want to register to vote and apply for a passport online. They want the ability to serve themselves according to their own schedules rather than waiting to be served by others who may or may not share the same sense of urgency.

The initial framework for emphasizing customer service within the federal government is rooted in the Government Performance Results Act of 1993. That act sought to "improve federal program effectiveness and public accountability by promoting a new focus on results, service quality and customer satisfaction."

But a year before that, in 1992, President George H. W. Bush proclaimed a National Customer Service Week, stating, "If the United States is to remain a leader in the changing global economy, highest quality customer service must be a personal goal of every employee in business and industry."

Fast-forward almost a quarter of a century later, and customer service in the federal government has evolved far beyond a single, simple action, such as applying for a passport or filing a tax return. The concept now encompasses all the interactions a person has with an organization and is often referred to as customer experience, or CX. The U.S. General Services Administration's DigitalGov blog defines an organization's CX as something measured in metrics and sentiment around "overall experience, likelihood to continue use, and likelihood to recommend to others."

Blog posts are only the tip of the iceberg when it comes to an increased emphasis on CX within the government. GSA also conducts extensive research on CX topics, produces a weekly CX newsletter and hosts a CX community of practice. It even conducts training and webinars through its DigitalGov University.

Customer experience is gaining a lot of traction now in the federal government for a variety of reasons, says Rachel Flagg, customer experience strategist in GSA's Office of Citizen Services and Innovative Technologies, and lead of the government's CX community of practice, which boasts a membership of 630 across 160 different agencies.

"People's expectations are just changing so much," she said. "We're part of a larger ecosystem, and people expect the same level of service from government as they get from anyplace else. They expect to interact with us just like they do with Amazon…. Government has to bring that level of service."

CX is a brave new world for the intelligence community. NGA is uniquely suited to venture into this territory, however; as it serves a diverse customer base across a number of security domains — from an aid worker supporting federal humanitarian efforts , to a soldier downrange, to an international counterpart, to a Capitol Hill policymaker.

"While customer-centricity is well known in the private sector, what we're doing here at NGA is leading the way for the intelligence community," said Cardillo during the agency's National Customer Service Week in fall 2015.

Charting the path ahead is NGA's Xperience directorate, the only organization within the intelligence community established with a direct customer service mission. But all IC agencies essentially have a customer service mission, according to Christy Monaco, deputy director of the directorate. She notes that every IC agency is tasked to do the same thing – get insights, whether geospatial intelligence, signals intelligence, all-source or other – to their customers in time to inform their actions.

"What we're trying to do is build a customer-service ecosystem that allows us to have such exquisite knowledge of our customers that we can deliver to them the GEOINT insights that they need before they even realize they need them," said Monaco.

The Xperience workforce is paying close attention to NGA's customers' behaviors and engagements as part of its focus on building better insights and better decision making through business intelligence.

"We take behavior data from the Globe [NGA's GEOINT customer-facing online presence] and sentiment data from our assisted- and full-service customer engagements, and serve up to our internal customers [those in key components who produce content and services] those insights," said Monaco. "We're able to make business analytics decisions. That just helps us be better stewards of taxpayer dollars."

But business intelligence is not just creating better fiscal decisions, according to Monaco; it's also saving the most essential currency in the IC – time.

"Our information and time advantage over our adversaries is not measured in days or hours. It's often measured in seconds or milliseconds," said Monaco. "Where we are able to, we need to be able to create that time advantage."

Constructing a time advantage means looking at ways to better serve some of the agency's closest partners and customers. To do that, Xperience has rolled out a number of initiatives over the last year. Among them was bringing together under the directorate many of the 23 NGA Support Teams embedded across the IC and throughout the Department of Defense. Each of these NSTs has an Xperience customer account manager that provides a direct link for resolving issues and coordinating outreach.

Additionally, as workforce demographics change, so will the nature of the agency's customer service interaction. Xperience has created a team to explore what the future NGA user's experience might be, even just five years from now, as customers are increasingly technology savvy.

"A lot has been made of digital natives," said Monaco.

From a customer-service standpoint this means the agency will need to re-think how it delivers GEOINT, according to Monaco. Many digital natives have been working in the field only a short time, she says, and the NGA user experience needs to help those folks "have as much productivity in their early weeks as they do in their last weeks, no matter how much time occurs in between."

In addition to serving a growing number of customers who are digital natives, NGA is also pondering how digital natives can be hired and retained as part of the agency's workforce, said Monaco. One of the Xperience directorate's more unique techniques for evolving the user experience for the next generation involved crowdsourcing its latest strategy, NextX, from its own workforce, giving the digital natives already on staff a voice in future direction.

Monaco said Xperience leaders organized a number of internal engagements with their workforce. She reported, "And, we essentially said, 'What do you all see going on in the world of customer service that you think will have applicability for us?' "

This type of engagement to gather direct workforce input maps to what Flagg considers one of the key components of customer service – employee engagement.

"It boils down to agency culture and supporting employees," she said. "Engaged employees provide the best service."

NGA has also started spreading its customer service message to the broader community. Through Xperience, it is spearheading a CX community of practice for intelligence agencies, with participants from the National Reconnaissance Office, National Security Agency and Defense Intelligence Agency. Participants acknowledge it won't be easy, or quick, for the community to shift to a more customer-service mindset, but it is essential. With a nation to secure, they believe it's crucial to get it right.

Flagg believes it's crucial for the government at large.

"No matter what the mission, the federal government has a responsibility to the public to provide the best customer service that we can," said Flagg. "For the most part, we are a single-service provider. [For example,] it's not like someone can go somewhere else and pay their taxes; they have to deal with IRS. To me, that makes it even more important that we get it right."

An expert's advice for creating a good customer experience

Rachel Flagg, customer experience strategist in GSA's Office of Citizen Services and Innovative Technologies and lead of the government's CX community of practice, offered up the following thoughts during a recent interview with NGA Pathfinder:

LOOK TO PRIVATE SECTOR

Flagg reiterated that commercial companies like Amazon are really setting the CX standard: "In this day and age, people don't care if you are Amazon or the federal government, or the mom-and-pop store on the corner; their expectations of service delivery are higher than ever."

AGENCY CULTURE

Another lesson from the private sector Flagg noted as essential to good customer service is developing a supportive agency culture: "One of the biggest lessons learned is that a strong organizational culture really has a very clear impact on the bottom line and the service that your employees provide."

EMBRACE TRANSPARENCY

Social media provides a public platform for people to voice their opinions, including what they love and don't love about government, said Flagg: "Nobody is operating in isolation anymore. Everything is very transparent."

BUILD RELATIONSHIPS

What CX boils down to is creating good relationships, said Flagg: "It's a trust – showing value, showing people that we value their time and feedback, that we are responsible stewards of taxpayer dollars."

ON THE GROUND OR ONLINE, NGA STRENGTHENS CUSTOMER ACTION

NGA content and services enable customers to take action within their mission spaces. By embedding geospatial analysts and providing online, on-demand GEOINT, NGA has changed the ways its customers integrate the agency's capabilities into their own operations. Following are examples of how NGA serves diverse customers.

WARFIGHTER SUPPORT IN THEATER:

NGA's presence in Iraq is by no means a recent development. Before the term GEOINT was coined and NGA existed, the agency's predecessor, National Photographic Interpretation Center, deployed a range of specialists to Iraq to support Operation Iraqi Freedom as early as 2003. By the winter of 2009, the number of NGA deployers had reached around 100, and they were stationed at forward operating bases throughout Iraq. This level of detailed support continued until withdrawal of coalition forces in December 2011.

