THE POWER OF GEOINT

Report Documentation Page

1. REPORT DATE **JAN 2011**	2. REPORT TYPE	3. DATES COVERED **00-00-2011 to 00-00-2011**

4. TITLE AND SUBTITLE **Pathfinder. Volume 9, Number 1, January/February 2011**	5a. CONTRACT NUMBER
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **National Geospatial-Intelligence Agency,Office of Corporate Communications,4600 Sangamore Road, Mail Stop D-54,Bethesda,MD,20816-5003**	8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**24**	

Putting the Power of GEOINT in Your Hands

NGA wants to put the power of GEOINT in your hands. That is our vision for the way ahead. We want to make it easier for our users—NGA analysts, national policymakers, warfighters, Intelligence Community partners and first responders—to have the GEOINT they want when and where they need it. We are actively pursuing two near-term goals to help us achieve that vision.

First, we want to fundamentally change our users' experience by providing online, on-demand access to NGA's GEOINT knowledge, services and content. We will use current and emerging technologies to put our resources into users' hands and give them the power to interact with and update this data and information in near-real time. We will create new GEOINT tools so that users can access global foundation, imagery, product and activity layers online whenever and wherever they need to, much the way we access data today with our personal smart-phone apps.

NGA's second goal is to create new value by augmenting our GEOINT analytic expertise so that we can provide deeper contextual analysis, informed not only by imagery, imagery intelligence and our study of the Earth's physical features but also by human geography. Human geography examines the world's cultures and cultural behaviors, looking at such factors as tribal boundaries, birth and death rates, ethnicity and languages. The robust incorporation of human geography into our analytic tradecraft combined with the use of technology will help us make sense of larger and larger volumes of data. This will enable us to discover patterns, trends, signatures and correlations by reviewing these complex datasets through a spatial and temporal lens. The resulting analysis deepens and enriches our understanding of a "place," giving policymakers and operators more of what they need to make plans and allocate resources over a longer timeline. They can use this information to focus on an issue before it becomes a crisis, leverage assets more effectively and consider a broader range of options.

In this edition of the Pathfinder, you will learn about how NGA is already moving forward on our new vision, both organizationally and operationally. One of our feature articles looks at how we're putting management teams in place to focus on our near-term goals. Another reviews how the National System for Geospatial Intelligence is transforming into an integrated GEOINT enterprise through building an Application Service Provider/Infrastructure Service Provider construct. ASP/ISP provides incredible speed and flexibility to move NGA toward a more user-focused approach to delivering GEOINT to warfighters and first responders. Many of the other articles in this edition highlight how various NGA offices have already been moving toward our vision.

NGA's new vision represents our commitment to becoming an on-demand, service-based provider of GEOINT, giving users intuitive access to our holdings and providing everyone, from novice to expert, the means to take advantage of our knowledge for their own mission purposes. We have said to our internal and external users that we want to put the power of GEOINT in your hands. We are now turning that vision into reality.

Letitia A. Long

LETITIA A. LONG
Director

Contents

NGA photo collage

6

PATHFINDER

On the Cover

NGA wants to put the power of geospatial intelligence in your hands. We want to make it easier for our users—NGA analysts, national policymakers, warfighters, Intelligence Community partners and first responders—to have the GEOINT they want when and where they need it. *Cover design by Ronald Kee.*

Thinkstock Photo

NGA photo

Air Force Lt. Gen. John C. Koziol, Deputy Under Secretary of Defense (Intelligence) for Joint and Coalition Warfighter Support and the Director of the Department of Defense Intelligence, Surveillance and Reconnaissance Task Force, visits the NGA booth at the recent GEOINT Symposium in New Orleans.

Record Attendance Marks 2010 GEOINT Symposium

From Nov. 1 to 4, 2010, the National Geospatial-Intelligence Agency participated in the U.S. Geospatial Intelligence Foundation's GEOINT 2010 Symposium in New Orleans.

More than 4,000 participants—including NGA speakers, panel members, exhibitors and staff attended the event at the Ernest N. Morial Convention Center. According to USGIF, this year's symposium boasted a record number of attendees, exhibitors and speakers.

The symposium's theme highlighted "Geospatial Intelligence 3.0 … A New Era of GEOINT."

NGA Director Letitia A. Long presented her vision— "Putting the Power of GEOINT in Your Hands"—in her keynote address at the symposium. (See related article, p. 6.)

Senior leaders from throughout the Intelligence Community—including Director of National Intelligence James R. Clapper Jr. and Vice Chairman of the Joint Chiefs of Staff U.S. Marine Corps Gen. James E. Cartwright—rounded out the keynote addresses.

This year's symposium will be Oct. 16 to 19 at the Henry B. Gonzalez Convention Center in San Antonio and feature the theme "Forging Integrated Intelligence."

DOD Photo

Ken Brewer

NGA Team Member Recognized at DOD Disability Awards Ceremony

National Geospatial-Intelligence Agency team member Ken Brewer received the Department of Defense Outstanding Employee with a Disability award Dec. 7 in Bethesda, Md., at the 30th Annual DOD Disability Awards Ceremony and 23rd Annual DOD Disability Forum.

Dr. Clifford L. Stanley, Under Secretary of Defense for Personnel and Readiness, joined NGA Director Letitia A. Long in recognizing Brewer with this honor and presenting him with the award.

"I am honored to be named as one of the DOD's Outstanding Employees with a Disability," Brewer said. "This is an unforgettable moment in my life."

The award recognizes Brewer for his commitment to NGA's Safety of Navigation mission as a marine analyst and as an ambassador for the NGA core values of excellence, accountability, respect, teamwork and honesty, or E.A.R.T.H.

Brewer was one of 18 recipients from across DOD agencies and was the only recipient for NGA. Brewer was joined by 14 family members at the ceremony, including his two sons and his mother and father.

Emergency Center Opens

On Dec. 15, 2010, Fort Belvoir, Va., officials opened the doors to a state-of-the art emergency service center near the National Geospatial-Intelligence Agency Campus East in Springfield, Va.

According to Army Col. John Strycula, Fort Belvoir Garrison Commander, the new center will "protect and serve our Fort Belvoir partners and our (NGA) neighbors across the street."

The center provides life-saving emergency support to Fort Belvoir and the surrounding communities, including NCE and the Fort Belvoir Child Development Center.

U.S. Army Corps of Engineers officials from the Baltimore District, including project manager John Pitts and officials representing the general contractor, Grunley/Goel Joint Venture, LLC, and Fairfax County attended the opening ceremony.

Fort Belvoir broke ground on the $7.2 million, 14,700 square foot center on Barta Road in July 2009.

While not a Base Realignment and Closure project, BRAC-related growth at Fort Belvoir created the need for an additional fire station within easy reach of Fort Belvoir facilities and tenant agencies. The center was built to Leadership in Energy and Environmental Design Silver standards, demonstrating the military's continued commitment to the environment.

