

2017 ISSUE 3

trajectory

THE OFFICIAL MAGAZINE

OF THE UNITED STATES GEOSPATIAL INTELLIGENCE FOUNDATION

The Insight *Economy*

Cloud-based analytic services have arrived.
And with them a new generation of companies
promising not imagery, but insights.

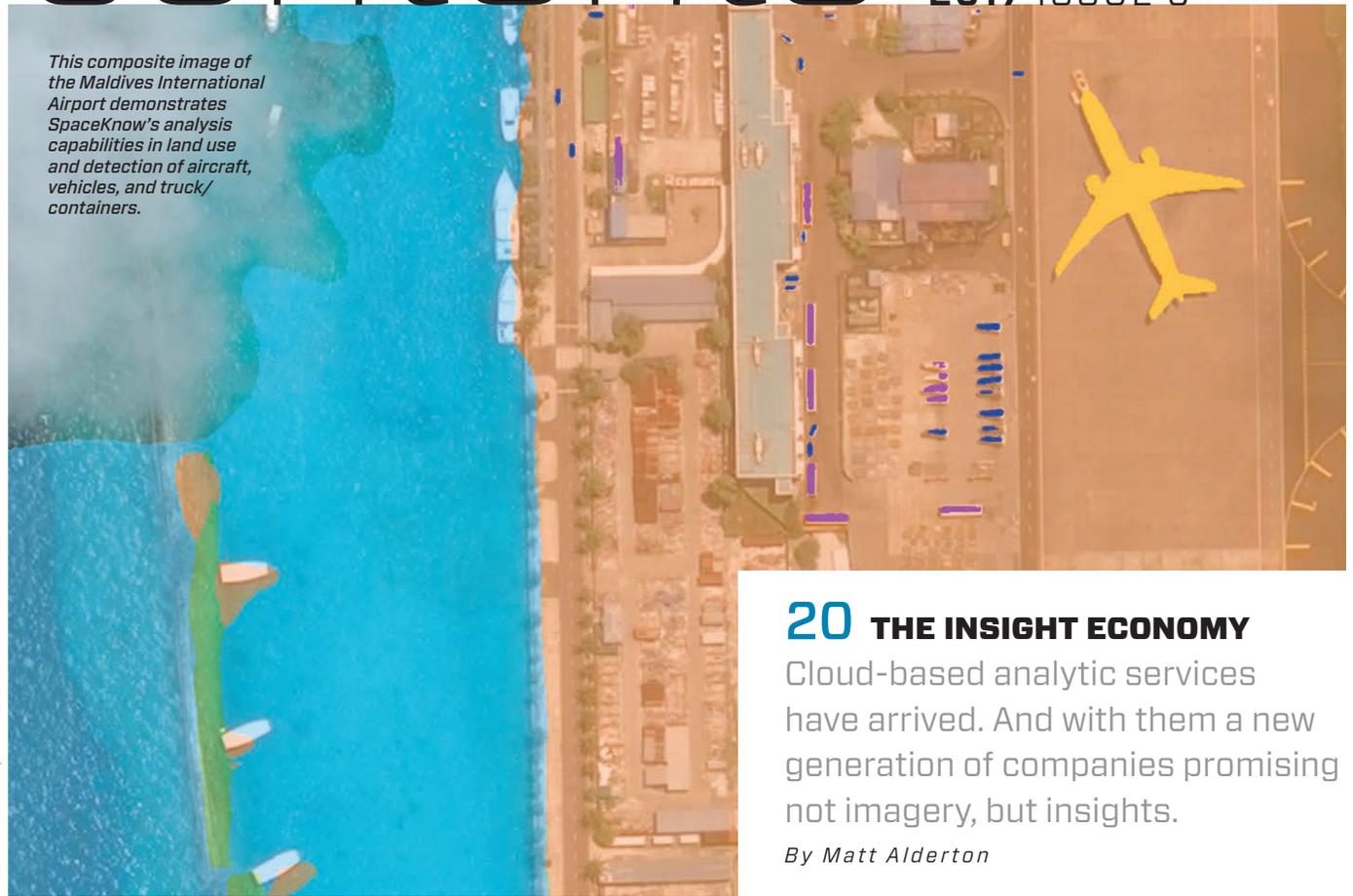
- GEOINT 2017 Highlights
- NGA Acquisition
- 2017 USGIF Membership Directory

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This composite image of the Maldives International Airport demonstrates SpaceKnow's analysis capabilities in land use and detection of aircraft, vehicles, and truck/containers.

CREDIT: SPACEKNOW; IMAGERY COURTESY OF DIGITALGLOBE



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Andre Hentz, acting deputy under secretary for S&T, DHS



TRAJECTORYMAGAZINE.COM

ON THE COVER:

TellusLabs' Kernel BETA product uses machine learning algorithms to translate satellite, weather, and other data into precise forecasts and metrics. The image on the cover shows agricultural areas, cooled lava flows, and rainforest in Maui, Hawaii.

INTERACTIVE PDF

The digital version of the 2017 USGIF Membership Directory includes a capabilities index and hyperlinks.

EXTENDED INTERVIEWS

Visit us online to read the full-length Q&As from this issue.

An Educational Continuum



“Every USGIF organizational and individual member should be justifiably proud of the progress we are making, none of which would be possible without your continued support.”

Good things do indeed come to those who wait. It took USGIF far too long to find the right person to fill our Director of Academic Programs position, but we couldn't be happier with the outcome of that search. Dr. Camelia Kantor recently joined the team, on the heels of a successful tenure at Claflin University in South Carolina.

We first met Camelia via our ongoing outreach efforts with schools in the Historically Black College and University (HBCU) program. We quickly recognized that her passion as an educator combined with her commitment to the inherently multidisciplinary nature of geospatial intelligence studies would make her an ideal candidate for our academic director role. You can read more about Camelia on page 14.

Camelia joins us at a critically important time, as the Foundation's continuum of education and professional development programs begins to mature. As you'll see reflected in the pages of this issue, our K-12 educational efforts continue to blossom, we are making progress in the St. Louis area with our Workforce Development Pipeline Initiative, and our Certified GEOINT Professional designations recently achieved national third-party accreditation.

Of course, all this builds upon our ever-expanding collegiate accreditation and scholarship programs, to include our first endowed scholarship, unveiled at the GEOINT 2017 Symposium. Every USGIF organizational and individual member should be justifiably proud of the progress we are making, none of which would be possible without your continued support. Our 2016 annual report is now available, and tells a compelling story about the breadth and depth of USGIF programs.

In this issue of *trajectory*, we offer insight into two areas that emerged at GEOINT 2017 as decidedly hot topics: the growth of business opportunity around providing analysis-as-a-service; and acquisition reform at the National Geospatial-Intelligence Agency. Our anecdotal experience in San Antonio and our formal survey results both indicated there is deep and sustained interest in these subjects across the GEOINT Community.

Finally, we're proud to publish our annual USGIF Membership Directory in this issue. The capabilities represented in the directory—page after page—are indicative of the power of GEOINT and the dynamic nature of the ongoing GEOINT Revolution. The sheer number of companies that continue to support the work of the Foundation is humbling, and everyone on staff is mindful of the responsibility that accrues to us implicit in that support.

Please enjoy another great *trajectory*. I eagerly look forward to seeing you in the halls of USGIF, at one of our events, and around our extended GEOINT Community.

KEITH J. MASBACK | CEO, USGIF
@geointer

trajectory

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EVENTS, AND EDUCATION

 GEOINT 2017

 USGIF NEWS
 GEOINT COMMUNITY NEWS
 EDUCATION
 APPLICATIONS
 CIVIL

GEOINT 2017 Symposium Highlights



Dr. Stacey Dixon, IARPA



Dr. Peter Highnam, NGA Research



Rep. Joaquin Castro, Texas



Robert Cardillo, NGA



David Lilley Jr., DHS Geospatial Management Office



Jimmy Comfort, NRO

“We’re really proud that our capabilities are not only making a difference in the Intelligence Community but contributing to the goals of organizations completely outside the IC.”

— DR. STACEY DIXON, IARPA

“Clearly, there’s a lot we can do in the NGA space with [machine learning]. The more we can bring these tools to bear ... the better off we’re going to be. The theme underlying this is: We don’t have the deep knowledge yet in these systems ... and that’s an issue.”

— DR. PETER HIGHNAM, NGA RESEARCH

“NGA sits on an amazing and broadly untapped resource. In a world of deep learning, historic data and ground truth are of immense value. Some have even called such data ‘the new oil.’”

— ROBERT CARDILLO, NGA

“Your work sheds light on the unknown and illuminates the space in which policymakers make tough decisions. I’m often reminded that intelligence is a collaborative process. Intelligence, especially geospatial intelligence, requires collaboration between military, industry, academia, and other agencies.”

— REP. JOAQUIN CASTRO, TEXAS

“Nobody in the NRO of any significance is talking about killing commercial GEOINT. Period.”

— JIMMY COMFORT, NRO

“We’ve got the opportunity to identify a lot of different organizations, data sets, capabilities, and available tradecraft.”

— DAVID LILLEY JR., DHS GEOSPATIAL MANAGEMENT OFFICE



Gen. Darren W. McDew, USTRANSCOM

“We need your help or we’ll be the best land-locked, CONUS-based military in the world.”

— **GEN. DARREN W. MCDEW, USTRANSCOM**

“[Humans] are going to map out every surface of the world at one-millimeter resolution someday soon.”

— **ROBERT SCOBLE, AUTHOR**

“Civil agencies have a lot of capabilities that can enhance the information that is collected, developed, and disseminated to help the warfighter.”

— **DR. SUZETTE KIMBALL, CIVIL APPLICATIONS COMMITTEE**

“We find pockets of excellence around this enterprise that are stopped because supervisors aren’t willing to push the envelope and allow those great ideas to be developed.”