Since then, regional stability concerns have focused on the Syrian civil war and the expansion of Islamic State of Iraq and Levant operations in Iraq. As a result, the international community has shifted efforts to support the Iraqi government in its operations against ISIL.

In October 2014, in response to a growing regional threat, a combined joint task force formed to train, advise and assist Iraqi Security Forces. NGA deployers continue to support the task force plus a range of local organizations, including the U.S. Department of State, coalition partners and non-governmental organizations operating in theater. The team answers more than 100 requests for information per month and produces more than 300 geospatial products per month.

The deployed team also works closely with NGA Support Team analysts at CENTCOM headquarters in Tampa, as well as with regional analysts at NGA's various U.S. locations.

NATIONAL DECISION-MAKERS:

Answering President Barack Obama's call to strengthen coordination on issues in the Arctic region, NGA enhanced its Web services available to the scientific community on a publicly accessible website.

One of these services is the Global Enhanced GEOINT Delivery tool, which provides more than 1.5 million square kilometers daily of unclassified, global, high-resolution images to nearly 17,000 users worldwide. Available to users on the Internet, on both unclassified and secret domains, G-EGD allows users to download imagery on average within five hours of collection – without direct NGA support. Users can also transport G-EGD-derived imagery to other viewers or collaborative workspaces.

According to Paul Morin with the National Science Foundation-funded Polar Geospatial Center at the University of Minnesota, the tool allows the center's team to "do more science, more efficiently, safer and cheaper."

Prior to using G-EGD, Morin's team took days and sometimes weeks to get the same high-resolution imagery. Today, the center's scientists, who support federally funded sciences in the Arctic and Antarctic, have access to near real-time ortho-rectified and raw imagery.

"We can take stereo imagery collected on one day and have elevation models available the next morning," said Morin. "This is absolutely critical for us because we need that information to land planes safely, measure ice volume and predict sea level change."

NATURAL DISASTERS AND HUMANITARIAN EVENTS:

In addition to its national security mission, NGA supports other government agencies and their representatives during natural disasters and humanitarian events. First responders, disaster-relief personnel and others supporting those missions use GeoQ, an open-source tool that provides a comprehensive operational picture within hours of an event.

GeoQ, which can be accessed from any handheld or mobile device, collates disparate geo-data into one automated workflow and allows users to add context as the event and response unfolds. Through GeoQ, NGA has supported nearly 20 missions worldwide, including the 2015 Legionnaire's disease outbreak in New York City.

NGA works with partners in many fields to ensure development of tools and services that can assist humanitarian aid and disaster relieve. One of NGA's academic partners, Pennsylvania State University, is considering using GeoQ for teaching operational best practices to its red cell team and students studying earth sciences.

Content contributed by Xperience Communications.

NGA SUPPORTS UNIQUE CUSTOMERS

Dear colleagues,

Protecting the pope is not part of our usual mission. But unique security challenges often lead to innovation, and partnering to protect the public during major events is one of the services NGA provides other government entities when requested to do so.

I was proud to be involved in such a partnering when Pope Francis visited our nation's capital last September. While volunteering as a member of the U.S. Army National Guard, I was able to also represent NGA and contribute unique NGA services to support the effort.

For leaders of the Papal Visit Task Force in Washington, D.C., the challenge was how to coordinate the activities and reporting of D.C. National Guardsmen during the visit. The D.C. National Guard is trained for domestic operations, and they were tasked with helping manage the influx of thousands of spectators during the pope's visit. After speaking with task force leaders, representatives of NGA's Office of the Americas and Disaster Preparedness saw the benefit of having me support the guard's soldiers and airmen as they tracked events across the Washington Metro area.

The D.C. Metropolitan Police deputized more than 500 members of the District's Army and Air Force National Guards in preparation for the event. Along with the police, the guardsmen supported Operation Roman Watch by helping with crowd directions, traffic control and general law enforcement. With exceptional support from several NGA key components, we were able to help the dispersed guardsmen by introducing them to NGA's Mobile Analytic GEOINT Environment, known as MAGE. MAGE is a mobile app that manages a common operating picture and provides situational awareness on mobile devices. The guardsmen used MAGE to make graphic reports. The Task Force's Joint Operations Center used the tool to track guardsmen and events across Washington, D.C.

A fellow guardsman, Spc. Gardner, who supported the JOC, perhaps summed it best when he said, "It gives you exact locations [near] real time, with the ability to include imagery, so that's really cool."

It was cool! It was also a great example of the kind of premier geospatial intelligence service NGA is known for. The guardsmen performed exceptionally well during Operation Roman Watch, and it was an honor to coordinate our engagement with this mission partner.

1st Lt. Daniel "Dan" Banasik
U.S. Army National Guard
Customer Account Manager, NGA

FEATURE

GEOINT SOLUTIONS AT THE *SPEED OF NEED*

By Evan Frank, Ctr., Chief Information Officer – IT Services

SCENARIO:

A team of first responders and analysts have an urgent need for a new application that will allow them to geographically tag and share information on mobile devices. A severe tornado in the Midwest is imminent, less than a week away, and such an app would streamline the team's emergency efforts with pinpoint accuracy and help team members respond more rapidly.

The team has relied on National Geospatial-Intelligence Agency for similar apps in past emergencies. In this case, though, they need something with a greater set of features, and they need it coded and tested to run with near-nonexistent downtime. And they need it delivered within a matter of days, not weeks or months.

This particular scenario is fictional, but it is not far-fetched. It provides a very real glimpse into how NGA's IT developers are creating and delivering new capabilities and applications that help NGA's customers meet their geospatial intelligence needs – on their terms and timetable, not the agency's.

In the case presented in the scenario, NGA has an existing app that could be customized to fit first-responders' unique requirements within a day or two. The app – called MAGE, an acronym for Mobile Analytic GEOINT Environment – and NGA's capability to quickly develop, test and deploy a reliable product to its customers exist in NGA's open-source cloud environment. (See story, page 18, for another example of customized MAGE use.)

Since becoming director of NGA, Robert Cardillo has expressed his vision for moving the agency's architecture to a more open environment and working with industry to deliver innovative technology to help NGA satisfy its customers' need for speed. This vision is further supported by NGA Deputy Director Sue Gordon's call to fully move NGA — its data, applications and operations — into the cloud within two years to create faster and better services and solutions for its GEOINT customers.

INTERNAL CHANGE

So what does NGA's move to the cloud mean for IT, and what does the agency do when it fully gets there?

It lets go.

It lets go of a monolithic IT infrastructure that demands extravagant sums of money to host the very solutions it is tasked to deploy. It lets go of the idea that software code must conform to function and that configuration is kept close to the chest.

"It's the collaboration and communication of software developers, analysts, data experts and IT professionals,

while automating the process of software delivery and infrastructure changes," said John "Murph" Murphy, a research and development technologist in NGA's Information Integration Office. "Get everyone together... simplify your software and services so they're not so monolithic."

It also means NGA embracing its role as a service-driven entity sourced from a wheelhouse of collaborative innovation. It does more with less — more speed, more integrity and more solutions with less latency, less resources and less money.

"The biggest change that users will see is how quickly new mission capabilities will be delivered," said Adam Timm, the unclassified domain mission manager for GEOINT Services.