NGA Photo

Activities Ramp Up to Put the Power of GEOINT in Your Hands

By Regina Genton

Work to implement the Director's two near-term goals to achieve NGA's vision is under way, with the target of unveiling new capabilities at the next GEOINT Symposium, scheduled for October 2011. This will coincide with NGA's 15th anniversary as an agency.

NGA director Letitia A. Long established NGA's vision and goals at the last GEOINT Symposium held in New Orleans this past November.

Her goals as stated then were simple and straight-forward:

Goal One: To provide online, on-demand access to our GEOINT knowledge.

Give our customers—from novice to expert—access to our content, our services, our expertise and our support—and to tools that allow them to serve themselves.

Goal Two: To create new value by broadening and deepening our analytic expertise.

Provide deeper, contextual analysis of places informed not only by the Earth's physical features and imagery intelligence, but also by human geography.

Implementing goal one will result in a suite of online services that will make it easier for customers and users to discover and access products, as well as interact with dynamic content through visualization and geographic information system applications. While implementing goal two will change the way NGA does analysis, it will also deliver new products and services based on anticipating when, where and why activities and events may occur.

Overall implementation will be led by Mary M. Irvin, the former Director of the Source Operations and Management Directorate. Three implementation

NGA Collage

leads will orchestrate the activities necessary to achieve the goals under Irvin's direction.

The implementation lead for Analytic Depth is John A. Goolgasian, the former director of the Office of Counterterrorism. The On-Demand Services implementation lead is Keith A. Barber, formerly the director of the National System for Geospatial Intelligence Expeditionary Architecture Integrated Program Office. Marshall B. Harper, the former director of the FBI NGA Support Team, is the implementation lead for Enterprise Development and will provide program and budget support, business process reengineering and other enabling services.

"We've spent a great deal of time thinking about the right kind of governance for this initiative," said Irvin, "and we're comfortable with executing these changes with a relatively small core team, with most of the work being performed by the key components, on a matrix basis."

To ensure that on-demand services are packaged and presented in a modern and useful way, the NGA director announced a contest by which the work force could compete to help define the look and feel of NGA's future online presence. Fifty-one teams successfully registered; winners will be announced in early February 2011.

"We really got a great reception for the contest," said Long. "It definitely shows that the work force is excited about being a part of implementing NGA's vision. I am confident we will receive many good ideas we can use to make our GEOINT knowledge easier to access and more intuitive to use, regardless of whether that user is a novice or an expert."

The director wants to "fundamentally change the user experience" so that NGA's diverse customer base can "serve themselves" through NGA's online presence. To do that, the Vision Implementation Team will integrate a large number of NGA's existing technical capabilities, while developing the new business processes necessary to operate as an online, on-demand geo-data, information and knowledge service for the Community. The NGA "App Store" will add to these integrated capabilities by allowing end users to perform all kinds of geospatial processing and content access on their desktops or even on tablet and mobile devices.

"We want our customers to be able to deal with the NGA enterprise with a coherent set of online capabilities," said Barber. "Currently, we provide too many different ways to obtain our products and services—and they're not as responsive as what our customers need nor what they expect from interacting with commercial Web sites and tools."

Broadening and deepening NGA's analytic expertise is a fundamental step to being able to deliver new products and services that make use of the context that is gleaned from human geography. Understanding the interrelationships among all GEOINT factors will enrich the analysis process—and the ability to develop signatures, patterns and correlations.

Once this foundation is in place, it is expected that NGA will be able to offer more "anticipatory" types of analysis to meet customers' needs.

"What's exciting about implementing the director's second goal are the possibilities that it offers," said Goolgasian. "As our customers' problems get more complex, our analytical techniques have to improve and expand. The best part is we will be able to deliver these products and services through our new and improved online presence."

NGA's plans for addressing the full scope of the director's vision include implementation over a two- to three-year period. Agile development techniques, continuous improvement and employing commercial best practices will all be part of Putting the Power of GEOINT in Your Hands. ▣

ǀ *Regina Genton is the Senior Advisor for Strategic Outcomes.*

The National System for Geospatial Intelligence: Enhancing the Value and Reach of GEOINT

By Ann R.

National and homeland and humanitarian requirements rely on the quality, richness and usability of geospatial intelligence data. In October 2010 the GEOINT functional manager submitted the 2010 annual report to the Director of National Intelligence, that outlined the successes of the National System for Geospatial Intelligence and detailed how GEOINT remains an essential element for solving the challenges faced by the Intelligence Community. Many of these successes are a direct result of NSG efforts to encourage multiagency cooperation, increase access to information, and develop a uniform curriculum for geospatial professionals and presage the potential for further advances.

Community Through Cooperation

Successful functional management requires multiple agencies, commands and departments to jointly address challenges and crises. The system outlined by the Unified GEOINT Operations program assesses, aligns and executes GEOINT operations across partner organizations to ensure efficient collection, analysis, dissemination and evaluation of GEOINT, resulting in knowledge management, more collaborative partnerships and information sharing, better analytic tools, and the adoption of best practices and procedures.

In 2010, a number of natural disasters put that system to the test. In a two-week period, the NSG responded to and coordinated relief efforts on six natural disasters: three typhoons, two earthquakes and a tsunami affecting Indonesia, Tonga, Samoa, Philippines and Vietnam. By moving mission, not people, the U.S. Pacific Command Joint Intelligence Operations Center leveraged Unified GEOINT Operations partners throughout the Pacific region to produce a wide array of specialized support products.

Humanitarian assistance and disaster recovery efforts following the Jan. 12, 2010, earthquake in Haiti also exemplified how the UGO process improves GEOINT access and sharing. UGO assessed NSG capabilities, aligned and coordinated collection resources, and executed smart analysis and exploitation, which enabled analysts to make more than 320 images available for relief operations. Additionally, an advanced GEOINT Research and Development Light Detection and Ranging sensor with processing, exploitation and dissemination capabilities provided unique, near real-time situational awareness for relief workers and decision makers on the ground.

However, working together on crises cannot replace long-term, day-to-day interactions. National Geospatial-Intelligence Agency Director Letitia A. Long continues to stress the importance of placing NGA employees within the footprints of other NSG members. NGA Support Teams, in over 200 locations worldwide, foster collaboration with domestic and international partners and significantly improve the integration of GEOINT, understanding of GEOINT capabilities and availability of GEOINT for mission execution.

Making GEOINT Accessible

This past year, the NSG aggressively focused on new ways to discover, exploit and move knowledge and data while protecting against compromise. Improved GEOINT dissemination and access for warfighters remains the top NSG priority. The delivery of the NSG Expeditionary Architecture enabled rapid, effective and efficient delivery of GEOINT data and services to warfighters and to the NGA analysts supporting them.