— **LT. GEN. VINCENT R. STEWART, DIA**

“In terms of proximity, trade, immigration, and the environment, I’d propose that no other part of the world has a greater impact on our daily life than the Americas.”

— **ADM. KURT W. TIDD, USSOUTHCOM**

“Our mission is about trust. Not just in what our customers have in the services we provide, but also the trust of our partners—whether it’s our partners in the Armed Forces or international partners.”

— **COL. ERIC VANDENBERG, CANADA**

“In the past ... the approach across DoD to developing and fielding AI/machine learning capabilities was to minimize disruption. That approach is no longer [viable].”

— **LT. GEN. JACK SHANAHAN, OUSD(I)**



Robert Scoble, author



Dr. Suzette Kimball, Civil Applications Committee



Adm. Kurt W. Tidd, USSOUTHCOM



Lt. Gen. Vincent R. Stewart, DIA



Lt. Gen. Jack Shanahan, OUSD(I)



Col. Eric Vandenberg, Canada

COMPLETE GEOINT 2017 COVERAGE
 With so many speakers, presentations, and exhibitors, it would have been impossible to see everything at GEOINT 2017. The *GEOINT Symposium Show Daily* by *trajectory* provided wall-to-wall coverage. Visit trajectorymagazine.com/geoint-symposium for keynote recaps, videos, exhibitor profiles, executive interviews, features, and more!

Dr. Lee Schwartz



GEOPOLITICS

Geographer of the U.S. Discusses State Department's GEOINT Use

Dr. Lee Schwartz, Geographer of the United States with the U.S. State Department, discussed geopolitical boundaries, participatory mapping, human geography, and more May 9 at USGIF's GEOInteraction Tuesday event.

The scope of the Office of the Geographer's mission is broad—starting with the responsibility to determine how every boundary in the world (with the exception of U.S.-Mexico and U.S.-Canada) appears on official maps produced by USAID, the Department of Defense and Combatant Commands, and many others. The office even provides all boundaries used by Google Earth. The Office of the Geographer also drives naming policy used on U.S. government maps based largely on advice from U.S. embassies and foreign missions.

Schwartz added that since the State Department now makes all boundary information publicly available, it often receives feedback from the public when a boundary is incorrect.

"Now that people are out there with GPS devices and cellphone technology, we're getting people literally on the India-China border offering corrections to our boundaries," Schwartz said.

Advances in technology are also enabling the department to revise maps for higher fidelity.

"Most of the world's boundaries as they're shown on many maps internationally at certain scales have errors," Schwartz said. "We are in the process of what we call 'boundary verification,' where with digital precision and satellite imagery we're remapping many of the world's boundaries based on priorities—such as places where we have military troops patrolling—with digital precision that we never had before."

Another essential role of the office is trans-boundary intelligence and analysis for issues that transcend borders, such as food and water security, refugee movements, human rights violations, wildlife trafficking, and environmental stability.

"This type of analysis is often fundamentally based on spatial relationships," Schwartz said. "A lot of the work we do is based on having an understanding of the people, environments, and relationships that drive conflict in the world today."

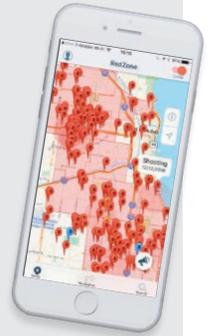
It's when revealing criminal networks that GEOINT especially comes into play. In these instances, Schwartz said, a map is more valuable than data or imagery alone.

"A before/after image is not enough," he said. "It's the power of using all the tools of our trade together."

PROCRASTINATION TOOLS

Redzone Map

This navigation app combines GPS technology with real-time, open-source crime data to help keep travelers safe. The app pulls crime information from government institutions and social media to identify instances of criminal activity such as shootings, thefts, assaults, traffic infractions, and even vandalism in the user's locale on an interactive map. Redzone's "safe route" capability allows users to navigate to their destination using the safest possible route.



redzonemap.com

Ingress

This GPS-based augmented reality game draws users out of the house to public landmarks of human creativity such as museums, sculptures, and parks. Gamers are tasked to investigate a mysterious energy source concentrated at these locations—called "portals." Exploration is rewarded with badges and equipment, but the ultimate goal is geographic conquest.



ingress.com

Theodolite

Theodolite brings augmented reality navigation to your live iPhone camera. The app is multi-functional, combining a GPS, compass, rangefinder, and inclinometer into a single platform. Measurable information such as position, altitude, bearing, and range is displayed seamlessly via the device's built-in viewfinder. In addition to general navigation, the app is designed for geologists, surveyors, military personnel, and first responders.



hunter.pairsite.com/theodolite

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Maj. Gen. (Ret.) Robert "Rosie" Rosenberg was awarded the 2017 USGIF Lifetime Achievement Award.

LIFETIME ACHIEVEMENT AWARD

A Distinguished Career

USGIF named Maj. Gen. (Ret.) Robert "Rosie" A. Rosenberg, former director of the Defense Mapping Agency (DMA), as the 2017 recipient of the Foundation's Arthur C. Lundahl-Thomas C. Finnie Lifetime Achievement Award.

Rosenberg served 30 years in the U.S. Air Force and was instrumental in the U.S. satellite program. He participated in the development, testing, and launching of the Atlas-Agena reconnaissance satellite systems with the Air Force Ballistic Missile Division, and was the mission planner and targeteer for the GAMBIT reconnaissance satellite program. In other National Reconnaissance Office (NRO) assignments, he was responsible for developing and acquiring the mission planning and command and control software for the HEXAGON program, and also served as acting director of the NRO staff.

Rosenberg was director of DMA, a predecessor to the National Geospatial-Intelligence Agency, from 1985 to 1987. During his tenure as director, Rosenberg made DMA essential to the success of the nation's warfare capabilities and guided Phase II of the DMA modernization program.

"What an unexpected and most humbling honor to be named as the Lundahl-Finnie Lifetime Award Winner at this year's GEOINT Symposium," Rosenberg said. "Just to be honored in the name of these two great American patriots—who so significantly contributed to the foundation of GEOINT—is an awesome recognition in my lifetime."

The Lundahl-Finnie award recipient is nominated and voted upon annually by the USGIF Board of Directors. This distinguished award is named for Arthur C. Lundahl and Thomas C. Finnie, celebrating their accomplishments in imagery analysis and mapping, respectively.

SMALL SATS

USGIF Workshop Focuses on Big Data Analytics from Small Sats

Dozens of speakers from government and industry discussed solutions for analyzing the exponentially growing mountain of big data derived from small satellite imagery at USGIF's "Powering GEOINT Analytics" workshop.

Dr. Anthony Vinci, director of plans and programs at the National Geospatial-Intelligence Agency (NGA), gave the keynote address at the workshop, held in April at NGA Campus East.



Dr. Anthony Vinci, NGA's director of plans and programs

Vinci said the convergence of small sats and big data will be a significant part of the agency's future, and that the ability to detect change at a global scale will allow the agency to take on new missions that were never before possible.

"[Humans] can't look at every part of the world every day," Vinci said. "Lots of people come at big data as a problem ... to me it's an opportunity. We do great missions every day, and now we can do more of them."

But accomplishing this, he continued, will require changing how imagery analysis and GEOINT are defined.

"There may be a convergence where imagery analysts become big data analysts," Vinci said. "There may be a time where they don't look at imagery, or only do so as a last step after an anomaly is detected. That's a huge shift."

He said "cross training" between imagery science and data analysis is another option worth exploring.

"We need to rethink at a core level who we are, what we are, and how we do it," Vinci concluded.

The workshop also included updates from small sat industry leaders, a panel of NGA analysts, a USSOUTHCOM presentation, a discussion of modern technology infrastructure, and more.

CONTRACTS

Harris to Develop Software, Train Employees for NGA

Harris Corp. announced at GEOINT 2017 a "Training with Industry" program that will provide National Geospatial-Intelligence Agency (NGA) employees with skills and training not available through military or civil education—such as industry (including Harris-specific) workflows, commercial processes, and more. Participants will spend one year training at the Harris Geospatial Innovation Center, then will tackle an

 GEOINTERACTION TUESDAY

GEOINT and Homeland Security

David Lilley Jr., acting director of the Department of Homeland Security's (DHS) Geospatial Management Office (GMO), outlined his office's main objectives and discussed the utility of GEOINT at USGIF's GEOINteraction Tuesday event in March.

Lilley said the need for geospatial intelligence is prominent, as the discipline is increasingly used to secure events, protect U.S. borders, assist in emergency response, inform policy, and much more.

"The need for GEOINT is not slowing down," he said. "It is ever evolving and expanding. It's helping DHS answer questions and plan and execute missions." He added GEOINT is "a force multiplier" that helps "do more with less."

According to Lilley, his office is focused on ensuring homeland security enterprise mission partners throughout the nation—a force of more than one million people including federal, state, and local agencies—have the geospatial information and technologies they need to perform, plan, and rehearse their mission sets.

Lilley also highlighted partnerships as essential to GMO's mission—citing other federal agencies, 22 offices across DHS, 78 fusion centers, more than 3,000 counties, 78 major urban centers, research laboratories, academia, and organizations like USGIF, to name a few.

Moving into the future, Lilley said his office is seeing a demand for 3D and 4D information, data from small sats, integrated wearable and mobile devices, and fine grain attribution—which can only be achieved by proper metadata standards. He added the office is often being tasked to evolve from a data producer to a data broker.

Lilley concluded by encouraging the audience to explore GMO's GeoCONOPS, a community-based website that provides access to existing technology capabilities, data repositories, and stakeholders contributing to the homeland security mission.



David Lilley Jr. discussed the Department of Homeland Security's ever evolving need for GEOINT at GEOINteraction Tuesday in March.

applied learning assignment based on the specific training they received.

The news comes on the heels of NGA awarding Harris a five-year, \$500 million IDIQ contract to develop more efficient data search-and-retrieval software for agency analysts. The software will process internal NGA content as well as data from other intelligence agencies, allowing for more timely and complete combat and national security support.