Describing what he referred to as a code-a-thon, which occurred in January, Timm said that NGA software developers and testers were able to work entirely in a cloud environment —in this case a small group with laptops and Internet access — and code, test and deploy successful GEOINT software in a matter of hours.

"That's the speed at which we can deliver mission capability," said Timm. "This process allows us to get an analyst with a developer to talk and, through rapid iteration, change the way we do requirements development."

A caveat with the process, Timm noted, is that all of the involved parties are either part of or in close communication with NGA's development and operations team, commonly referred to as DevOps, which essentially means developing in the same space in which you operate.

While this sets the tone and pace for the agency's early-adopter programs, NGA's current enterprise IT architecture comprises nearly 150 programs scheduled for cloud migration, and many of those programs contain siloed IT systems built on legacy frameworks. Transitioning those legacy systems and legacy-minded program managers to a new and hyper-connected architecture within two years is a significant challenge.

"The 800-pound gorilla in the room is 'culture change,'" said Murphy, NGA DevOps lead, at a recent cloud tech conference, responding to an industry representative asking how NGA will transition its entire enterprise to the cloud by the end of 2017. "The big change will be when we can get program managers into a room and say, 'see this.'"

Murphy spoke of small-group sessions and program outreach as vessels for cultural change, but he also offered something that any developer, from an NGA engineer to a young upstart in a basement office, can now see.

NGA's unclassified website (https://devops.geointservices.io) is a beta-stage portal for program managers, developers and users alike to engage Murphy's DevOps team and learn the benefits of what GEOINT Services Development and Engineering Lead Ben Tuttle calls "a cloud-native platform." The site is scheduled to go fully live in April, and, if successful, it will be a clear point of entry for those looking to take full advantage of NGA's cloud-native DevOps environment.

"If you think of DevOps as a framework, they have bounds on them," Tuttle said. "You can't just do whatever you want. There are rules. But, usually, people play by the rules if the framework is right. It's flexible, and, if you buy into this framework, you'll do things faster and more effectively."

A program can transition solely to a web services infrastructure, which removes the constraints of onsite hardware, but without adopting a cloud-native platform as a service, or PaaS, the elegance and speed of a program's DevOps is greatly restricted.

EXTERNAL PARTNERSHIPS

GEOINT Services and DevOps leaders such as Murphy, Timm and Tuttle have taken Cardillo's challenge to heart and partnered with industry innovators including Pivotal Software, whose Cloud Foundry is an example of a cloud-native PaaS.

Chris Goehring, Cloud Foundry's senior platform architect, said that Cloud Foundry streamlines the experience for developers and operators by creating, deploying, running and managing software in the cloud through a set of contracts; digital promises between the platform and the software centered around automation; operating systems; middleware and services. The company also takes into account monitoring, availability, scaling, routing, zero-downtime patching and deployments.

It all equates to consistency and portability of applications across IT environments and cloud providers so that application developers and service providers can focus on application itself. Or, as Pivotal's haiku for Cloud Foundry states, "Here is my source code. Run it for me in the cloud. I do not care how."

Developers are able to more intently focus on addressing user and mission needs through building great software without getting tangled up in all the underlying mechanics of the cloud.

"DevOps, platforms, continuous delivery and microservices are patterns that emerge in high-performing [cloud native] organizations that deliver highly available applications continuously at scale," said Sharon Ober, Pivotal's NGA account manager. "NGA is embarking on a cloud-native journey to drive successful mission outcomes by transforming the way it builds software in order to create new and compelling experiences for its customers and workforce."

The administrative capabilities are also not to be underestimated. Security, for example, has often served as a necessary delay to the deployment of GEOINT solutions.

What good is a quickly deployed, flexible, resilient — but unsecure — app? Even at the unclassified level users need to have confidence in the data consumed through the apps they provision.

NGA's Jason Hess has accompanied GEOINT Services and the DevOps team at every step, including their collaboration with Pivotal, making IT accreditation cloud native as well.

"This is what will allow the risk management framework to work at the speed of the user," said Hess. "The whole [assessment and authorization] process should be condensed. Do you want to get it done in hours and days, or weeks and months?"

Hess said that the process is condensed due to automation of common services, such as access control and malware protection, from immediate implementation into a program's cloud-native infrastructure, to automated testing of the app's code.

These cloud-native processes greatly reduce the time, resources and manual configuration management required to develop GEOINT solutions in traditional network architectures and remove many of the growing pains associated with deploying software into an enterprise the size of NGA.

The end result: the user gets better, faster and more secure solutions.

To level set, the DevOps team's full-force transition to an entirely cloud-native environment is not one that is easy or even immediately necessary for every NGA program.

NGA Deputy Chief Information Officer Shishu Gupta recently spoke at the aforementioned cloud tech conference, stating that NGA systems not directly delivering GEOINT software solutions can go through a traditional lift-and-shift to the web services cloud infrastructure and be refactored for Cloud Foundry, or some other cloud-native PaaS, at an agreed-upon future time.

But DevOps and the cloud-native environment in which it works are the future, and they are essential to strengthening NGA's support to the GEOINT community.

TAMING THE DATA STREAM

NGA will create a constant yet manageable flow of consumable knowledge for GEOINT users. Learn how the agency plans to do business in the future ... in the next

NGA **PATH**FINDER

LEAN SIX SIGMA BRINGS MEASURABLE IMPROVEMENT

By Stephen Jayjock, Business Improvement Office

Lean Six Sigma is a data-driven approach to business process improvement. While rooted in manufacturing, LSS has evolved into a leading way for businesses of all kinds to improve operational efficiencies. Its use is helping the National Geospatial-Intelligence Agency significantly reduce compliance reporting time, establish standardized and repeatable processes, and increase accountability, among other benefits. For us as individuals, it helps us work smarter and faster.

As its name suggests LSS draws on the philosophies, principles and practices of both Lean and Six Sigma approaches. It builds on the knowledge, methods and tools derived from decades of operational improvement research and implementation, which began immediately following World War II. Efficiencies were needed to quickly rebuild Japan and other war-torn parts of the world, ultimately to ensure they could contribute to the global economy. Lean strategies reduce time and cost through process optimization, by focusing on eliminating bottlenecks, waste, and non-value added activity. Six Sigma focuses on meeting customer requirements and stakeholder expectations, and on improving quality by measuring and eliminating defects.

The fundamental goal of LSS in the business realm is to build better understanding of customer needs and cultivate a collective workforce mindset of innovation and continuous process improvement. Five NGA key components – Source, Research (formerly known as InnoVision), and the offices of diversity management and equal employment, the inspector general and the chief information officer – demonstrate how the agency is applying LSS principles to improve its business processes. The improvements these organizations have realized by incorporating an LSS approach range from significant reductions in process cycle time, increased transparency, accountability, reduced process cost and improved customer satisfaction. Specifically, staffers in the diversity office reduced their cumulative compliance reporting processing time by over 150 days, established standardized repeatable operational procedures/process maps and eliminated two timely superfluous reporting activities. Those in the inspector general's office reduced the Inspections Draft reporting time by over 70 days, revised business process guidance and established an on-the-job training capability to accelerate functional professional development.

TRAINING IS KEY

The NGA Business Improvement Office leverages LSS methodology to help improve the efficiency and effectiveness of business processes across the agency. A core office mission is to empower the NGA workforce to identify, lead and complete improvement initiatives that drive enterprise-wide mission excellence. This is achieved through a continuous-learning framework that includes Green Belt, Champion and Executive Champion training events.