Sometimes accessibility is as simple as moving information across multiple systems that speak the same language. Doing so, however, is not an easy task. In an effort to modernize its information-sharing capabilities, the NSG promulgated more than 100 GEOINT standards for the Department of Defense and Intelligence Commu-

nity. These standards better align NSG efforts and ensure interoperability, but focusing on defense and intelligence issues is not sufficient. This last year, the federal government civilian geospatial standards board accepted 64 of 65 recommended standards from the NSG. During earthquake response efforts in Haiti and Chile, NSG analysts brought this new alignment into play, using a standardized tagging and naming structure for all NSG GEOINT products, making the products available to remote locations with limited communications.

Successfully making data available also requires keeping it safe. The GEOINT functional manager presided over the launch of the initial operating capability of the Counterintelligence Threat Mitigation Center on Sept. 8, 2009. Called a benchmark for the U.S. counterintelligence community, the TMC is an integrated operations center and transformational partnership of selected NSG elements and various counterintelligence, intelligence and law enforcement organizations. Its mission includes protecting NSG personnel, technologies and capabilities from loss or compromise by using systemic detection, assessment and mitigation strategies.

Maximizing Mission Performance Through Professional Development

Strengthening mission performance starts with an expert, diverse and collaborative global work force that rapidly shifts and surges to address changing security challenges and intelligence priorities. The NSG is pushing toward curriculum sharing among its members and partners to help build high-quality GEOINT professionals, fostering a participatory culture and reinforcing collaboration as a vital part of training.

In 2010, the National Geospatial-Intelligence College continued to build joint training ventures and share best practices for designing and delivering education and training programs across the

Defenselink Photo

NSG. The advent of extended learning sites made GEOINT training more accessible to NSG members and partners within the United States, while mobile training teams ensured that the same high-quality training was available to partners around the world.

Additionally, U.S. Joint Forces Command continues to collaborate with other NSG members to develop a joint GEOINT curriculum to improve support to both military and civil operations. Their efforts produced an online GEOINT overview course for military and civilian members who use or produce GEOINT. Work continues on GEOINT cell and GEOINT officer courses.

Eye to the Future

2010 was a significant year for the NSG. For the past several years, the NSG has devoted significant resources and time to building a strong foundation for GEOINT functional management. The GEOINT community has a big year ahead and equally large challenges. By continuing to focus on collaboration, access and training, the NSG should realize equally impressive accomplishments in 2011. ▭

Ann R. is a staff officer in the Office of Geospatial Intelligence Management.

New NGA Capability Brings Transparency to Requests for GEOINT

By Jeri Jones

Analysts with the National Geospatial-Intel-ligence Agency and the consumers of geospatial intelligence can now easily submit and track their GEOINT information needs thanks to a new NGA capability.

The GEOINT Information Management Services system, in place since July 2010 and known as GIMS, employs automated processes similar to those used by commercial companies. These processes make GEOINT requests easier and more transparent from start to finish.

"I think [GIMS's] biggest strength is that it brings the NGA analyst into the requirements managing [process], giving them transparency in the tracking cycle—from the intelligence request to the final product," said a strategic analyst at NGA.
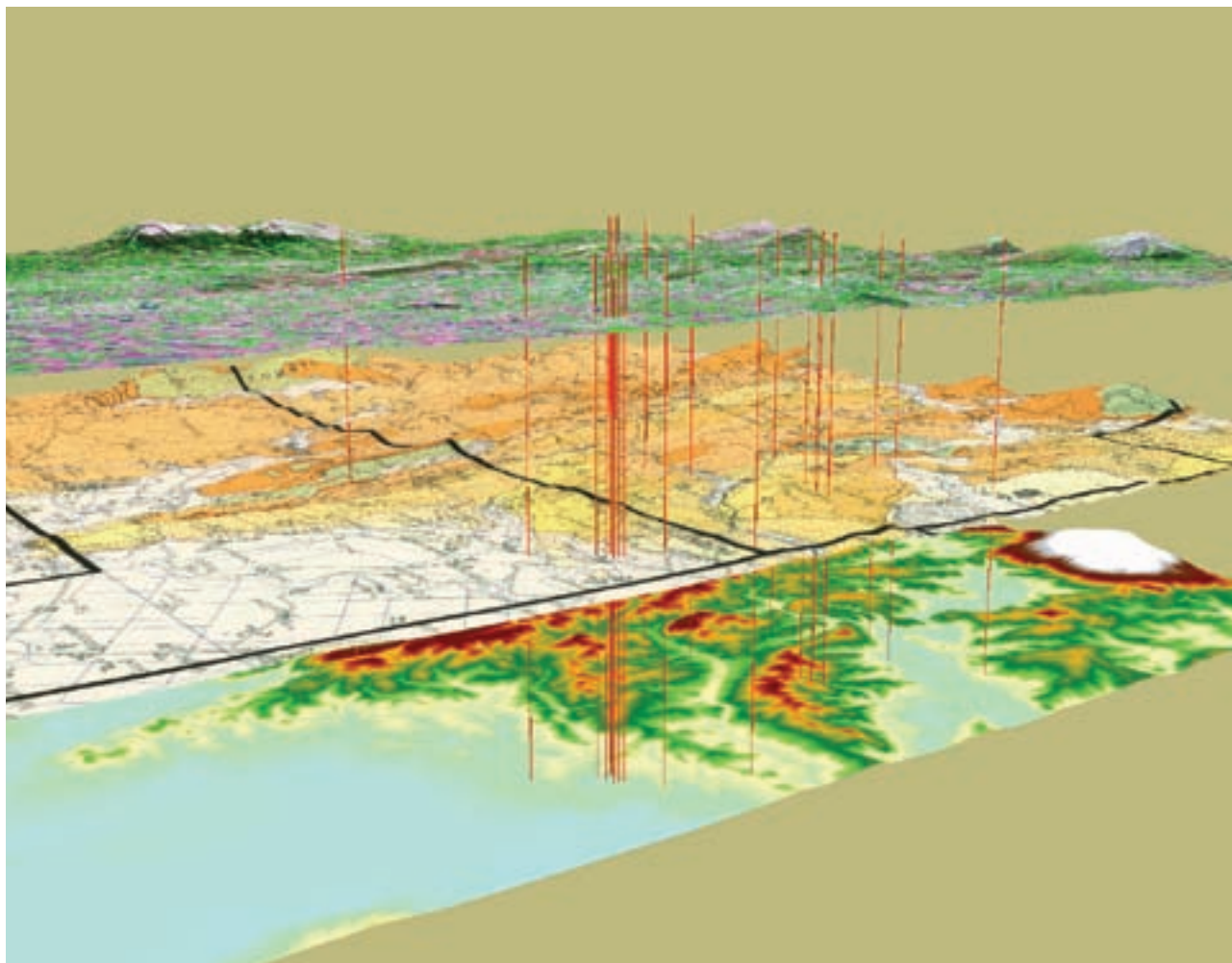
The image above is an example of a geographic information system application combining information on elevation and human geography. Image courtesy of Satellite Imaging Corporation.