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USGIF AWARDS

Accelerating Innovation in the Community

The USGIF Awards Program annually recognizes the exceptional work of the geospatial intelligence tradecraft's brightest minds and organizations that are pushing the community forward. Award winners are nominated by their colleagues and selected by the USGIF Awards Subcommittee.

"Unwavering commitment to service, inspired innovation, academic rigor, and discipline are just some of the words that define the exceptional accomplishments of this year's awardees," said Kevin Jackson, USGIF Awards Subcommittee Chair. "Their accomplishments will have lasting effects on our nation and the world."

THE 2017 USGIF AWARD WINNERS:

- 1. Academic Achievement Award:**
DIRSIG Development Team,
Rochester Institute of Technology
- 2. Government Achievement Award:**
NGB-J2 DAART Development
Team, National Guard Bureau
- 3. Community Support
Achievement Award:**
Dyah Goodman and Michael B.
Mosteller, National Geospatial-
Intelligence Agency
- 4. Industry Achievement Award:**
SpyMeSat Team,
Orbit Logic
- 5. Military Achievement Award:**
Canadian Armed Forces



 COLLEGIATE ACCREDITATION

Academic Spotlight: Briana Williams

Briana Williams is studying to complete a bachelor's degree in mathematics with a minor in computer science at Fayetteville State University. She is also taking the required courses to obtain a GEOINT Certificate as part of USGIF's Collegiate Accreditation Program, and is slated to graduate in May 2018.

While pursuing her degree, Williams is a Higher Education Research Experience (HERE) intern with the GIS Team at Oak Ridge National Laboratory's Computational Sciences and Engineering Division. As an intern, Williams is assigned to the Environment for Analysis of Geo-Located Energy Information (EAGLE-I) project—a situational awareness tool used by the U.S. Department of Energy. Williams

has worked on integrating hurricane models into the project's interface and tested the functionality of new tools available to assist with faster response times following disasters.

"Studying for a USGIF GEOINT Certificate has given me the essential skill set that has been proven to be very useful in my current internship," Williams said.

Looking toward the future, Williams hopes to earn a doctorate degree in the field of urban geography and to conduct research for the government.

"In addition to research, I would also like to start a nonprofit to serve underrepresented adolescents and introduce them to STEM and the importance of receiving a higher education," Williams said. "Showing the next generation of scientists and engineers that you can take the world by storm is a goal that is dear to me."



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analytic
potential

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MURPHY AWARD

Army Veteran Robert Farnsworth Recognized with Lt. Michael P. Murphy Award

At GEOINT 2017, the 2017 Lt. Michael P. Murphy Award in Geospatial Intelligence was presented to Robert J. Farnsworth, a retired U.S. Army Reconnaissance Engineer. Farnsworth is currently a senior consultant of geospatial data for KeyW Corporation in support of NGA. After serving 12 years in the U.S. Army, Farnsworth retired in 2009 following injuries sustained while deployed in support of Operation Iraqi Freedom.

The Murphy Award is named for Navy SEAL Lt. Michael P. Murphy, a distinguished Penn State alumnus. Murphy was killed June 28, 2005, by enemy forces during a reconnaissance mission in Afghanistan. For his selfless leadership and courageous actions, he was posthumously awarded the Medal of Honor. The Murphy Award recognizes achievement by a Penn State graduate who is serving or has served in the U.S. Armed Forces or IC. Recipients are chosen based upon demonstration of exceptional contributions to the discipline after completing Penn State's graduate certificate in geospatial intelligence.

Also receiving the 2017 Lt. Michael P. Murphy Award is U.S. Coast Guard Lt. Drew Cavanagh, who will be recognized



at Penn State's Military Appreciation Day Nov. 11 in State College, Penn.

The generosity of USGIF, the DigitalGlobe Foundation, and faculty, staff, and friends of Penn State contributed to endowing the Murphy Award.

USGIF CEO Keith Masback, DigitalGlobe Vice President of Corporate Communications Nancy Coleman, and PSU Professor of Practice of GEOINT Dr. Todd S. Bacastow, presented the Lt. Michael P. Murphy Award to Robert J. Farnsworth (second from right) at GEOINT 2017.



Dr. Dave Warner spoke to young professionals at the GEOINT 2017 USGIF YPG booth.

YPG

The Next Generation of GEOINTers

Twenty-six young professionals received complimentary GEOINT 2017 registration under this year's Golden Ticket Program.

The Golden Ticket recipients participated in a special agenda composed of mentoring sessions and luncheons with senior leaders such as NGA Director of Analysis Sue Kalweit and Planet co-founder Robbie Schingler.

The young professionals were also invited to USGIF's invitation-only chairman's reception, an exclusive opportunity to meet and network with senior leaders from throughout the GEOINT Community.



From left to right, Dawn Eilenberger, Karyn Hayes-Ryan, Carmen Medina, and Letitia Long spoke to Girl Scouts on the National Geographic Giant Traveling Map at GEOINT 2017.

STEM EDUCATION

San Antonio K-8 Students Introduced to Geospatial Sciences at GEOINT 2017

As part of GEOINT 2017, K-8 students from the San Antonio area had the opportunity to participate in various activities to learn about GEOINT.

“GEOINT education for K-12 students is very important to the Foundation,” said USGIF Chief Operating Officer Aimee McGranahan. “We were very excited for these groups of San Antonio students to hear from senior leaders in the Intelligence Community and make them aware of GEOINT and the many career possibilities the field offers.”

During the Symposium, USGIF hosted a K-8 program for students to experience GEOINT firsthand and learn basic intelligence and analysis skills. More than 25 girls from the Girl Scouts of Southwest Texas earned their STEM merit badges at the Symposium, and 15 girls from the Eureka! STEM program of Girls Inc. San Antonio also attended.

The K-8 program—generously funded by AECOM, AGI, BAE Systems, DigitalGlobe, and Raytheon—was a full-day agenda that included interactive activities on the National Geographic Giant Traveling Map of North America, a live drone demonstration, technology demos, and presentations from female government and industry leaders.

In addition to participation in the K-8 program, students from Girls Inc. attended an exclusive GlobalXplorer Workshop sponsored by DigitalGlobe, GlobalXplorer, and USGIF. GlobalXplorer, produced by DigitalGlobe, is a citizen science and archeology platform that enlists volunteers around the world to discover sites unknown to modern archaeologists.

Also at GEOINT 2017, a few middle-school-age Boy Scouts of America Alamo Area Council participated in a geocaching activity with members of USGIF’s Young Professionals Group (YPG). The young professionals led the scouts throughout downtown San Antonio, where they navigated various historic landmarks. After completing the activity, each scout earned a geocaching merit badge.

IGAPP GRAND CHALLENGE

Geo-located News Analysis

At GEOINT 2017, Engility named Optensity and Rosoka Software winners of the company’s annual IGAPP Grand Challenge for the GlobeNews-Reader app. GlobeNewsReader allows users to quickly peruse hundreds of global news sources and articles by geo-locating them on a map.

“By allowing users to filter news content by geographic location, GlobeNewsReader provides assistance to Department of Defense analysts who wish to focus on information that is specific to their area of responsibility,” said Amanda Brownfield, senior vice president of Engility’s Intelligence Solutions Group.

The IGAPP contract vehicle bridges the gap between the National Geospatial-Intelligence Agency (NGA) and private sector app developers interested in creating meaningful and effective solutions for NGA’s local, state, and federal customers. The IGAPP Grand Challenge is an annual contest in which app developers create an application addressing a DoD need.

Engility and Rosoka were awarded \$25,000 and their app is now available on the GEOINT App Store.



Left to right: NGA Director Robert Cardillo; Amanda Brownfield, Engility; Pamela Arya, Optensity; and Gregory Roberts, Rosoka.

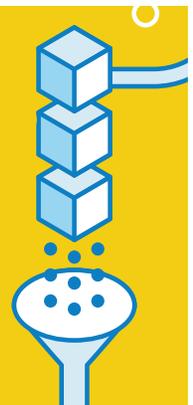
IGAPP BY THE NUMBERS

IGAPP has released **47** apps to the GEOINT App Store and has **27** in queue.

IGAPP apps have been downloaded more than **13,000** times.

IGAPP has **72** approved vendors, **87%** of which are small businesses.

IGAPP has paid more than **\$2.4** million to vendors with apps in the store, **99.9%** of which has been paid to small business owners.



STAFF UPDATE

Expanding Geography Education

Dr. Camelia Kantor joins USGIF as director of academic programs

BY LINDSAY TILTON MITCHELL

A passion for education runs in Dr. Camelia Kantor's genes. With her mother, father, and much of her extended family having careers in education, they naturally influenced Kantor—setting the stage for a fulfilling career that has now led her to USGIF.

In July, Kantor became USGIF's new director of academic programs. She joined the Foundation with nine years of experience in college-level teaching, course development, and research in addition to four years of K-12 teaching in the U.S. and abroad.

"While it took USGIF some time to fill our director of academic programs position, our patience was rewarded in the hiring of Camelia," said USGIF CEO Keith Masback. "She brings a deep academic background in geography combined with substantial passion for learning and discovery, including an absolute buy-in to the unique interdisciplinary approach required to convey GEOINT in an academic setting."

Kantor was born and raised in Romania, and has long held an interest in languages. She is a multi-linguist, speaking English, French, Italian, and Romanian fluently.

When she pursued her undergraduate degree majoring in both English and French, Kantor discovered the usefulness of geography.

"At the time, my summer and winter holidays were spent as a tourist guide in my village in Romania to help my parents with additional income," she said. "So geography became a logical enhancement to languages, and the reason why I started a three-year certificate in geoinformatics and tourism."

This was the start of Kantor's academic GEOINT career. She then went on to earn a Ph.D. in geography from Babes-Bolyai University in Romania. She also holds a master's degree in regional planning with a concentration in border conflicts, a master's of business administration, and a master's degree in educational administration.