The green belt is typically a junior to mid-level subject matter expert and the most crucial member of an LSS project team. Traditionally serving as project leads, green belts are responsible for managing the kick-off and completion of LSS initiatives with the approval of their direct supervisors and senior leaders. The Green Belt training teaches these prospective practitioners the foundational principals of the LSS project management frameworks.

The training approach is designed to accommodate a variety of workforce learning styles informed by a blended learning model; 26 hours of Web-based training, followed by a two-day interactive instructor-led session. Over all, the training empowers candidates to lead change with knowledge of useful tools, techniques and resources to aid in the successful identification and implementation of process improvement efforts that substantially improve the agency's performance and consequence to the customer.

After successfully completing the Green Belt Course, a black belt coach is assigned to the candidate to provide additional training, advisory support and mentoring to help the green belt lead and complete a process improvement project.

Champions play a very important role in all successful LSS initiatives. The champion's role is typically filled by a senior manager. These individuals have the primary mission of ensuring team success by providing adequate resources and removing any roadblocks preventing execution of the improvement project. They also play a pivotal role in defining the project scope and completion schedule.

Champion and Executive Champion training programs support NGA seniors who recognize the need to promote greater efficiency and effectiveness within their organizations. Interactive, thought provoking and dynamic, the Champion training is a two-day, in-class session, and the Executive Champion training is a half-day, in-class session, both facilitated by an expert master black belt. The courses offer NGA leaders opportunities to share learned experiences and to conduct interactive exercises to put LSS principals into practice. More importantly, NGA seniors who complete either training will walk away with an in-depth understanding of how to best leverage LSS to bring greater success to their organizations and their workforce.

Stephen Jayjock devotes every day at NGA to improving the way the agency conducts business.

IT'S ABOUT MAKING THINGS HAPPEN

By Norman Stein, Ctr., Xperience Communications

"You may never know what results come from your action. But if you do nothing, there will be no result."

– Mahatma Gandhi

National Geospatial-Intelligence Agency is taking action to reach Director Robert Cardillo's goal of creating a culture that starts and finishes with NGA's customers. The shift toward customer centricity naturally involves the information technology and software development necessary to provide customer access to NGA's offerings, but it also requires developing a workforce that keeps the customer at its core.

Following release of NGA Strategy 2015, the agency quickly initiated two activities to support the goal. "Lead with your Customer" and an agency agility training program are two professional development efforts aimed at helping NGA foster a culture of customer centricity.

NGA is evolving its people and IT – two seemingly different career skill sets – through similar customer-centric approaches. Both the LWYC and agile professional development programs are educating the NGA workforce to conduct business by looking through the lens of the customer. Both programs teach similar methodologies: daily tag-ups or "scrums," stand-ups, action plans and retrospective techniques. Both programs promote employee collaboration, fluid dynamic approaches to task management and problem solving, organizational development and change, risk taking and employee engagement.

"These programs promote the customer-centric shift we need at NGA," said Ralph Plaskett, a member of the Agency Agility Strategic Initiative Team, which manages the agility training program. "The agency is using agile principles to create an agile mindset."

The LWYC training emphasizes the importance of creating positive, lasting relationships with customers. Consultants Mark David Jones and J. Jeff Kober, who lead the training, contend this is absolutely essential for creating a customer-centric organization. Jones and Kober provide each training participant with a toolkit for obtaining customer metrics and feedback, which can assist them with better understanding their customers and providing tailored support and experiences.

"The LWYC training introduces the best practices of private-sector corporations and public-sector agencies to benefit every part of NGA's wide-ranging operation," said Jones.

Echoing Gandhi's sentiment, Jones also stressed it is not enough to think about and plan to serve customers.

"The emphasis of both agile and Lead with your Customer is on taking action," he said.

On the technology side of the house, NGA has begun to implement Scrum Alliance® techniques along with agile IT development and acquisition methodologies. Scrum is an agile framework for tackling complex projects or workflows. It involves direct engagement (i.e., active dialogue) with customers to determine their IT application needs. Development and acquisition teams then organize around common work objectives.

This modern development process has been shown to better meets customers' needs. Traditional government procurement and IT development processes are time consuming and costly, and often do not fully incorporate users' and security requirements into the development cycle.

"The whole premise of agency agility is that the customer is part of the entire acquisition process," said Karyn Hayes-Ryan, NGA's Agile Champion. "It's all about mission first; that requirements cannot and will not remain constant, but they evolve as the users' missions, needs and requirements evolve."

Nurturing a customer-centric mindset in both NGA's people and approach to IT acquisition and development will enable mission success, positive impact for customers and continuous learning, according to Plaskett. LWYC and agency agility training provide learning opportunities to reach that goal. Through them, and other customer-focused professional development, NGA will continually evolve its workforce and operations to "make things happen" for its customers.

Angela French, Ctr., Xperience Communications also contributed to this article.

FEATURE

GOING THE EXTRA 10,000 MILES TO SERVE CUSTOMERS

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

When it comes to supporting its mission partners, National Geospatial-Intelligence Agency personnel literally travel to the far corners of the Earth.

NGA's customers are decision-makers on the forefront of some of the world's most immediate and complex problems, whether involving national security concerns, humanitarian crises or environmental challenges. When they need geospatial intelligence, they need it where their mission is. That's usually nowhere close to NGA headquarters.

NGA meets its partners wherever they are – geographically, technologically and culturally – and works to empower them, often through training. That means National Geospatial-Intelligence College instructors leave their high-tech classrooms in NGA facilities, grab their passports and board a plane, bringing with them necessary materials and support so that all students can work from the same data.

It is after the plane lands that local challenges often become apparent. That's why it is so beneficial to conduct partner trainings in-country. On the customer's terrain Team NGA is better able to identify potential challenges firsthand and help structure solutions for working around problem issues.

GROWING GEOINT ON LOCATION

International partnerships, including nontraditional alliances, expand Team NGA's mission consequence, helping the agency move beyond the Department of Defense to a wide range of customers. NGA shares its decades of institutionalized knowledge and cutting-edge tradecraft training. NGA's partners, in turn, share data produced by analysts the agency knows and trusts. Partner products often cover areas NGA may not have ever fully mapped, including terrain and shoreline details, sparing the agency analytical and financial resources, as well as providing regional expertise from the people who best know their own backyards.

NGA's collaboration with foreign partners is done primarily through its International Affairs directorate. IA negotiates Basic Exchange and Cooperation Agreements, otherwise known as BECAs, or memorandums of understanding that expand partner nation access to global sources of data. These partnerships create a worldwide GEOINT enterprise that helps both NGA and its mission partners to stay relevant in the face of rapidly evolving situations and capabilities.

Each partner nation has its own goals for growing GEOINT and its own challenges for making it happen. Taking NGA expertise to these partners' locations helps with both.

TECHNICAL CHALLENGES IN AFGHANISTAN

"The U.S. government's goal is to strengthen the government of the Islamic Republic of Afghanistan such that it can never again be a safe haven for international terrorism," said Robert Norris, Ph. D., former director of NGA Task Force Afghanistan. "Part of that strengthening is to provide the necessary intelligence support."

Sometimes, that is easier said than done. In Afghanistan, as in many far-flung locales, low Internet bandwidth and unreliable

connectivity in the region limit data accessibility. In addition, to ensure success, solutions provided must be low- or no-cost and require minimal training.

Captain Ryan Nelson, U.S. Army, is an NGA crisis and expeditionary manager. He says the GEOINT users he has trained in Afghanistan face more extreme obstacles than those in other developing countries.