NGA is taking the lead in bringing its imagery analysts into the GIMS workflow, according to a technical collection officer in the agency's Source Strategies Office. GIMS's FedEx-like user interface, used to track imagery requests, allows the analyst and GEOINT consumer to see exactly where their requests are in the process. In this way, GIMS mirrors how FedEx tracks the package delivery life cycle that ensures efficiency and transparency.

To track requirements "a lot of [agencies] within the Intelligence Community use e-mail or spreadsheets, so essentially they're blind to the process," the officer said. "With GIMS, they can see exactly where their requirements are, making the process a lot more transparent."

GIMS replaces the agency's 15-year-old architecture, the Requirements Management System, and is much easier to use than its more complex predecessor. Users can access GIMS through a Web browser on their desktop with no special software. And in about five data fields, even a novice user can task for a specific image. GIMS allows the user to view that tasking once submitted, view others' taskings within the same organization and search for taskings in a particular region of interest, then subscribe to imagery in that region.

GIMS also eliminates stovepipes, integrating systems such as Geospatial Visualization Services, Net-Centric GEOINT Discovery Services and even Google Earth, so users can research and find images already available in their region of interest.

To capture the needs of the user, GIMS relies on the GEOINT Information Needs system, or GINS. In the same way that TurboTax software completes the tax filing process for the consumer, GINS fills in knowledge gaps to fill requests based on users' answers to preliminary questions.

"Let's say I have an intelligence need," explained the GIMS program manager. "The system takes the information and makes decisions for me… as a user, I don't have to know every possible provider of data—what sensors will be used or the technical parameters to get the right information. Once the user provides enough of the right information, the system does the rest."

GIMS offers many benefits to the user by centralizing the agency's task management system and, for the first time, managing commercial and government assets in one system. GIMS not only enhances NGA's current collection management capability but also provides a foundation for the integration of new sources and technology into the future.

The GINS system within GIMS is a foundation piece the user can build on. For that reason, while the basics are in place now, the GIMS of tomorrow will likely look completely different. According to the GIMS program manager, when the mission partner comes up with a new data source or new intelligence or information need, NGA will have the ability to make that source available through GIMS, without the need to deliver new software. Instead, that new source will be added to the existing construct.

"Let's say I need to get home, and currently the system looks at what's the best way to get there, whether it's a traffic report from a helicopter or other means," he said. "In the future, there may be road sensors in the road—which would mean better sources of data—and users will get better answers from GIMS to their intelligence needs. We'll be better able to provide users in the future with a total intelligence picture." ⊓

Jeri Jones is a contract employee in the Office of Corporate Communications.

Seeing Into the Future: InnoVision Studies Reveal Growing GEOINT Challenges and Opportunities

By Joanna D. and Dr. Dick B.

Recently the National Geospatial-Intelligence Agency's InnoVision Directorate sponsored two studies to identify key issues and implications for NGA's operating environment now and in the future.

The RAND Corporation and the National Academy of Sciences completed the studies with participation from government agencies and labs, including Pacific Northwest National Laboratory and the National Oceanic and Atmospheric Administration's National Geodetic Survey, as well as numerous universities.

The RAND study addressed two broad questions: How future global development and trends result in new operational demands being placed on NGA and the Intelligence Community, and associated with that, what future technologies might be available to help meet new needs.

The National Academy study focused on discerning the likely growth areas of future geospatial intelligence science where research initiatives will be needed to support the production and analysis mission.

The variables of the studies were trends in global, geopolitical and science and technology developments—including economic, financial security, terrorism, weapons of mass destruction and military strategy factors. Preliminary conclusions from both studies showed that NGA will likely see significant operational changes.

Some of the broad conclusions included:
- » Current problems continue to be more difficult based on emerging powers, technology advancement, decreasing threat signatures and increased demographic, climate and environmental stressors.
- » Nontraditional threats and new intelligence consumers assume increased importance, for example:
  - Unsecure western hemisphere with hyper-violent failed states on borders
  - Do-it-yourself biotechnology as weapons of mass destruction
  - Expanding demand for situational awareness and human geography in contested dense urban environments
- » Flexibility, agility and adaptability become a strategic competitive necessity.

More specific conclusions include:
- » It will be possible to know at all times where everything is globally and in cyberspace—people and things.
- » Source boundaries will blur, making intelligence-based ownership of data an obsolete concept.
  - Ubiquitous sensing of georeferenced, time-tagged multimedia

The Albert Einstein Memorial Statue at the National Academy of Sciences in Washington, D.C., depicts a great scientist and Nobel Prize winner who serves as a model of innovation in scientific research disciplines.
Photo courtesy of Wikimedia

data, available on a global scale, will overtake traditional government methods.

- Citizen-acquired, useful geospatial information could become the norm in the future.

» Exabyte-scale computing power will be used to make sense of the vast quantities of real-time, continuous collected data.

- Creative tools not tied to traditional methods will emerge to exploit massive data on new problems from new sources.

» A new, different set of work force skills will be needed to handle the new technology and data environments and new analytical challenges.

Dr. Greg Smith, InnoVision's dual-hatted deputy director and chief scientist, reacted to these conclusions saying, "When you think about the wealth of data available coming from so many non-traditional GEOINT sources, new areas of research will be needed to take advantage of them. These areas of research, such as human geography, geospatial narratives, participatory sensing and visual analytics, to name a few, are ones that NGA and InnoVision have little experience with or expertise to pursue. NGA will also need to expand its human capital skills mix for both the analytical and the research work force."

Indeed, NGA will be challenged to keep abreast of these future demands. However, many of the areas of opportunity, already a part of InnoVision's research agenda, will require expansion.

Those areas include:
» Exploitation of personal converged mobile devices
» Geosocial modeling, patterns of life and human geography
» High-performance computing and high-performance algorithms
» Smart intelligence from smart infrastructures
» Georeferenced sensor networks and arrays

» Novel opportunities from emerging nano-technology
» Persistent urban surveillance in high-threat environments
» Global tracking and geolocating
» New GEOINT from new platforms

A follow-on study with the National Academy of Sciences has just begun and will examine the implication of the evolution of research disciplines on the future work force available to NGA. This study will build off the first one by providing a more comprehensive analysis of work force issues. It will determine the status and viability of academic and other education programs focused on GEOINT sciences, identify and assess the future availability of geospatial intelligence experts and suggest ways NGA can enhance its work force skills.

Smith underscores the importance of the forward-leaning efforts these studies represent.

"We've had two independent looks at what the mission space and important science and technology at NGA might look like in the future," Smith said. "When you read the reports, it's remarkable that these two groups have come to such similar conclusions. The InnoVision leadership is considering the deeper implications of these studies and how they point to opportunities to effect changes in its research agenda." ▯

Joanna D. is a contract employee supporting the InnoVision communication team.