For the past nine years, Kantor worked at Claflin University, in Orangeburg, S.C. At Claflin, she designed, secured funding for, and implemented a modern and innovative

"At the time, my summer and winter holidays were spent as a tourist guide in my village in Romania to help my parents with additional income. So geography became a logical enhancement to languages, and the reason why I started a three-year certificate in geoinformatics and tourism."

—Dr. Camelia Kantor

geography curriculum. This, in addition to many of her other accomplishments, earned her the Association of American Geographers' 2017 Dr. Helen Ruth Aspaas SAGE Innovator award.

Now, as part of the USGIF team, Kantor is on a mission to expand the Foundation's educational programs. Her role includes overseeing USGIF's Collegiate GEOINT Accreditation Program, which awards students GEOINT Certificates accompanying their college degrees. Another of Kantor's first initiatives will be to integrate elements of USGIF's GEOINT Essential Body of Knowledge and Universal GEOINT Certification Program with the accreditation program to better prepare students entering the GEOINT workforce.

"I'm excited to have the opportunity to work much closer with the GEOINT Community," she said. "My major goal is to help make GEOINT education and training relevant, not only to today's job market, but to future society needs. I am a strong supporter of public-private partnerships in ensuring students are equipped with the appropriate skills and competencies and that they have the opportunity to keep up with such a rapidly changing environment through pertinent continuing education and training."

Kantor will also play an integral role in the USGIF Scholarship Program as well as the Foundation's ever-expanding K-12 educational outreach program.

Outside of work, Kantor enjoys spending time with her husband and young daughter. While living in South Carolina, the family entertained friends with homemade traditional Romanian food and Kantor was involved with the local community via initiatives dedicated to sustainable economic development, international culture appreciation, and food-based allergy nutrition and awareness in schools. She plans to continue this lifestyle and advocacy at her new home in Northern Virginia.



Dr. Camelia Kantor, USGIF's new director of academic programs, participated as a judge at the 2016 Annual Biomedical Research Conference for Minority Students.



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PARTNERSHIPS

Boundless Partners with Spatial Networks, Planet, and Mapbox to Offer New Capabilities

Boundless recently announced two new strategic partnerships—one with Spatial Networks and another with Planet.

At GEOINT 2017 in June, Boundless and Spatial Networks highlighted their new partnership and the capabilities it enables.

The alliance will integrate Spatial Networks’ location-based data into Boundless Desktop, delivering geospatial products, analytics, and support to joint customers in the government and defense sectors.

“This new partnership not only arms government and defense customers with unparalleled technology, products, and support, but also provides users with a rich content catalog organizations need to gain deeper intelligence and insights using location-based data,” said Boundless CEO Andy Dearing.

Boundless also announced Planet will provide customers access to a vast library of high-resolution Earth imagery and fast-loading imagery base maps in the Boundless Connect ecosystem. Beginning in Q3, Boundless Desktop will feature automated base maps including time-lapse updates, 4-band image tiles from PlanetScope, and 5-band image tiles including Red Edge for visual and analytic use.

“This partnership significantly advances the content available through Boundless Connect, and expands our ability to provide high-quality imagery to Boundless users,” said Anthony Calamito, vice president of product for Boundless.

In July, Boundless announced a strategic partnership with Mapbox that will allow Boundless customers to access Mapbox base maps within the Boundless Connect ecosystem. Mapbox content will be available through Boundless Connect plugin or Boundless Suite and Exchange subscriptions.

CERTIFICATION

USGIF’s Universal GEOINT Certification Program Earns NCCA Accreditation

USGIF’s Universal GEOINT Certification Program recently achieved accreditation by the National Commission for Certifying Agencies (NCCA) under the Institute for Credentialing Excellence.

The NCCA is a third-party accrediting organization and its Standards for the Accreditation of Certification Programs are the first guidelines developed to validate professional certifications. Accreditation for professional certification programs provides impartial recognition that the program has met accepted national and international credentialing industry standards for development, implementation, and maintenance. NCCA was chosen by the U.S. Department of Defense as its primary and preferred accrediting organization.

“Having a third party look at our program lends credibility and gravitas to our certifications,” said Dr. Darryl Murdock, USGIF’s vice president of professional development. “The NCCA accreditation speaks volumes of the professionalism of our team, and is yet another example of the value USGIF brings in its professional development offerings.”

The NCCA accreditation presents new opportunities for USGIF to continue discussions with government entities that have openly embraced the value of external credentials as well as to explore options for support and funding at the state level.

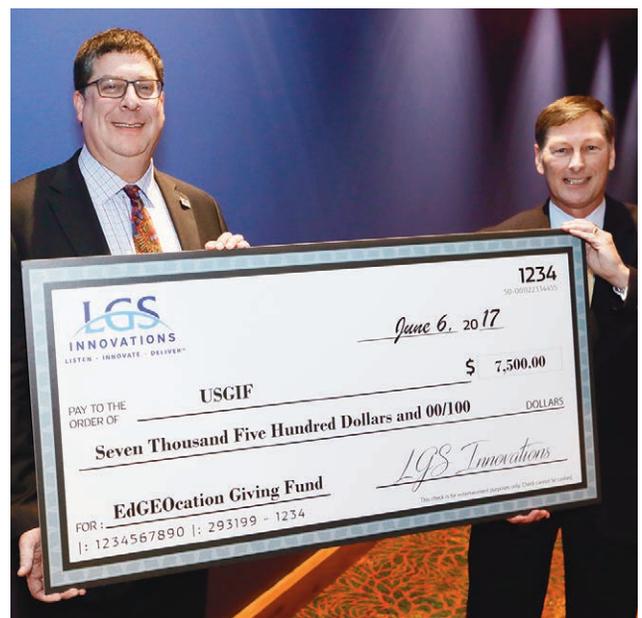
EdGEOcation GIVING FUND

Creating a Lifetime of Learning

LGS Innovations donated \$7,500 to USGIF’s EdGEOcation Giving Fund at GEOINT 2017—the largest single donation to date.

“When it comes to ensuring our nation’s continued leadership in science and engineering, it takes a village,” said Kevin Kelly, CEO of LGS Innovations. “Education starts early, and we’re proud to support STEM initiatives across the country.”

The Giving Fund supports USGIF educational programs, including awarding scholarships to university students, accrediting university programs to grant academic GEOINT certificates, and delivering STEM materials introducing GEOINT to K-12 students.



LGS Innovations CEO Kevin Kelley (right) presented USGIF CEO Keith Masback with the EdGEOcation Giving Fund’s largest single donation to date.

 MOVINT

BAE Systems Adds Movement Intelligence Capabilities

BAE Systems is making it easier for analysts to track objects of interest with its new Movement Intelligence (MOVINT) capability, introduced at GEOINT 2017. As part of its Geospatial eXploitation Products (GXP) line, MOVINT easily identifies intelligence threats using motion sensors with complex multi-tracking analytics and interprets movement and activity from video, radar, and other types of motion sensors.

GXP's tracking analytics allow analysts to eliminate manual processes and to focus instead on exploring and interpreting threat activity and networks while creating actionable intelligence reporting.

"Our MOVINT capabilities allow users to monitor multiple feeds across many regions," said Dana Poirier, general manager of BAE Systems' Geospatial eXploitation Products group. "Advanced MOVINT and tracking analytics enable



IMAGE COURTESY OF BAE SYSTEMS

BAE Systems introduced its new Movement Intelligence (MOVINT) capability at GEOINT 2017.

our customers to identify critical targets, activities, and emerging situations much more quickly and effectively than previous intelligence, surveillance, and reconnaissance solutions."

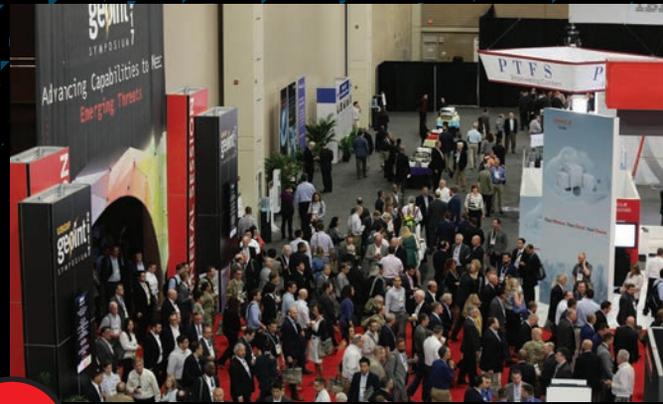
MOVINT capabilities deliver situational awareness, intelligence, and insight for critical activities to include border security, counterterrorism, drug interdiction, and the protection of high-value infrastructure.



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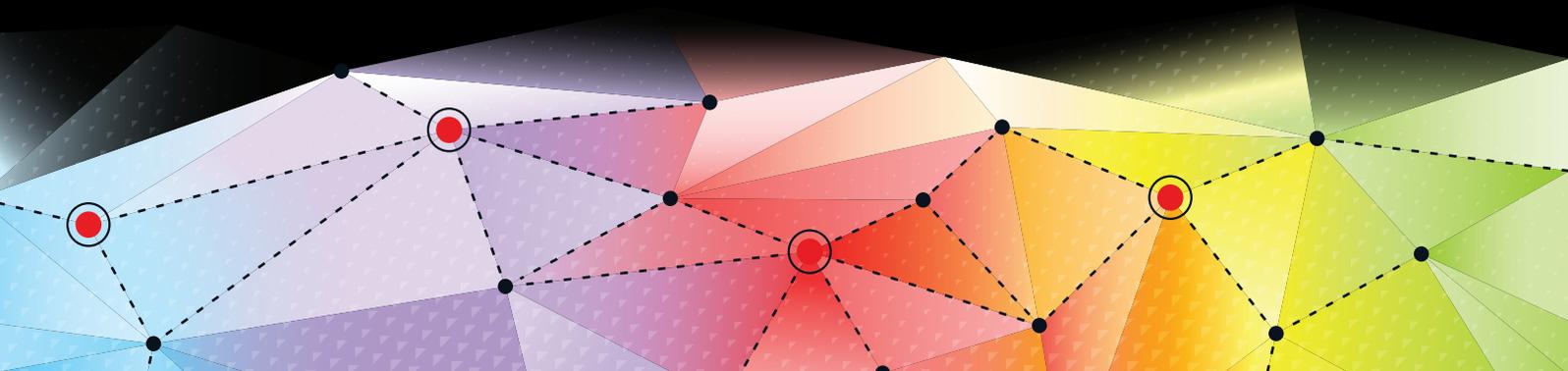
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Cloud-based
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imagery, but
insights.