"We've been in Afghanistan for 15 years now," Nelson said. "But none of it will matter if we don't enable the Afghans to do the work themselves."

NGA's Expeditionary Team capitalized on experience from partners in similar environments to craft a solution with the Afghans. Trainers introduced the Protected Internet Exchange, commonly known as PiX, during a November 2015 training session. PiX provides low-bandwidth data-sharing capabilities and allows Afghan forces to access data themselves rather than requiring formal requests for information be submitted. This is a key stride toward NGA's vision of providing 'self-service' customer options.

"PiX represents an enormous capability for the Afghan Security Pillar," said Army Maj. General Mark Quantock, deputy chief of staff for intelligence, Resolute Support headquarters, and former NGA director of operations. "We are seeing them use the capability to good effect."

Some of the first Afghan students have been able to build imagery, leading to multiple arrests. With the support of NGA experts, an Afghan officer from that initial training led the next session, which took place in January 2016. By using training materials that NGA had translated into Dari, the program was expedited from two weeks to two days.

Training the Afghans expanded NGA's capabilities as well. NGA's success there now serves as a model that can be applied in other parts of the world.

LANGUAGE BARRIERS IN COLOMBIA

Sometimes NGA instructors discover unfamiliar local customs, logistics issues, or in the case of Colombia, simple language barriers. In Colombia, Team NGA was pleased to learn that analysts have access to the same commercial off-the-shelf software available in the United States, but ensuring accurate interpretation was the challenge.

Language barriers may be the easiest problem to solve, however; between NGA's cadre of multilingual employees and NGC's Foreign Language and Culture Office, translation support is another in-house capability that NGA brings to the table.

Liz Vazquez, who has deployed to Colombia with the trainers, facilitates her students' knowledge assimilation and helps instructors reach their learning objectives by ensuring accurate interpretation.

"If I wasn't there, we'd risk losing something in translation," Vazquez said. "Then, all our efforts are wasted."

Dana Fairley-Juarez, an NGC instructor, has conducted training all over the world. Her goal is to build an in-country cadre of skilled users, analysts and instructors by facilitating classes and peer-to-peer conversations. Much of her work involves building confidence as well as capability, context and correlation.

"I really like when people immediately realize how they can use what you've taught them," said Fairley-Juarez.

CULTURAL ELEMENTS IN ETHIOPIA

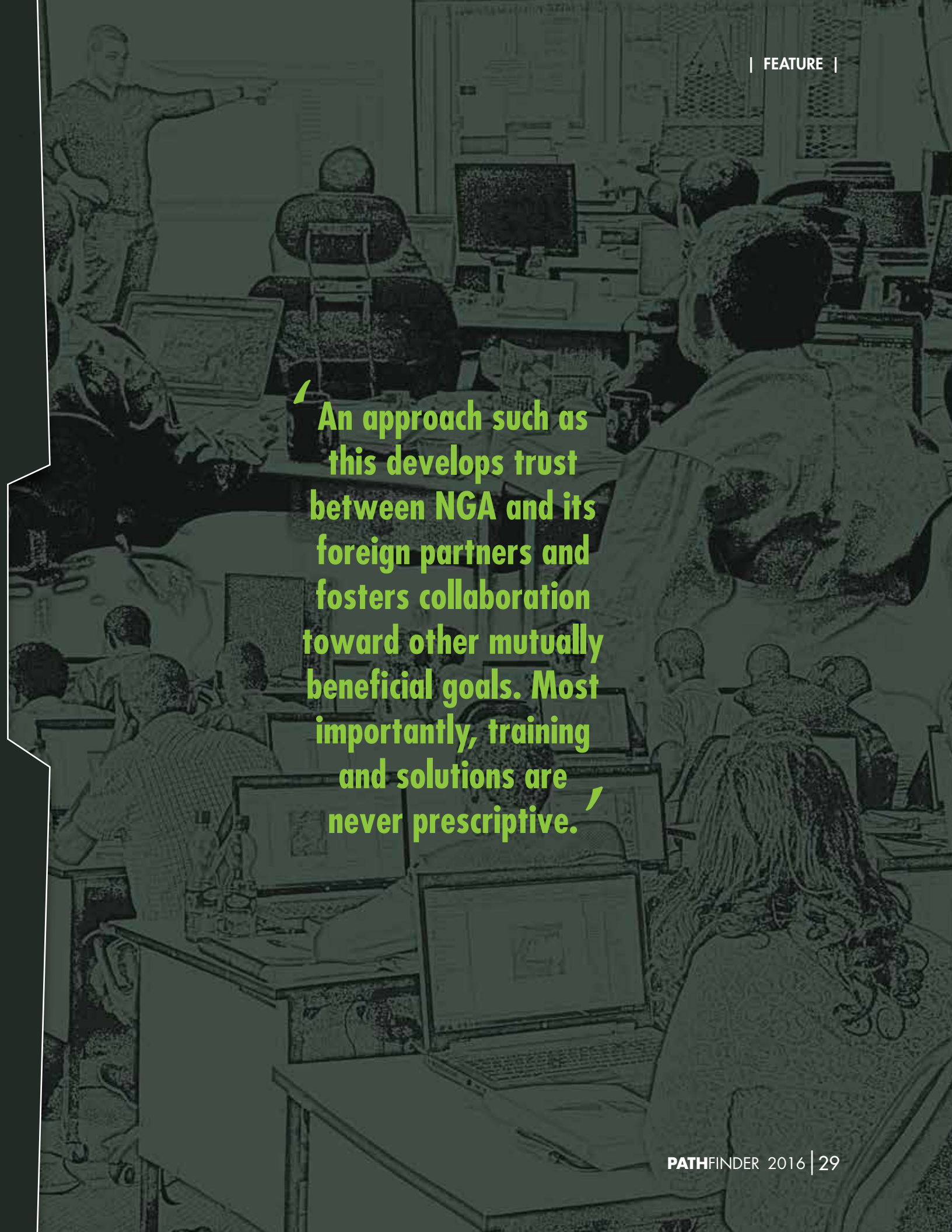
GEOINT trainers and interpreters aren't the only ones involved in programs with foreign partners. Other experts become involved when circumstances warrant.

As Ethiopian analysts completed initial NGA GEOINT training in fall 2015, human geography emerged as an important and relevant topic. In tailoring customer service to meet this need, NGA provided both training and tradecraft standards and data that could be applied to the Ethiopians' work.

Team NGA went beyond simply sharing concepts. Dean Bland, an NGA human geography outreach coordinator, followed up the training with a visit to Ethiopia, where he initiated a joint project. The project combined data with human geography information to create actionable, region-focused products that address relevant thematic elements. In this case, the project team chose to analyze the cultural, tribal and geographical influences that impacted their area of interest.

An approach such as this develops trust between NGA and its foreign partners and fosters collaboration toward other mutually beneficial goals. Most importantly, training and solutions are never prescriptive.

"We don't want our foreign partners bound by how we do things," Bland said. "They understand the context of their region better than any of our analysts could. The only difference is that we have a few years' head start."



‘An approach such as this develops trust between NGA and its foreign partners and fosters collaboration toward other mutually beneficial goals. Most importantly, training and solutions are never prescriptive.’

NGA Precision Guides Historic SpaceX Launch

By Daniel Colling and Dave Abele, Source Geomatics Office

On December 21, 2015, the world watched as SpaceX, a commercial space company, completed a vertical landing after the launch of its Falcon 9 rocket from Complex 13 at Cape Canaveral Air Force Station in Florida. It was a first for SpaceX and a milestone in the space launch industry, as used rocket stages typically are destroyed upon reentry.