Dr. Dick B. is a contract employee working with the InnoVision Deputy Director and NGA Chief Scientist to enhance NGA's research and development programs.

Expeditionary Operations Directorate Contributes to GEOINT Evolution

By Moyah W.

The Expeditionary Operations Directorate trains, equips, deploys and sustains operations and safely returns National Geospatial-Intelligence Agency deployers home from their worldwide combat operations and intelligence missions.

Several initiatives this past year have greatly improved the deployer experience.

The Afghanistan Intra-theater Airlift Team—an NGA and U.S. Transportation Command partnership—established a dedicated airlift to aid NGA employees traveling throughout theater. This dedicated resource overcame the inherent difficulty of resource movement in the Afghan area of responsibility, aiding the delivery of critical intelligence support to the warfighter not only where it's needed, but when.

Expeditionary Operations also employed new and emerging technologies to enhance geospatial intelligence support. A continuing goal is to change the end-user experience and improve access to GEOINT knowledge, products and services through online, on-demand access. Open Geospatial Consortium-compliant Web Services enabled end users to easily discover and access NGA products and services.

Expeditionary Operations is also leading multiple Intelligence Community and Intelligence Surveillance and Reconnaissance Task Force initiatives to enable hand-held device access through smart phone and tablet-sized devices. These hand-held devices will join the growing number of community wide-area surveillance and full-motion video assets that supplement the more traditional NGA standard imagery products.

Expeditionary GEOINT architecture improvements being operationally fielded this year will build out new high-capacity terrestrial and satellite backbone network links throughout the U.S. Central Command area of operations. This initiative will enable rapid dissemination of on-demand GEOINT products and services directly to the warfighter.

Defenselink Photo

Expeditionary Operations will also continue to leverage existing commercial off-the-shelf technology to enable a quick-reaction capability for humanitarian and crisis operations missions.

One directorate employee had this to say about their mission: "I've deployed twice to Afghanistan and completed several TDYs (temporary duty tours) to Iraq. I have seen how what we do truly helps the warfighter. During my first deployment I met a soldier who didn't know who NGA was but remembered our products—and how they aided him on patrol.

"I took a sense of pride that I was out there supporting our deployers—so that they could support the young men and women putting themselves in harm's way."

Deployment operations are mission-critical, and Expeditionary Operations continues to enable them. ⊓

Moyah W. is a contract employee supporting the Expeditionary Operations Directorate communication team.

National Geospatial-Intelligence College Aligns for the Future

By Will Hopkins

When the National Geospatial-Intelligence College relocates this spring from its Fort Belvoir, Va., main campus to the National Geospatial-Intelligence Agency Campus East at Fort Belvoir's North Area in Springfield, Va., students can expect to see a lot more change than just the location of classrooms.

For the past year, NGC has been realigning to better support the GEOINT community's expanding mission and focus more clearly on delivering training. There are many benefits in addition to new classrooms and equipment; the biggest one is proximity to the NGA work force, currently spread out at multiple locations.

NGC has also expanded its organizational alignment to maximize this change, from two schools (the School of Geospatial Intelligence and the School of Leadership and Professional Development) to five programs: Analysis, Sensors, Leadership, Work Force Professional Development and Military Programs.

This new structure is designed to drive decision making and academic leadership lower within the organization and empower NGC program managers to work with tradecraft offices, professional advisory boards and other key stakeholders to identify and meet the urgent learning needs of the GEOINT community. This new way of operating will have a profound impact on what the college delivers. Stakeholders will help decide what courses to revise, retire or reformat into distance learning. While student critiques and the NGA requirements process are integral, the college will implement a more comprehensive plan to develop and deliver the career-long learning options needed for all GEOINT professionals.

Some positive results of the new strategic alignment are already apparent, including an increased investment in adult learning methods and technologies. One example is the first eLearning course, Introduction to Commercial Remote Sensing.

eLearning—which has received overwhelmingly positive comments—has freed up classroom space and instructors for other needs and reduced the need for mobile training teams across the National System for Geospatial Intelligence.

NGC is also reviewing and modernizing its leadership program, making leadership materials from contemporary thought leaders available to the NGA work force, providing training experiences in an in-residence setting and providing post-course activities to apply the training in the workplace. The content will be based on Office of the Director of National Intelligence competencies and will emphasize leading as part of a team.

eLearning is not the college's only new learning delivery option. In fact, one long-term goal of the new strategy is to employ a new learning architecture to include blended learning (combining eLearning pre-work with classroom instruction), facilitated online learning communities and information repositories, seminars and many other adult learning methodologies.

With NGA Director Letitia A. Long's focus on putting GEOINT in the hands of the user and broadening and deepening analytic expertise, NGC has structured to help identify the learning needs and fill the gaps required to achieve that vision. NGC will provide or connect employees to the training they need to succeed. Employees will also share that knowledge with peers—serving as adjunct instructors, participating as subject matter experts and assisting in course development.

The ultimate goal of the new strategy is to create a robust culture of learning at NGA that spreads throughout the GEOINT community. Leveraging NCE and NGA's presence in St. Louis, NGC will finally be collocated with its core student base—NGA professionals. And working together, it will take the future of GEOINT to a whole new level. ⌐

Will Hopkins is the Deputy Director of the National Geospatial-Intelligence College.

NGA Transitions Users to St. Louis Information Library

By Paul T.

Arnold Building in St. Louis
NGA Photo

Since 2007, the National Geospatial-Intelligence Agency has diligently prepared its St. Louis Information Library in Arnold, Mo., to replace the capabilities of multiple legacy imagery libraries in the Washington, D.C., area to meet Base Realignment and Closure mandates in 2011.

The deployment of the STIL has been accomplished through the delivery of incremental phases of capability. In 2010, the STIL became NGA's premier centralized data holdings repository by successfully transitioning thousands of users from BRAC-affected legacy library systems to the new STIL architecture.

The first two phases of the STIL program delivered initial ingest, processing, storage and dissemination capabilities for mapping, charting and geodesy and a limited set of government data. This transition greatly expanded the STIL's data holdings, brought in support for new data types and extended holdings across three security domains.

The 2010 STIL Phase 3 deployment was the culmination of more than a year of development, integration and test activities. Concurrent with the technical development, the STIL program migrated several petabytes of storage from historical data holdings at multiple legacy libraries in the greater Washington, D.C., area.

The deployment effort transitioned thousands of analysts who previously accessed the data stored in those legacy systems to the new STIL system, enabling the retirement of three legacy library systems to support the NGA's BRAC mandates in 2011. The STIL Phase 3 deployment, data migration and user transition activities were all accomplished while concurrently supporting ongoing operations.