BY MATT ALDERTON

the insig ec

Kernel is TellusLabs' suite of agricultural intelligence products that rely on a terabyte-scale satellite and weather database updated every 24 hours with the latest plant health, local weather, and crop conditions to provide a daily outlook on U.S. soy and corn yields from continental to local scales.

IMAGE COURTESY OF TELLUSLABS



**THE KANGBASHI DISTRICT OF
ORDOS, CHINA,** looks like a

cosmopolitan city of the future. It's just 14 years old but already has all the trappings of a mature municipality. It has a large public library designed to mimic the shape of books on shelves. Elsewhere are a contemporary and cavernous airport, a spectacular-looking stadium, clusters of towering apartment buildings, spacious plazas and parks, a five-story food court with 400 vendors, an intricate opera house, and perfectly paved streets designed to connect more than 300,000 residents to the places they live, work, and play. Although Kangbashi has the appearance of a modern metropolis, the truth is apparent in the one thing it lacks: *people*.

ht

onomy



PHOTO BY GETTY IMAGES

New apartments line an otherwise empty street in Kangbashi New District of Ordos City, Inner Mongolia. Kangbashi is one of hundreds of “ghost cities” throughout China.

“It’s not about pixels; it’s about providing insights to customers so they can do something with them.”

—MATTHEW CHWASTEK, DIRECTOR OF PRODUCT MANAGEMENT FOR THE PUBLIC SECTOR, ORBITAL INSIGHT

Kangbashi is one of hundreds of “ghost cities” rumored to dot the Chinese countryside. Erected at the height of China’s real estate boom, they’re pet projects of wealthy local governments that built them to be the center of a virtuous circle: Spending their economic windfalls on megacities, governments believed, would attract inhabitants from outlying agrarian communities, creating new urban centers with which to generate even more wealth. In some cases, that’s exactly what happened. In others—like Kangbashi, which so far has attracted only a third of its expected population—residents never came, leaving many buildings, businesses, and boulevards eerily empty.

These civic specters are especially troubling to hedge funds, banks, and other commercial institutions with stakes in China’s economy. Not only has the Chinese government been opaque about the number and location of ghost cities, but it has also been accused of using them to inflate its GDP, showing more economic growth on paper than actually exists on the ground. In order to get an accurate picture of China’s economic performance, the private sector has had to lean on alternative data sources—including geospatial intelligence.

In 2015, Chinese technology giant Baidu identified 24 potential ghost cities by tracking the GPS location of cellphones; cities that ingested a large

number of cellphone users during the week and expelled them on weekends, it determined, were likely ghost cities.

Satellite imagery can be used to similar ends, according to SpaceKnow, whose China Space Manufacturing Index (SMI) monitors more than 6,000 manufacturing and industrial sites across China for signs of economic activity such as visible inventory and new construction.

“One thing we track is shipping traffic in and out of China’s ports,” said SpaceKnow spokesperson Chikodi Chima. “If the volume of ships in ports goes down relative to the same time period last year, that indicates that fewer manufactured goods are leaving ports and that China’s economy ... has slowed down.”

Drawing those kinds of temporal conclusions from space requires analyzing thousands if not millions of images captured on a regular basis—far more than any human analyst could reasonably process. SpaceKnow and a new generation of likeminded companies are therefore leveraging computer vision and machine learning to digest maximum pixels in minimum time. And in a major departure from legacy players, the product they’re peddling isn’t imagery at all; rather, it’s actionable intelligence derived from it.

“Imagery is a commodity,” Chima said. “What people want are answers.”

How new analytics-as-a-service (AaaS) firms are creating and selling those answers, and to whom, promises to radically alter the course of commercial remote sensing and democratize GEOINT in new and powerful ways.

ANSWERS ON DEMAND

The traditional commercial remote sensing business might be compared to an expensive game of fetch wherein satellites are the dog and images the newspaper: Customers who want information must order the dog to retrieve the paper, then peruse it page by page in search of a specific article. And if they want to follow a story? They have to repeat the whole ritual again the next day.

“The business model [isn’t ideal],” said Dr. David Potere, co-founder and CEO of TellusLabs. “The classic problem is counting cars in a parking lot. If I want to count cars in 1,000 parking lots I have to pay for a whole strip of data, then take 10 small chips out of it.”

Some customers didn’t even want to own the data in the first place.

“Because the model for so long was literally shipping CDs and DVDs, that’s how things had to be. But now that model is getting flipped on its head,” Potere continued. “People have grown really impatient with any kind of old-fashioned approach where they have to own, hold, or manage data themselves.”

Consumers of satellite imagery want to be able to query a search engine at any time for whatever answer they seek—just like everything else in their lives. AaaS is that search engine.

The workflow is simple and takes place entirely in the cloud: Users tell AaaS providers which geospatial questions their business needs to answer, at which point providers create new algorithms or leverage existing ones to automatically process imagery acquired from their own or partners’ satellites. Using computer vision and machine learning, those algorithms identify and extract relevant features from



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“Certification represents a way to identify geospatial professionals invested in lifelong learning. Given two applicants for a geospatial position, a manager will likely choose the one who is already certified. Certification requires someone who is willing to invest their time, prepare and study, and is dedicated to developing their subject matter expertise—all qualities you would want within a potential employee.”

LTC Michael L. Wood, Geospatial Engineer & Army Geospatial Information & Services Officer, is a recipient of USGIF’s Universal GEOINT Professional designation.



The Universal GEOINT Certification Program is accredited by the National Commission for Certifying Agencies (NCCA), under the Institute for Credentialing Excellence (ICE).

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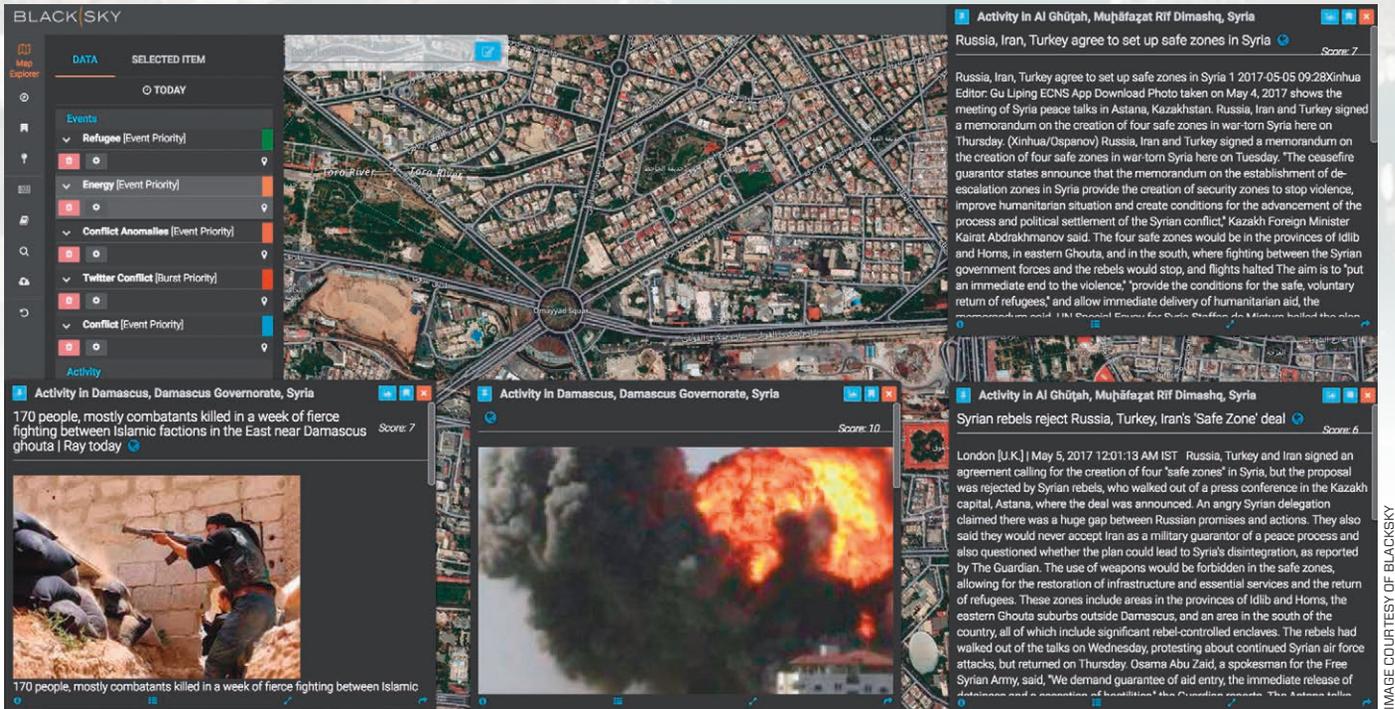


IMAGE COURTESY OF BLACKSKY

The BlackSky geospatial platform provides satellite imagery and relevant information from various sources about a conflict event in Syria.

imagery and interpret them for users, who receive updated intelligence in the form of a semantic dashboard or report.

“While being able to count cars in parking lots is interesting, we provide a consultative solution that fuses those car counts with other data in order to tell our customers how a retailer is performing this quarter,” said Matthew Chwastek, director of product management for the public sector at Orbital Insight. “It’s not about pixels; it’s about providing insights to customers so they can do something with them.”