National Geospatial-Intelligence Agency involvement was critical to the success of the historic SpaceX event. NGA's Eastern Range Geodetic Survey Branch at Patrick Air Force Base established geodetic control on the launch pad, which provided a dependable three-dimensional location for the landing and recovery of the first stage.

According to SpaceX the ability to reuse the first stage of the rocket will greatly reduce the cost of future launches for customers such as the Department of Defense and NASA. The company reports that Falcon 9 costs roughly $60 million to build, with the rocket engines accounting for the bulk of this cost. The first stage of the rocket is used to propel the payload into space and is normally destroyed upon reentry. Even if built and launched by a commercial company, cheaper space capabilities benefit the government agencies that contract them.

HISTORY OF SUPPORT

NGA and its predecessors have been providing geodic support to the eastern launch range for nearly 50 years, including when the government last used CX13 as a Minute Man missile test site in 1978.

The Eastern Range Geodetic Survey Branch provides precise geodetic surveys and staff support, including recommending geodetic policy, reviewing plans and requirements, assisting offices in requesting geodetic support, and assigning priorities to geodetic surveys for the 45th Space Wing, Patrick AFB. The branch also serves a host of other DOD agencies, ranges and contractors within the southeastern United States and down-range islands. It is one of six branches in the Surveys Division, Office of Geomatics, within NGA's Source directorate.

MONTHS OF PREPARATION

In late December 2014 the 45th Space Wing announced SpaceX would lease CX13 with the goal of establishing a landing pad for launch hardware. NGA's Geodetic Survey Branch began working with 45th Space Wing and SpaceX personnel to re-establish geodetic control at the site, bringing it into the existing launch range control network.

As the team worked, 23 previous geodetic control stations were identified as being near or on CX13, but only four were found to be viable. Geodetic control using WGS 84 positioning (i.e., a set of constants and model parameters that describe the Earth's size, shape and gravity and geomagnetic fields) was essential for the rocket to have the correct coordinates to land after launch. SpaceX requested data accuracy at 1 meter or better, and if possible, they wanted it down to the centimeter level of accuracy.

The government-industry team worked over the next several months to protect the four viable control points and update the passive marks with new geodetic positions and local elevation data. In August 2015 NGA provided WGS 84 geodetic positions (latitude, longitude and ellipsoid height) of the landing pad's center mark and four corner azimuth marks. Team members computed geodetic azimuths from the pad center to each corner mark and database-interpolated local datum values. Our unmatched level of accuracy gave SpaceX added room to work with when computing other launch variables, such as ground-level winds.

The ability to replicate launches like this presents an enormous cost-savings benefit and thus opens the door for cheaper and more efficient space exploration. For that to be possible, accurate and timely geodetic support is required. NGA's Eastern Range Geodetic Survey Branch was integral to the success of this monumental moment.

Daniel Colling and Dave Abele are NGA geodetic surveyors supporting Patrick Air Force Base, Florida.

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.

NGA TRANSFORMATION: MAKING IT PERSONAL

By Sandra J. Simpson, Xperience, and Tamara J. Verdon, Office of Contract Services

It's no secret that Director Robert Cardillo and Deputy Director Sue Gordon are committed to change. They are leading a charge to transform National Geospatial-Intelligence Agency into a more customer-centric agency.

For the past year we have been fortunate to learn what that means up close and personal. We have shadowed the director and deputy director through special events and daily operations to learn more about their vision and strategy for the future. As our year-long shadowing winds down, we have a better understanding of how they approach issues, challenges and opportunities. We also have a good sense of how the agency is doing and where we need to work harder moving forward.

Daniel D. Flash, Ph.D., and James R. Long, Ph.D., in their book *Shadowing for Leadership Development*, define shadowing as, "a technique in which a person wishing to learn a skill accompanies, observes and collaborates with another (mentor), while that person is employing their expertise on a value-producing assignment."

Our shadowing assignment began at the 2015 GEOINT Symposium in Washington, D.C. Our task for the year has been to observe our leaders' interactions and ultimately incorporate our observations into planning for NGA's participation in the 2016 symposium. While NGA is not an event sponsor, participation in the annual GEOINT Symposium is important to the agency, as it serves as a significant gathering place for geospatial intelligence thought leaders from around the world. (United States Geospatial Intelligence Foundation is official sponsor of the GEOINT Symposium.)

What we remember from our very first week of shadowing is how personally invested the D and DD are in NGA's collaboration with the larger GEOINT community. We witnessed some very long days during GEOINT Symposium that we knew were intense, but our leaders still had an exuberance and an energy that was reflected in vendor conversations, the keynote speech and in various panel discussions.

One event that we felt was particularly successful was the NGA acquisition panel discussion. Led by the DD, panel members developed a scorecard, which both they and industry members completed. The NGA panelists actually scored themselves lower than industry did. Why is this worth mentioning? Because NGA now has a better sense of what we [NGA] are doing right. The exercise also helped us identify certain things that are impeding our opportunities for success with industry. The NGA panelists concluded by committing to investing in our acquisition processes and improving our communication with industry. They also committed to bringing the scorecard back to the 2016 GEOINT Symposium for transparency of progress.

With the ice broken through GEOINT 2015, we feel more comfortable engaging with NGA leadership and feel better prepared to use those experiences to help NGA achieve its strategic and tactical goals. NGA is focused on the future, on understanding our customers and in developing our workforce.

Like most federal agencies, NGA faces industry engagement and communication challenges, but we are driving progress through partnering activities beyond the GEOINT Symposium. Examples include participation in USGIF working groups and in Armed Forces Communication and Electronics Assn. and Intelligence and National Security Alliance industry days, where government and industry members converge to collaborate. Since last June, we've worked closely with the USGIF Young Professionals Network and the NGA Professionals Network. Of note, the NPN created the NED Talks series, modeled after TED Talks presentations, a great example of how NGA is empowering its workforce to engage on topics the workforce cares about or has an interest in. An employee-managed talk series is a powerful platform, as it reflects workforce interests and can help leadership understand how well key messages are being received and understood.

As we close our year of shadowing and helping to carry forward our senior leaders' vision for transformation, we think back to points made in *Shadowing for Leadership Development* and to the lessons we have learned through our experience. We believe that keeping these thoughts in mind can help all of us become better leaders of change:

- Have patience. Transformation takes time, and we must have the collective will and patience to realize the vision.
- Don't be afraid to put your hand up and ask questions, or ask for help.
- Engage with everyone you encounter; you never know what you will learn from them.
- Identify a project you want to take on and then own it.
- Change can be chaotic – lean in!

We can only hope that future shadowing teams will enjoy and benefit from the experience as much as we have.

INTERAGENCY COLLABORATION MATCHES MAPPING SERVICES TO CUSTOMER NEEDS

By Josh Laurion, Source Communications

Rapid-deployment units, such as the Army's Georgia-based Fort Bragg Ready Brigade, need thousands of copies of maps during their pre-deployment preparation, and sometimes those maps change during the deployment cycle.

Less than a year after the National Geospatial-Intelligence Agency and Defense Logistics Agency instituted a new operational model for producing and delivering the most up-to-date mapping products possible, the interagency framework has demonstrated it can deliver as many as 25,000 freshly updated and printed maps within 24 hours.