As functional manager for the National System for Geospatial Intelligence, NGA collaborates with its customers and mission partners to ensure access to accurate and timely geospatial intelligence that supports a knowledge foundation for planning, decision and action. NGA is developing and incrementally deploying capabilities to establish the NSG's future Geospatial Intelligence Knowledge Base, an interconnected web of data holdings and services that will facilitate and greatly enhance knowledge management and data mining operations for its customers.

Under the STIL acquisition program, NGA is transforming its existing dissimilar and geographically dispersed imagery library and data storage elements through the creation of a homogenous, net-centric and data-centric operations platform within its Arnold data center. This transformation is fundamental to establishing a knowledge base that better enables content discovery, storage and archive management, ingest and export of holdings, content delivery and holdings cataloging.

The demand for access to accurate and timely GEOINT will continue to increase, and NGA is working to meet those evolving needs by taking significant steps forward to deliver new capabilities and transition users to the STIL and data center operations.

In 2011, NGA will expand its STIL data holdings to support airborne data. When completed in late 2012, STIL will encompass all facets of current and future NSG data storage and dissemination operations to continuously provide survivable, interoperable, secure and operationally effective information exchanges that enable net-centric military, national and civil operations.

Paul T. is the St. Louis Information Library Deputy Program Manager.

NGA Lights Way in Boston Harbor

By Jeri Jones

At the beginning of 2010, the National Geospa- tial-Intelligence Agency began assisting the U.S. Coast Guard with an assessment of the safety of the population and property in the area of the Boston Harbor.

The project examined, by scale and distance, what the impact of a breach and the ensuing explosion in a liquefied natural gas tanker, or LNG, would be to the surrounding area. NGA imagery and terrain data were used in the study to illustrate how big and how far the extent of the affected area would be.

"Initially the Coast Guard wanted to find a way to prove that it would be safer to allow LNG tankers to dock at night when there are fewer people in the area," said the lead analyst on the effort in NGA's Office of Counterterrorism.

NGA relied on an earlier Coast Guard study conducted by NGA and the 2005 Breach Assessment conducted by Sandia National Labs. These studies gave the Coast Guard's theory about night docking legs. Building on the 2005 data, the lead analyst studied census and population data to assess the number of people in the Boston Harbor area during the day, at night and during special events. He then used NGA's high-resolution terrain data—light detection and ranging or LIDAR—to view line-of-sight from about 500 meters for the entire route, which captured the tanker's approach right to the LNG terminal.

The NGA analyst's practical, hands-on experience by participating in the actual docking event with the Boston Harbor Police during a detail assignment with the Office of the Director of National Intelligence's Rapid Analytical Support and Expeditionary Response Team helped him understand the proximity of other structures to the tankers and gave him a more complete picture.

"I actually got to see how tankers are brought into the terminal and what kind of security that's used to ensure the safe docking of each," he said.

The NGA report assisted the Coast Guard with developing risk mitigation strategies for more than 60 LNG deliveries to the port of Boston each year, and Coast Guard representatives use NGA's analysis to brief other members of the Intelligence Community to ensure better safety and the security of future LNG transit.

"The U.S. Coast Guard now has a better understanding of what NGA can do," the NGA analyst said. "We provided the [right information] for protecting Boston." ⌐

Jeri Jones is a contract employee in the Office of Corporate Communications.
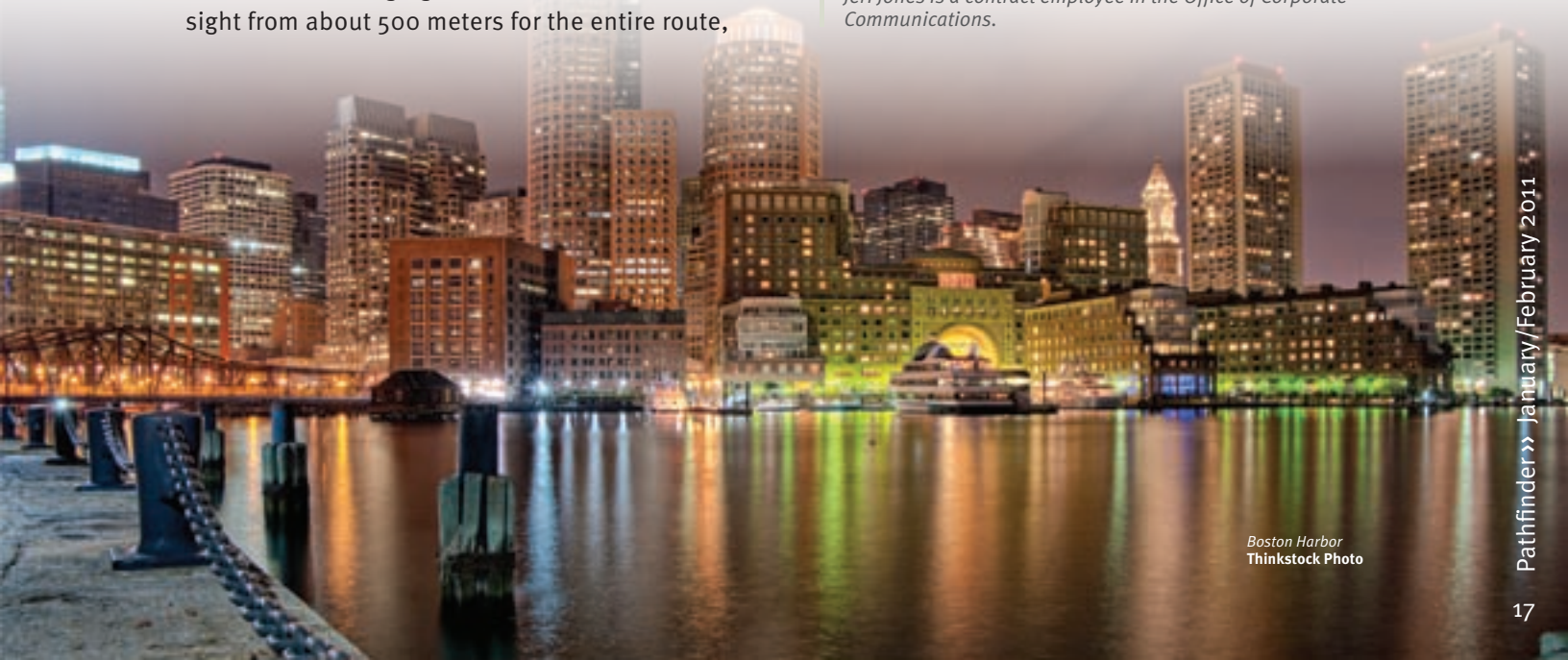
Boston Harbor
Thinkstock Photo

Technology Environment Increases the Impact of GEOINT

By Keith Barber

I recently did a Google™ search on my per-sonal cell phone for a restaurant; I found the place I was looking for, selected the navigate function and received turn-by-turn voice directions. I reflected on how technology has evolved; it's created an environment for the increased impact of geospatial intelligence—with the potential for a limitless future for the National Geospatial-Intelligence Agency and the National System for Geospatial Intelligence.