BREAKING THE MOLD

Flexibility breeds possibility, according to Potere. “There are a whole bunch of new questions you can ask now that you never would have been able to answer with the old, ship-me-the-pixels approach,” he said.

TellusLabs specializes in answering agricultural questions. Its first product, Kernel, uses open-source satellite

imagery to monitor fields in 2,000 U.S. counties for factors such as plant health, local weather, and crop conditions. Using decades of historic data from NASA, the National Oceanic and Atmospheric Administration, and the U.S. Department of Agriculture (USDA), TellusLabs developed machine learning algorithms that process terabytes of data every day in order to predict agricultural yields.

In 2016, for instance, the United States produced 52.1 bushels of soy per acre of planted crop. Kernel predicted a soy yield within one percent of that final outcome as early as September—nearly two months before USDA’s monthly forecasts entered the same one percent range—and in October it predicted the yield exactly.

“To do the kind of agricultural forecasting we’re doing, we need a view that is consistent for every single day of the year for 18 years, and we need it spectrally and longitudinally calibrated so that the red band from 2003 is totally comparable to the image from last night,” Potere explained.

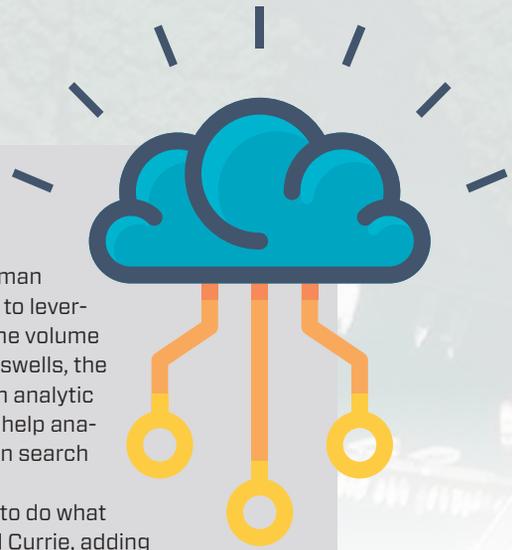
This capability makes GEOINT desirable and accessible to new users who have never before considered the technology. In Kernel’s case, for instance, users include ethanol plants that need to know how much to expect to pay for corn, agribusiness companies that need data feeds with which to operate next-gen farming equipment, and asset managers who need intelligence with which to inform their investments.

Then there are the farmers themselves: Two of TellusLabs’ competitors, Astro Digital and Vinsight, provide field-specific insights to growers, who can synthesize data about crop production, health, and conditions to make better business decisions.

“Knowing what your crop is going to be will help you enter into a contract with a buyer at the right time to ensure you can fulfill that contract,” said Megan Nunes, founder of Vinsight, which currently specializes in

“There are a whole bunch of new questions you can ask now that you never would have been able to answer with the old, ship-me-the-pixels approach.” —DR. DAVID POTERE, CO-FOUNDER AND CEO, TELLUSLABS

NGA EYES ANALYTIC ASSISTANCE



For the commercial sector, analytics-as-a-service (AaaS) is a game changer. By delivering spaceborne intelligence to industries that have never had access to it, AaaS companies can offer customers a competitive edge sharper than a Japanese sushi knife. It's not just the private sector that stands to benefit from AaaS, however; it's also the defense and intelligence communities—including the National Geospatial-Intelligence Agency (NGA), which has placed automation and machine learning at the top of its list of strategic priorities, Director Robert Currie reported at this year's GEOINT Symposium in San Antonio, Texas.

"If we attempted to manually exploit all of the imagery we'll collect over the next 20 years, we'd need 8 million imagery analysts," Currie said during his Symposium keynote, adding that NGA already collects with a single sensor—every day—the data equivalent of three NFL seasons recorded in high-definition video. "Imagine you're a coach trying to understand the strategy of his opponent by watching a game—every game and every play for three seasons, all in a single day ... That's exactly what we ask our analysts to do when we don't augment them with automation. All this data, combined with dramatic improvements in computing power, represents a phenomenal opportunity."

NGA is counting on AaaS upstarts to help it seize that opportunity, according to Scot Currie, director of NGA's Source Mission Integration Office.

"For the last 40 years, NGA has been applying a rather brute-force approach to dealing with all of our various data sources," said Currie, who called AaaS "the most exciting part of what's happening in industry right now."

"We're extracting value manually out of pixel streams ... That's not something that scales when you talk about moving to the kinds of rapid-revisit suppliers that are coming forth now across the commercial community. So, we've got to look at things like machine learning and algorithm development," Currie continued.

Unlike commercial AaaS customers, many of which lack human resources to analyze satellite imagery, NGA

has a deep bench of human analysts it will continue to leverage going forward. As the volume of commercial imagery swells, the agency sees AaaS as an analytic metal detector that will help analysts sift through sand in search of buried treasure.

"We want machines to do what machines do best," said Currie, adding AaaS will be ideal for rote tasks like counting the tanks and aircraft in a target location, while human analysts will be retained to determine why the military vehicles are there in the first place. "We're trying to get analysts freed up so they can do higher-order thinking to answer broader questions."

NGA analysts will still need pixels. Using their machine learning algorithms for automated change detection, however, AaaS companies will be able to flag for NGA analysts which pixels they should look at and when.

Although he declined to name them, Currie said NGA is already testing some AaaS offerings via its Commercial GEOINT Activity (CGA), a joint program with the National Reconnaissance Office through which the agencies are evaluating new commercial capabilities.

"Between us and CGA, we're building an assessment process that's going to eventually tell us who the best-of-breed is among these new analytic services," reported Currie, who said the most important attribute for AaaS providers to demonstrate is veracity. Until providers can all but eliminate false positives, he said, AaaS will be on NGA's wish list instead of in its toolbox.

"For us to make the decision to move resources [away from humans and toward machines] we're going to need a fairly significant confidence level ... And quite honestly, what's good enough for [commercial customers] may not be good enough for us."

Its high standards mean NGA may lag commercial industry in AaaS adoption. But even if the agency moves slower, it will forge ahead, Currie promised.

"I've been a part of [NGA's] commercial imagery team since 2010, when I was the first program manager for the EnhancedView contract that started this whole transformation," he said. "We saw [AaaS] happening then, but it was only on the periphery. There was a lot of vision, but that vision is now starting to show up in execution and delivery of real capability ... We're excited to become a stronger part of these commercial offerings and to bring them to our customers."



Scot Currie, director of NGA's Source Mission Integration Office



Orbital Insight's technology can count objects—such as these planes on the ground in Macau, China—in satellite images.

analysis for growers of grapes and almonds. “Also, labor. If you know your grape crop is going to be lower than expected, you can hire fewer people to harvest those grapes.”

Such information can enable efficiencies that allow farmers to run profitable businesses growing even low-margin crops.

Agriculture isn't the only AaaS use case. SpaceKnow sees applications in real estate and construction, according to Chima, who said AaaS could help developers identify properties ripe for development. Then there's speculation—the same type of monitoring service SpaceKnow provides around factories in China, Spaceflight Industries is using to monitor fracking across the U.S. and Canada.

“I can see things like how many holes they're drilling and whether they are dry holes; if crews are packing up and going home; if they're starting to lay down pumping equipment,” said Scott Herman, vice president of product development for BlackSky, Spaceflight Industries' AaaS service. “... When we do that kind of day-by-day and week-by-week monitoring across thousands of fracking sites, hedge funds can start placing bets either for or against different organizations long before they ever get their quarterly earnings.”

WHY NOW?

Commercial users have always wanted answers. That they're receiving them now is thanks to four converging trends.

The first is the omnipresence of affordable, accessible, unclassified data from smartphones, small sats, and a litany of other low-cost, high-power sensors.

The second trend is the widespread adoption of elastic cloud computing, according to Chwastek, who noted the availability of cloud-based graphics processing units (GPUs), which he called “a key technology responsible for the ability to process imagery.”

Cloud computing has allowed companies to forego the time and expense of building IT infrastructure in order to focus on bleeding-edge software development, resulting in faster, cheaper innovation, echoed Herman.

“Things like imagery-derived analytics and open-source data are not new. What's new are the techniques you can apply against those disciplines and their low cost, which means more people can take advantage of them,” he said. “This is going to open up an addressable market to small and mid-sized businesses that traditionally have not been able to afford [GEOINT].”

Third are advancements in computer vision, natural language processing, and machine learning. When computers are programmed to apply statistics to their raw observations, the outcome is knowledge—deducing not only that an object is a car, but also who is driving it, to where, and for what purpose.

Which leads to the fourth trend: appetite.

“There's a new understanding on the demand side that's going to lead to a revolution in the next three to five years,” Herman said. “Whether it's finding a restaurant in Google Maps or looking at their house from space on Zillow, people have become more comfortable with geospatial technology and are now wondering, ‘Why wouldn't I bring it into my business, too?’”

PLATFORMS AND PARTNERSHIPS

Although demand is an important driver, the AaaS supply chain is also compelling. Not just the volume of data, but also where it's coming from—and where it isn't.

Because they want to control the inputs they feed their algorithms, some AaaS companies are investing in their own satellites, imagery from which will serve as fuel for their analytics engines. Spaceflight Industries is one such company. By 2019, it plans to have a constellation of 60 high-resolution commercial satellites in orbit. In the meantime, its BlackSky AaaS service leverages imagery from 20 commercial satellites operated by external partners such as Airbus and UrtheCast. When Spaceflight's constellation is complete, BlackSky will leverage its own data alongside its partners' imagery.

There are several reasons for its approach, one of which is continuity.

“Some analytics companies are doing phenomenal work, but they're completely beholden to third-party content

providers who can kill their business at will just by turning off their content feed,” Herman explained.