"These timelines were unthinkable just two years ago but are routinely exercised every quarter today," said Dale Kornuta, director of the NGA Geospatial Intelligence Information Services Office.

The new model employs the benefits of technology to also meet the warfighters' need for digital media (e.g., CD, DVDs), and the agencies are looking toward delivering additional media formats, such as standardized external hard drives, that would enable warfighters to retain a holistic view of their operating environment. On top of that the collaboration is lowering costs and reducing the time necessary to fulfill mapping requirements for customers of all kinds.

The NGA-DLA partnership established a business model whereby NGA posts map files online, and printing is staged at DLA locations around the world. The print-on-demand process ensures combatant commands have the ability to obtain updated maps and charts when, where and how they need them.

"Print-on-demand is a game changer for the warfighter. We have reached a tipping point that enables the NSG, ASG, our co-production allies and DLA to deliver updated maps to units directly from NGA's digital holdings or cyber-hardened databases staged forward," said Kornuta.

NGA completed the transfer of the hard-copy print mission to DLA in June 2015 to reduce costs and print times. The move also unwittingly created an economic engine based on a new unifying commodity of exchange now used between production offices, agencies and partnering countries – a print-ready georeferenced PDF file.

"Transitioning the print mission to DLA enables each agency to do what we uniquely do best," said Kornuta, "NGA is marvelous at geospatial intelligence. DLA is marvelous at logistics."

NGA now maintains over 100,000 print-ready map files that are seamlessly updated in the DLA Catalog. These maps are made available through Map of the World visualization or print-on-demand web services, allowing customers to view maps electronically, print hard copies or order thousands of hard-copy maps or data disks through DLA.

NGA and DLA also use their new business model to respond to world events. During the Ebola crisis in West Africa, maps, charts and atlases were printed on an as-needed basis and helped deployers and humanitarian aid workers mobilize within two weeks of the initial request for mapping products.

In years past, printing timelines required months to years to build up warehouse stocks, making the map products essentially obsolete from the moment of issue. The traditional printing process also required minimum print quantities, resulting in warehouses filled with surplus paper stockpiles. Obsolete maps were sometimes retained in inventory for years or decades.

New updates required replacing the existing hard-copy shelf stock with the latest revision, which was a costly and time-consuming process.

The agency collaboration has changed all of that.

"We have the vehicle in place to print exactly what the customer needs; nothing more, nothing less," said Kevin Bettis, chief of DLA's Aviation Division. "We reduced the paper stock reserve by over 90 percent, disposing of over 135 million maps."

> **"The interagency collaboration has reduced the excessive war reserve and the associated costs, but the number-one benefit is our ability to provide the most up-to-date maps to the warfighter,"**

DLA initially stood up its print-on-demand capabilities in January 2014. Within the first year the agency reported that print volumes decreased by 50 percent, an estimated savings of $7 million. Over the next 35 years, DLA estimates a savings of tens of millions of dollars.

DLA has also reduced delivery times and shipping costs by printing maps closer to its customers. Print-on-demand locations are strategically sprinkled across the globe – in California, Florida, Georgia, Hawaii, South Carolina, Virginia, Germany and Japan.

"The interagency collaboration has reduced the excessive war reserve and the associated costs, but the number-one benefit is our ability to provide the most up-to-date maps to the warfighter," said Bettis.

MULTILATERAL PARTNERSHIPS TYPIFY TEAM GEOINT ERA

By Kelly Graveline, NGA Communications

NGA cannot do it alone. NGA will not do it alone.

Such candid language is not typical from government leaders, but that is exactly what Robert Cardillo has been saying since he became director of the National Geospatial-Intelligence Agency in October 2014. He has taken every opportunity to emphasize that NGA must partner to be successful in today's global environment – a market in which the proliferation of commercial services means that NGA no longer has a monopoly over geospatial information. The agency's strategy articulates embracing the contributions of the agency's strategic partners as one of its four main goals.

Key members of what Cardillo calls 'Team GEOINT' are NGA's international partners, with whom NGA partners to share geospatial information and knowledge. The NGA Office of International Affairs negotiates the agency's sharing agreements, both unclassified and classified, and works to ensure the relationships are beneficial to all parties. Once the agreements have been negotiated, IA coordinates with other NGA directorates, such as Source, for their execution.

"Source executes many of the Foundation GEOINT agreements through the Office of Geography [known as SFG inside NGA], in collaboration with the NSG [National System for Geospatial Intelligence] Operations Executive, for the coproduction and exchange of topographic data and products," said Marzio Dellagnello, chief of the international branch of the Office of Geography. Aeronautical and hydrographic exchanges are executed through two other Source offices.

"NGA's international partnerships provide an enormous value to the United States," said Melissa Planert, former deputy director of the Partnerships Division within IA. "Agreements between NGA and international partners help the president, National Security Council, DNI [Director of National Intelligence] and DOD [Department of Defense] build relationships abroad to contribute to our own national security."

The Multi-National Geospatial Co-production Program is an example of an NGA international partnership. Since 2003, the MGCP managed by SFG, has grown to include 31 member nations. It serves as a marketplace for unclassified vector data. Member nations focus on their part of the world and provide data to share with other members.

NGA partners with 73 additional countries through unclassified, bilateral Basic Exchange and Cooperative Agreements, which focus on the sharing of basic mapping data. Although BECAs are considered lower-level sharing agreements, they serve an important role in expanding international partnerships. (See related story, page 26.)

"Because of the unclassified nature of a lot of geospatial information, sharing agreements often serve as a starting point to establishing a new relationship with a foreign government," said Martin Tierney, director of the Partnership division.

The explosion in commercial imagery has further fueled NGA's ability to partner with foreign governments.

"Because the geospatial capabilities of other nations have increased, there is a greater return on investment for both parties," said Tierney.

Based on the success of the MGCP, the United States established a multinational coproduction and sharing agreement led by NGA and Germany's Bundeswehr GeoInformation Centre. The TanDEM-X High Resolution Elevation Data Exchange program, known as TREx, illustrates how the value of these kinds of partnerships often exceeds the technology available without them.

"Together with Germany, we've reached out to other nations to share post-processing of data in a way that is mutually beneficial to all that participate," said Mark Sorum, NGA's TREx lead.

On the international side, TREx is the result of a public-private partnership between Germany's Aerospace Center and Airbus Defence and Space, which represents 86 different nationalities. The two tech giants joined forces to launch a dual-satellite system to collect digital elevation data with the purpose of modeling the entire earth. Elevation data, also called terrain data, provides a digital representation of the earth's surface — mapping hills, valleys, mountains and other surface attributes.

Through sharing agreements, the TREx member nations are provided access to the unclassified raw elevation data collected by the TREx constellation for free, in exchange for edited data to share among members. By participating in the alliance, NGA is able to increase its elevation data holdings and enhance its expertise, said Sorum, who has spent the majority of his 34 years at NGA working within the elevation data discipline.

The benefits of NGA's international partnerships often run much deeper, beyond new capabilities, according to Sorum.

"It has been fascinating to see how well and how naturally people from such diverse cultures pull together," he said. "I've seen friendships form between Turkish and Chilean representatives, and Mongolian and Japanese. I think that programs like TREx and MGCP do more than provide cost-effective production solutions. I believe these efforts truly strengthen the bonds between coalition partners."

The TREx Alliance is another example of 'mission sharing,' which has become increasingly important due to budgetary constraints, a constant increase in requirements and the pace of today's 24/7 world.