GEOINT has always been a fundamental Department of Defense and Intelligence Community capability. It has shortened mission planning timelines from months to days—and sometimes minutes. Today's NSG is transforming from a group of independent systems and databases into an integrated GEOINT enterprise—approaching a cloud or Application Service Provider/Infrastructure Service Provider construct.

When the National Imagery and Mapping Agency was established, the goal of system engineers and information technology architects was to create an integrated analytic environment for sharing information. The U.S. Imagery and Geospatial System was defined as a "system of systems" (SOS), or an analytic environment created for geospatial and imagery analysts to work in collaboratively. The SOS analytic environment was a group of federated systems lashed together in a nonintegrated fashion that typically had a single-intelligence or task focus and limited collaboration tools.

Each organization developed its own set of tasks or workflow that established processes integral to the system based on the organization's concept of operations. These tasks established differing versions of the tasking, processing, exploitation and dissemination processes required to support a given intelligence collector. The early SOS thought was that through this limited construct the analyst was able to get sources previously unavailable—and gain some efficiencies by reducing work and using the output generated in other parts of the community. However, analysts still had a problem

collaborating with their counterparts—with the additional challenges of how and where to store information and products.

There were many other drivers forcing change. A lack of standards limited information sharing and interoperability between organizations, within NGA and across the NSG. The costs of maintaining this environment also rose, further driving changes in how government and the commercial world viewed and managed IT. Technology advancements, however, enabled change.

Mid-decade technology advancements allowed system engineers and architects to push DOD for more information sharing and fewer stovepipes using a new paradigm—the Service Oriented Architecture or SOA.

NGA defines SOA as an application architecture in which loosely coupled services are defined with interfaces that perform business processes. SOA is not just a services architecture as seen from a technology perspective; it also includes the policies, practices and framework NGA's chief information officer and directorates use to ensure they provide and consume the right services.

SOA also describes an IT infrastructure that allows different applications to exchange data with one another. This construct allows defined business processes to be reused and adapted to meet NGA mission partners' ever-changing needs in a dynamic, net-centric environment. SOA aligns business goals processes with a standards-based IT framework. For GEOINT to increase in relevancy to the warfighter's real time mission, tasking, processing, exploitation and dissemination processes had to be networked. Operators began to understand the importance of data standards to improve information sharing and interoperability.

In a distributed architecture, analysts and operators collaborate, decreasing mission planning time from days to hours—significant because many of the nation's enemies are no longer just other nations. Radical groups and individuals also use technology. Agencies using the same

hardware, software and netware can share multiple sources—enabling collaboration. This environment offers limited multi-intelligence capability. The SOA construction allows the NSG enterprise to expose data to more users while eliminating redundancy; improves overall service reliability while lowering development risks; and lowers cost while delivering new capabilities faster.

Despite the obvious performance improvements of SOA over the SOS construct, the SOA environment has its limitations in terms of inflexibility that may affect analysts' and warfighters' ability to do their work. Once again, as technology adapted, the system engineers and IT architects saw the opportunity for integration across the NSG.

Effective GEOINT collaboration requires not only enhanced data sharing and the architecture necessary to support it but in some cases the sharing of the applications. Discovery services, as well as physical storage of massive amounts of GEOINT data within the NSG, become additional issues to solve.

In government and industry this led to the development of cloud concepts. Key to most of them are the virtualization of the infrastructure (communications, processing and storage) and the applications required to accomplish activities (software). The associated business model has two components, an Application Service Provider and an Infrastructure Service Provider. This concept provides incredible speed to market, flexibility to create new capabilities and agility to deliver. The most common phrase associated with this could be "Got an app for that?"

So what is an ASP/ISP? The ASP is responsible for the engineering, development, acquisition, testing and maintenance of GEOINT mission applications. The ASP delivers the mission applications along with the SOA application infrastructure. The ISP is responsible for the engineering, development acquisition, testing and maintenance of the IT infrastructure and services that enable common corporate and mission applications. The ISP delivers the office automation and manages the IT infrastructure services. The ASP/ISP eliminates the stovepipe traditionally associated with IT deliveries, not only within NGA, but potentially across the NSG.

Consider an NGA analyst supporting a mission partner at a non-NGA location using a non-NGA system. The analyst will have access to the tools and data required to successfully complete his or her work. This environment will seek to maximize the ASP/ISP construct featuring virtualization and open standards.

This technology construct is essential for the success of the agency's move to NGA Campus East as well as the efforts of the NGA Expeditionary Architecture Integrated Program Office. Core to NEA's mission is to transform the deployed aspects of the NSG to a data-centric, net-centric and application-independent enterprise that allows rapid, flexible expeditionary operations—whether they support the warfighter or humanitarian relief efforts.

In this user-focused operational environment, a deployed analyst will use and create information from a data environment that can access multiple nodes either in the continental United States or overseas. NCE-based personnel will be able to discover and access information from the regional data center. This environment also greatly enhances NSG data consumers' ability to more freely access and use GEOINT data.

NGA's 15th anniversary is near—and with it likely a new technology development that will further enable NSG analysts to not only do their mission, but share their work across the entire DOD and IC. While we have come a long way, it's time to consider the next technology development. ⊓

Keith Barber was the Director, NSG Expeditionary Architecture Integrated Program Office in NGA's Acquisition Directorate. He is currently the Implementation Lead for On-Demand Services.

2010 Accomplishments

By Kemisola Lofinmakin

In January 2011, the first employees from the National Geospatial-Intelligence Agency began moving into their new home for geospatial intelligence—NGA Campus East—located at Fort Belvoir's North Area, Springfield, Va.

NCE fulfills NGA's vision of creating one home for its GEOINT operations in the East. It will support a unified organization and culture while providing state-of-the-art facilities at a single location and facilitating integrated operations.

"As we work together to lead NGA into a new era [...] we have developed and we will continue to pursue innovative approaches and technological advances that will continue our leadership of the GEOINT community," said NGA Director Letitia A. Long.

The 2005 Base Realignment and Closure legislation was the driving force behind NGA's consolidation of its East facilities. This complex effort involved the design and construction of multiple buildings, modernization of numerous information technology systems, and the redeployment of a sizeable work force into a classified environment.

Eight thousand five hundred NGA employees in the Washington, D.C., metro area will move to NCE to inhabit 2.4 million square feet of space. This move will take place over 35 weeks, is mandated by BRAC and must be completed by September 2011.

The design principles for NCE were implemented to deliver numerous improvements for NGA. These include infrastructure upgrades and data accessibility that will enhance NGA's internal and external collaboration and integration capabilities and increase synergy agency-wide.