Another argument for launching its own platforms is autonomy. Having the freedom to task its own satellites, Spaceflight argues, will give BlackSky the ability to generate more and better data, faster and at a lower cost.

Astro Digital is also betting on its own platforms, and for many of the same reasons. Along with open data from Landsat 8 and Europe’s Sentinel-2, it eventually will consume data from its own Landmapper-BC and Landmapper-HD constellations.

“Why did we need to build our own constellation? Reliability for the commercial space is one reason; if I say I can give you a fresh insight about your business every week or every day, I need to guarantee that I can do that. The existing commercial sensors ... don’t have the capacity to offer that kind of reliability and consistency to a wide swathe of commercial customers,” explained Astro Digital Head of Product Bronwyn Agrios.

Not everyone thinks satellite ownership is so vital. Many—including Orbital Insight, SpaceKnow, TellusLabs, and Vinsight, just to name a few—believe there is more than enough imagery to go around already. Thanks to open platforms, much of it is free. And that which isn’t is becoming more affordable as market forces continue to drive prices down.

“It’s not necessary to own any hardware in space,” said Chima, adding SpaceKnow culls imagery from third-party providers such as DigitalGlobe, Planet, Airbus, and UrtheCast.

Platform ownership might be necessary if traditional commercial imagery providers weren’t willing to partner, but most are open to collaboration.

“There’s a recognition that you can’t do the whole thing by yourself; it’s part of the culture in this space,” said Fritz Schlereth, head of product at Descartes Labs. “Once data partners realize how much more valuable their data becomes to the customer [in the hands of an AaaS partner], they’re very receptive to what we do.”

So much so that they have become key AaaS enablers. Among the companies collaborating with AaaS providers is Planet, which to date has launched more than 233 small satellites it calls “doves.”

“We produce a lot of imagery, and we sell that imagery. But is that the end game for Planet? Absolutely not,” said Alex Bakir, Planet’s vice president of product marketing. “... That is stage one of a multi-stage approach that ultimately will result in a marketplace that’s full of information derived from imagery as opposed to a marketplace that’s drowning in a large amount of unprocessed pictures.”

“Whether it’s finding a restaurant in Google Maps or looking at their house from space on Zillow, people have become more comfortable with geospatial technology and are now wondering, ‘Why wouldn’t I bring it into my business, too?’”

—SCOTT HERMAN, VICE PRESIDENT OF PRODUCT DEVELOPMENT, BLACKSKY

Google Earth Enterprise Platform

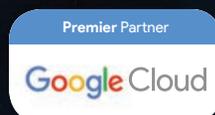
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To enable the kind of marketplace it envisions, Planet plans to spend the next six to 18 months inverting its cloud-based infrastructure to automatically pre-process imagery for external as well as internal use.

“We don’t believe that everyone who wants to derive information from imagery should have to build the foundational elements of how to deal with that data set,” continued Bakir. “There are a lot of things we can do to encourage the growth of an ecosystem of application developers.”

Planet aims to make it easier and more affordable for AaaS companies to do business, creating a win-win scenario.

“You shouldn’t have to throw tens of millions of dollars at a problem just to get to a place where you can start to ask the right questions,” Bakir said.

DigitalGlobe is similarly engaged in ecosystem construction via its GBDX platform, through which AaaS partners can access its cloud-based satellite image library and run

their proprietary algorithms against it.

“DigitalGlobe is enabling the analysis business, much like Amazon enabled online e-commerce,” said Dr. Walter Scott, DigitalGlobe founder, executive vice president, and CTO. “Our industry has a remarkable number of smart people who have the ability to create analytic solutions or new sources of data, and there is tremendous potential to unlock value by allowing them to tap into ‘the digital globe.’”

“DigitalGlobe is enabling the analysis business, much like Amazon enabled online e-commerce.”

— DR. WALTER SCOTT,
DIGITALGLOBE FOUNDER,
EXECUTIVE VICE PRESIDENT,
AND CTO

More than 350 developers already are building new applications and machine learning algorithms using GBDX.

Even as they enable new AaaS partners, legacy providers are building internal analytic capabilities via acquisition. In November, for example, DigitalGlobe acquired privately held Radiant Group, an AaaS company specializing in GEOINT analysis for the U.S. intelligence and special operations communities.

“We now have hundreds of innovative developers and analysts with expertise in big data analytics, cloud computing, and machine learning to solve complex geospatial intelligence challenges,” Scott said.

Clearly, the marketplace is moving. Where it’s going, however, is anyone’s guess.

“Will all the cool technology just get acquired by the legacy players? Or will there be enough upstarts that gain traction to ... create a whole new ecosystem of companies that become household names?” Herman asked.

ANALYTIC IMPEDIMENTS

Despite the market opportunity, AaaS providers must clear many hurdles in order to realize their full potential.

“[AaaS companies] are shiny objects,” Herman said. “They’re really interesting and they’re attracting venture capital, but if you dig underneath and look at how much

revenue is being generated by legitimate use cases, it’s still very limited.”

Challenges range from technical to cultural in nature. On the technical side, for instance, Bakir cited interoperability as a major obstacle.

“Application developers are ... pulling data from Planet, Landsat, Sentinel, and DigitalGlobe; it doesn’t all look and feel the same, it won’t load up in the software the same way, and it may not have been processed in the same way,” Bakir said. “That disparity in data sets continues to be problematic.”

He added Planet eventually plans to address that problem by bringing popular data sets into its platform, giving AaaS companies a one-stop shop for data acquisition.

“Planet has a massive data set, but there are also massive data sets elsewhere. Getting those data sets to work together is not easy, and moving data around is no longer the solution. So, collocation of data sets is a really big and important problem.”

Culturally speaking, the biggest challenge facing AaaS providers is trust: Because their companies and technologies are new, they often lack a track record with which to woo skeptics.

“One thing I hear from sophisticated customers is the need to understand our secret sauce,” Agrios said. “They want to validate our analysis and understand how we got to our results.”

“It’s not enough to be right, or even to be right several times in a row,” echoed Potere, who said AaaS companies have to educate their customers by sharing not only their algorithms’ outputs, but also their inputs. “The answer isn’t the whole story; at this early stage, you have to be in the ‘why’ business as well as the ‘what’ business.”

THE HOLY GRAIL: CONSUMERIZATION

AaaS is an infant among industries. As it matures, its prospects are bullish, buoyant, and bold. So much so that AaaS could be the missing link that finally democratizes GEOINT for the masses.

“We would like to see the concept of a query-able Earth where you can ask questions of the changing planet and receive information that makes sense to you,” Bakir said. “We would like to see the market move beyond highly technical GIS users and move into business intelligence and then, who knows, maybe even consumers. That’s the goal: working with the market landscape as it exists today, but planning for a future where the market is dramatically expanded.”

A future where everyday consumers can ask colloquial questions of satellites like they do of search engines? Although it may sound ambitious, so does the idea of using computers to find ghost cities, forecast crop yields, and assess real estate opportunities.

“[AaaS] is primarily a B2B play for the foreseeable future. However—and this is really important—our goal is to reach a point where B2C is a viable part of our product offering,” Herman concluded. “The whole industry needs to bake for another three to five years, but there will be attempts at consumer-grade products ... It’s one of the holy grails that we’re shooting for.” 🎯

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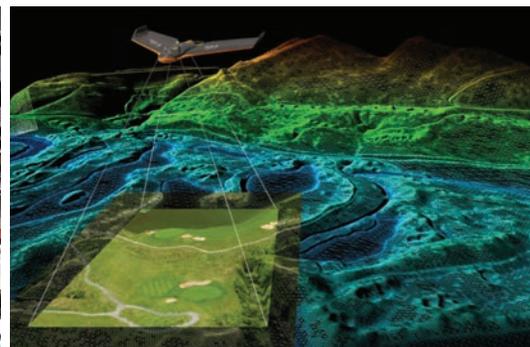


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NGA Campus East in
Springfield, Va.

NGA seeks to enable speedy
innovation, optimize partnerships
with industry.

BY ANDREW FOERCH

accelerating *acquisiti*

 **THE NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA)**, like many other government agencies, has found itself consistently outpaced by commercial industry when it comes to the development of progressive GEOINT tools and solutions. Rather than trying to compete with industry, the agency has focused on contracting with private sector innovators to leverage their creativity and technical expertise.



on

IMAGE COURTESY OF TREVOR PAGLEN/WIKIPEDIA

“We’re taking way too long to do things, and it’s a drain on [our partners’] resources,” Pierce said. To cut down on wastefulness, NGA is working to reduce its acquisition timeline and to lower bureaucratic process barriers that hold companies in limbo—for example, requiring proposals to be reviewed by numerous boards before awarding a contract. A company might spend months pitching a project and waiting for a response, only to be declined. NGA aims to eliminate traps such as these.

DEFINING SUCCESS

To be more generous and experimental with its partnerships, NGA must first perfect what Pierce refers to as “Phase One.” Often called acquisition planning, this is an area in which—before ever issuing a public request for information (RFI)—the agency articulates internally exactly what end capabilities or services it seeks and how those capabilities would benefit national security. NGA has neglected Phase One for years and hopes to improve it in order to enhance and accelerate the entire acquisition cycle, according to Pierce.

If project requirements are not clearly defined and communicated to industry partners, contracts often end up delayed. Pierce referenced a delayed program called Patagonia, which was a call for commercial vendors to develop a cloud-provisioned content library for structured and unstructured GEOINT data.

“There was a recognition that perhaps we weren’t getting it right,” Pierce said. “[We need to] make sure that we don’t engage industry before we’re ready—where we go out with an RFI or a draft RFP saying we’re going to do something one way, and when the final [RFP] comes out we do it a different way.”

This problem isn’t exclusive to the contract team—NGA’s overall acquisition governance recognizes the need for clearer communication. Deputy Component Acquisition Executive Donna Logsdon said, “We often don’t do a good job at clearly defining what success looks like and not just success for us, but success for the industry partner as well.”