NGA is also currently exploring the feasibility of establishing an additional multinational program, this one targeting the coproduction of human geography. HG is the study of human presence, patterns and activities within their physical environment. The HG multinational effort promises to deliver useful information, especially in areas of the world where NGA's partners are more familiar with local customs than the agency is. Although still in its nascent phase, NGA is enthusiastic about the potential benefits to all members of the HG partnership.

"Wherever we go, whether it is for a humanitarian assistance and disaster relief mission, or Iraq and Afghanistan, we operate in a multinational environment," said Tierney. "This is where our partnerships come to bear."

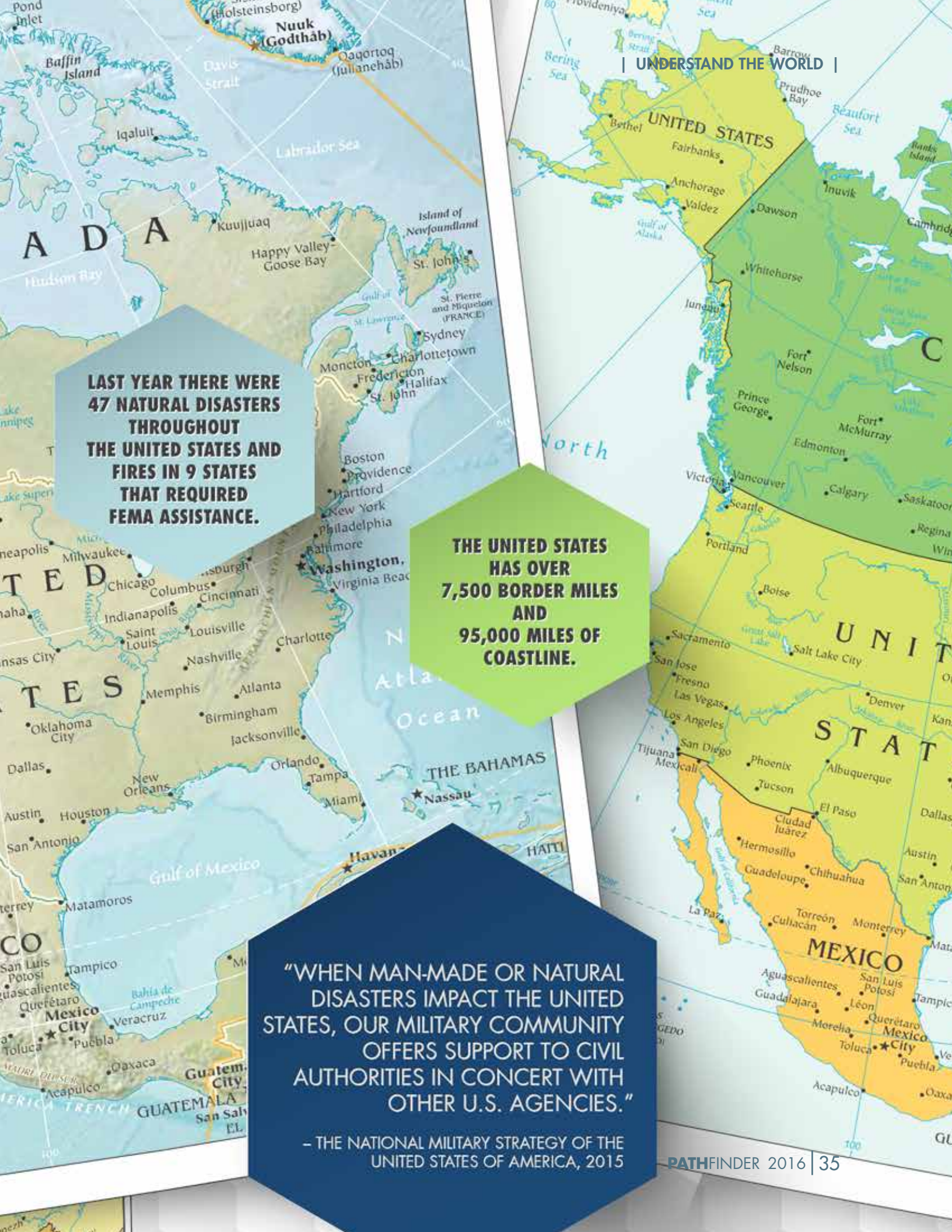
USNORTHCOM

INFORMATION PROVIDED BY NGA OFFICE OF GEOGRAPHY

USNORTHCOM PROVIDES COMMAND AND CONTROL OF DEPARTMENT OF DEFENSE HOMELAND DEFENSE EFFORTS AND COORDINATES DEFENSE SUPPORT OF CIVIL AUTHORITIES, CIVIL SERVICE EMPLOYEES AND UNIFORMED MEMBERS REPRESENTING ALL SERVICE BRANCHES.

WITH OVER 20 MILLION PEOPLE, MEXICO CITY IS THE LARGEST SPANISH SPEAKING METROPOLIS IN THE WESTERN HEMISPHERE.

THERE ARE OVER 364 INDIGENOUS LANGUAGES IN MEXICO.



LAST YEAR THERE WERE 47 NATURAL DISASTERS THROUGHOUT THE UNITED STATES AND FIRES IN 9 STATES THAT REQUIRED FEMA ASSISTANCE.

THE UNITED STATES HAS OVER 7,500 BORDER MILES AND 95,000 MILES OF COASTLINE.

"WHEN MAN-MADE OR NATURAL DISASTERS IMPACT THE UNITED STATES, OUR MILITARY COMMUNITY OFFERS SUPPORT TO CIVIL AUTHORITIES IN CONCERT WITH OTHER U.S. AGENCIES."

– THE NATIONAL MILITARY STRATEGY OF THE UNITED STATES OF AMERICA, 2015

Mapping Alaska and the Arctic

National Geospatial-Intelligence Agency and National Science Foundation are collaborating with the University of Minnesota's Polar Geospatial Center and the private sector to create the first-ever publicly available, high-resolution, satellite-based elevation map of Alaska by mid-2016, and of the entire Arctic by the end of the U.S. Chairmanship of the Arctic Council in mid-2017. These digital elevation models, known as DEMs, are derived from NGA-sponsored DigitalGlobe commercial imagery and will support informed land management, sustainable development, safe recreation and scientific studies, as well as domain-specific challenges inherent to the aviation, transportation and defense industries. In addition, the DEM will serve as a benchmark against which future landscape changes (due to, for instance, erosion, extreme events or climate change) can be measured.

Department of Interior/U.S. Geological Survey, in partnership with the State of Alaska, is leading efforts to fly the Alaskan Arctic with new sensors, generating Interferometric Synthetic Aperture Radar data that will complement the Alaska and Arctic DEMs. This will improve maps and elevation models of these regions to unprecedented levels of accuracy.

NGA has developed and is making available in both hard-copy and explorable digital formats the most comprehensive pan-Arctic map ever published by the U.S. government. The map will include layers such as Arctic Routes, Arctic Currents, Oil Production Sites, Gas Production Sites, Oil Drilling Areas, Oil and Gas Reserves, Airfields and Ports, Bathymetric Data, Digital Terrain Elevation Data and Natural Earth (including rivers, railroads and populated places). The map will be easily accessible on NGA's Arctic website, along with links to Alaska DEMs, NGA's 28 nautical charts for the Arctic region, a collection of Arctic sailing directions and links to other Arctic websites and resources.

To learn more visit NGA's
Arctic website at
http://nga.maps.arcgis.com