The NCE marks NGA as one of the first agencies in the Intelligence Community to build a completely modernized IT infrastructure from the ground up. When the new campus opens, users will enjoy enhanced IT capabilities, and NGA's East Coast operations will have a new, state-of-the-art home where technology fosters a collaborative environment for the fulfillment of the GEOINT mission and improves operations in support of the Director of National Intelligence Vision 2015 for adaptability, alignment and agility.

GEOINT depends on technology for mission success. With a high-speed network architecture, robust storage capability and virtualized computing architecture—including thin client desktops—NGA

employees will be able to work together seamlessly.

In addition to IT considerations, NCE offers many advantages for the NGA work force to fulfill the GEOINT mission. The facility includes integrated workstations capable of supporting multiple types of analysis, such as imagery, geospatial and marine, that previously required separate platforms. Software delivery to thin client workstations will be virtualized, enabling the NGA work force to use any available workstation to perform their jobs.

During 2010, NGA executed a systematic migration of all NGA shared office files and user home directories and declared them operational at NCE. In addition, mission and function testing on administrative workstations was completed, guaranteeing NGA employees could accomplish their work upon arrival.

The NCE building design takes advantage of the natural elements and when possible reduces energy usage. On April 22, 2010, NCE staff celebrated the 40th anniversary of Earth Day to draw attention to sustainable design and green efforts of the new campus. The ceremony marked the first efforts to restore landscaping to the campus, which included the planting of more than 3,200 trees and shrubs.

To ensure no net loss of trees on the Fort Belvoir North Area due to the construction, NGA will also plant 44,000 tree seedlings across the FBNA. When completed, the new campus is expected to meet the Leadership in Energy and Environmental Design Silver Certification, with integrated energy-efficient design, resource-efficient construction methods, energy and water efficiency, and more. NCE will have a pond that captures stormwater to be reused for landscape irrigation, green roofs over the tunnels, an energy-efficient lighting system and a chilled beam heating/cooling system.

Built specifically to support the GEOINT mission of tomorrow, NCE is more than just a building. "It represents the physical manifestation of breathing life into geospatial intelligence, which really provides the foundation for all other intelligence," said Director of National Intelligence James R. Clapper Jr. during a tour of the facility in January 2009. ▶

Kemisola Lofinmakin is a contract employee on the communication staff of the NCE Program Advocacy Team.

NCE Atrium
NGA Photo

Historical Encounters— Where Accomplishments Begin

By Dr. Gary E. Weir

Have you ever heard of the Great Grain Robbery of 1972? What sounds like a train hijacking actually opened the Intelligence Community's eyes to the possibilities of a new form of sensory technology that has since become very important for the defense of the country against military, terrorist, environmental and economic threats. History in this case demonstrates that accomplishments frequently begin with fortuitous technical and personal encounters. As a result you can often find the roots of accomplishment in some rather unexpected places, like a field of wheat.

All through the Cold War, the challenges of the Russian climate and questionable Soviet agricultural methods made crop failure a regular occurrence in the Union of Soviet Socialist Republics. It also made the constant presence of Soviet agricultural trade representatives in foreign commodity markets part of business as usual. The Soviet leadership always had a difficult time providing adequate supplies of basic food necessities.

Faced with nothing less than a catastrophic grain failure in the summer of 1972, the challenge became critical and the Soviets acted swiftly to stave off widespread hunger. Over a three-month period in the summer of 1972, the Soviet Union purchased $19 million metric tons of grain from the United States, amounting to 25 percent of the total wheat crop. Acting quickly and early, their trade representatives managed to get their purchases through before the market had a chance to raise prices in reaction to the considerable increase in demand. They also benefitted from a U.S. Department of Agriculture wheat export subsidy program and a recently renegotiated credit agreement. When the purchases became generally known and the domestic wheat supply in the United States fell, the Soviet action caused a considerable disruption in the American and global grain markets. This event became known as the Great Grain Robbery.

All of this had occurred in a matter of a few weeks, and the U.S. national leadership had no idea that the Soviets faced a domestic agricultural emergency. Neither did they know about the extensive and rapid grain purchases. How could this have happened? What steps or changes might prevent its reoccurrence? The intelligence methods used to estimate the success of the annual Soviet agricultural programs employed U.S. Embassy-based Department of Agriculture representatives, economic modeling and regression analysis but, given the location, very little direct contact with Soviet farmers or the crop. While electro-optical satellites could photograph the grain growing areas, the imagery could not clearly reveal in black and white any damage wrought by drought, insects or disease. The general success or failure of a growing season often remained in doubt.

The Great Grain Robbery led the Intelligence Community to revisit the research done earlier in the Cold War on nonphotographic sensors. Radar imaging had emerged from that research as well as

a desire for infrared sensors that could detect heat radiation emitted by people and hardware. These emissions did not even appear on infrared film because of the longer wavelengths. Shorter infrared wavelengths had occupied the camouflage experts during World War II because one could capture this portion of the light spectrum on film as it reflected from crops. The developed infrared film turned the various stages or conditions of the plants into different colors. The resulting false-color image provided a potential way to discern the difference between a healthy field of wheat and one ravaged by insects or lack of water. Earlier, this might have provided a way around camouflage.

In the 1960s civilian scientists hoped for insight from the technology into the proper management of the Earth's resources. NASA's decision in 1964 to embark on a largely civilian Earth resources satellite in consultation with the Departments of Agriculture and Interior had sparked some interest in the Defense Department and the Hughes Corporation to develop with them a practical space-worthy multispectral scanner. The system had both civilian applications and defense potential in a world still dominated by traditional overhead imagery and tradecraft.

Oddly enough, NASA launched the first in its series of Earth resources satellites, Landsat 1, at the very same time the Intelligence Community reacted to the Great Grain Robbery of 1972 by reevaluating promising earlier sensor research. This satellite provided a practical multispectral technology in orbit that intelligence analysts could then use to examine the potential of spectral sensors to address issues of consequence. It carried return beam vidicon cameras as well as a multispectral scanner. The emphasis quickly turned to the scanner when the vidicon ceased operating only a few days into the mission. Scientists and engineers managed to fine-tune the scanner so it achieved a greater accuracy than first anticipated. Later Landsat flights—the series went through seven launches—carried improved video, sensitivity to additional spectral bands, and an improved scanner called "Thematic Mapper." Some of the earliest experimental intelligence work using spectral data employed Landsat as a source.

Landsat represented a constructive encounter between the civilian desire to monitor effectively the Earth's natural resources and the earlier, promising spectral surveillance research conducted by the Defense Department as a hot war turned cold. The Great Grain Robbery illuminated for analysts the intelligence possibilities in the kind of spectral sensing coincidentally present in Landsat. This early effort to understand the potential of Landsat data for defense purposes has since evolved at the National Geospatial-Intelligence Agency into significant multi- and hyperspectral accomplishments. ⊓

Dr. Gary E. Weir is the NGA historian.

Thinkstock Photo