Clear, two-way dialogue is necessary to ensure partners understand exactly what challenges NGA is struggling with and what is required of industry solutions.

One important tool NGA is leveraging to improve communication and promote collaboration with industry is the GEOINT Solutions Marketplace (GSM), an interactive online repository for information about GEOINT users’ needs and challenges.

According to NGA industry advocate Daniel Takane, “It’s all about evolving our market research into market understanding.”

GSM features a problem center that details specific GEOINT obstacles that require solutions in addition to a capabilities catalog, which is a centralized list of products, services, and data offered by GSM members.

New to GSM is the Commercial GEOINT Activity (CGA), a partnership between NGA and the National Reconnaissance Office (NRO). CGA provides preliminary assessments of commercial GEOINT offerings that have the potential to satisfy Community mission needs, including activity characterization, activity discovery, and mapping. A remote sensing company, for example, could upload a change-detection offering to GSM’s capabilities catalog. The CGA Leaderboard, a new web platform accessible via GSM, would assess the offering’s usefulness to NGA to determine whether the company would be an apt fit for an upcoming contract. The Leaderboard will serve as a digital scoreboard that articulates joint NGA/NRO needs and allows prospective industry partners to score their solutions against those needs as a means of gathering timely feedback about their business prospects.

Clarity in the pre-contract domain is just the tip of the iceberg in reforming NGA’s acquisition program. Since Sue Gordon—as

“Agile acquisition is about acknowledging where our bottlenecks are and how we break down those barriers.”

—DONNA LOGSDON, DEPUTY COMPONENT ACQUISITION EXECUTIVE, NGA

Nicole Pierce, NGA’s head of contract services, spoke as a member of the NGA Acquisition Report Card Panel at GEOINT 2017.



At USGIF’s GEOINT 2017 Symposium in June, NGA participated in an “Acquisition Report Card” panel session to discuss the evolution of the agency’s acquisition strategy and to glean constructive feedback from industry spectators seeking government partnership. Audience reaction was critical, which was not surprising to agency representatives. According to Nicole Pierce, NGA’s head of contract services, industry’s main criticisms of the acquisition system predictably revolved around timeliness.

of press time nominated to be Principal Deputy Director of National Intelligence—assumed the role of NGA deputy director in 2015, agility has become the primary emphasis.

Agile acquisition serves to improve NGA's speed to market. According to an open letter Gordon issued to the NGA workforce shortly after she joined the agency, national security threats do not brake for outdated bureaucracy, so why should the federal government adhere to passé processes that slow the delivery of crucial capabilities?

"Agile acquisition is about acknowledging where our bottlenecks are and how we break down those barriers," Logsdon said. She and Pierce are co-chairing a study to identify choke points where agile methodology could be applied to save valuable time and resources, not just in the acquisition cycle but in NGA's corporate governance as well. According to NGA, the study is expected to be released in the fall.

Logsdon reiterated source selection is one of these problem areas, and she recommended written process requirements that would shorten the timeline between when an RFP is issued and when NGA makes a final source selection for a contract.

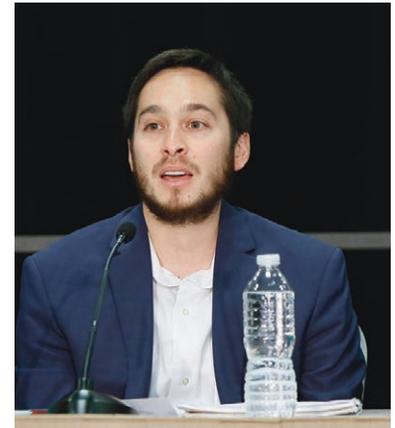
NONTRADITIONAL TECHNIQUES

NGA's new acquisition workforce strategy, released in April, sees the agency pivot away from the program management focus of the last decade, which concentrated energy on things such as certification and systems engineering, to a more technical, performance-based nucleus. NGA employs many of government's finest program managers, Logsdon said, but that priority has detracted from the agency's technical edge. Rather than simply making sure a project is on schedule and under budget, it is increasingly essential to verify that programs are operating efficiently and delivering on goals.

To improve this process, NGA is encouraging program managers to enroll in internal coding classes to sharpen their skills and keep abreast of the proficiency of modern industry. Even NGA Director Robert Cardillo has completed some of the coding training. Critical thinking courses are being offered as well to help managers fully digest information provided by analysts.

To further enhance industry partnerships, NGA is working to become more software and data orientated—one of the primary goals identified at GEOINT 2017 by agency director of plans and programs Dr. Anthony Vinci.

More artificial intelligence programs, for example, will be introduced to allow analysts to reallocate their energy to more critical assignments such as event prediction. Furthermore, data will be offered as a form of digital currency when



NGA Industry Advocate Daniel Takane spoke about modernizing the agency's acquisition processes.

partnering with industry. With years of historic intelligence records, the agency possesses a vast abundance of data wealth that can be shared to help meet mission demands.

"Data is going to become the new oil for [NGA] in a lot of ways," Logsdon said.

Instead of paying a commercial vendor to develop an image recognition algorithm, for example, NGA might give the vendor access to heaps of relevant, high-quality data that small, non-government companies would never be able to collect on their own. That data accelerates the production, testing, and practical application of the algorithm and bolsters the vendor's own internal research.

New, nontraditional companies that wouldn't otherwise want to compete in the government market might be

A UNIQUE VALUE PROPOSITION



USGIF's Small Business Advisory Working Group hosted a discussion with NGA acquisition leaders at GEOINT 2017.

The National Geospatial-Intelligence Agency's (NGA) Acquisition Report Card session has become a staple of USGIF's annual GEOINT Symposium. The interactive panel discussion takes place on the Government Pavilion Stage in the exhibit hall and is typically the conference's final content offering.

"The annual acquisition report card session is part of a unique, ongoing conversation facilitated by USGIF that includes industry, academia, and government," said USGIF CEO Keith Masback. "It is part of the fundamental

value proposition of the Foundation to create myriad opportunities throughout the year for rich discussions across a broad set of GEOINT-related topics via our events and working groups."

Of USGIF's eight working groups, two in particular—the NGA Advisory Working Group and the Small Business Advisory Working Group—often focus on acquisition and government-industry partnerships.

NGA Advisory Working Group

The NGA Advisory Working Group brings industry and academia together to advise, recommend, and promote actionable ideas to improve NGA's acquisition processes.

One of the group's recent activities included co-hosting a session at GEOINT 2017 with USGIF's NRO ASP Industry Advisory Working Group to discuss how changes in the government-industry business model and the move to the cloud would affect the industrial base and future acquisition processes.

attracted to the availability of NGA's extensive data pool, trading their services for access and subsequently strengthening the relationship between the public and private sectors.

Industry partners both old and new are cautiously hopeful regarding the shift to agile acquisition practices.

"Achieving a more agile acquisition framework is enviable, but I'm not certain this is close to reality," said Michael Goman, a program manager at Altamira who attended the GEOINT 2017 report card session. "Recent efforts such as Patagonia make me think NGA isn't certain what it wants. For example, I would like to see a definitive statement and acquisition announcements that show whether NGA is committed to [Amazon Web Services]. One of the big question marks for the Community is how to get existing databases into the cloud. ...Small and flexible acquisitions that do not require mega companies to respond represents a solid strategy—if there is enough meat on the bones to determine where to invest and how to shape opportunities."

CONTRACTUAL LINGUISTICS

Smaller, more flexible acquisition is the goal, and the shift to agile acquisition will ripple beyond NGA project management—contracts issued by the agency will undergo renovation as well.

Returning to the Patagonia contract as an example, NGA asked, "Can we make this into smaller, more modular activities where we can more clearly

articulate what our requirements are to industry?" Logsdon said. "We did this with Patagonia, and it was a wonderful experience."

Specific clauses within contract text may be slowing solution development as well. NGA plans to revamp contract language to emphasize the delivery of end capabilities rather than adherence to traditional development processes.

"To support agile, we've created capacity-based contracts," Pierce said. "We're buying in sprints. We're not buying a system that's confined to requirements A, B, C, and D in the contract vehicle itself."

Where a traditional contract might stipulate that a vendor must deliver a series of results in a certain order with a pre-allocated number of human resources, a contract under the new system would simply specify a deliverable outcome without restricting how to achieve it.

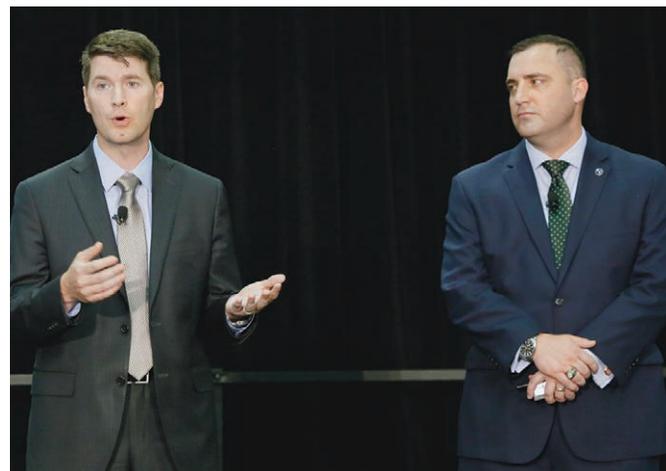
NGA has made provisions for new contracts to be more flexible. According to Pierce, this applies primarily to the concept of "scope" within a contract, and NGA's traditionally strict adherence to that scope. Literal interpretations by the agency's acquisition governance may be limiting innovation in the post-award environment—a hypothesis Pierce posed to the audience at GEOINT 2017. Innovation often requires deviation from expected methodologies, and creative solutions can sometimes qualify as changes of scope that would violate NGA's contractual agreement with a vendor.

To avoid stymieing creativity and driving away potential partners with red tape, NGA is beginning to expand contract scopes to allow vendors to re-range their developmental priorities if they discover new room to innovate—the idea being that adaptability will breed ingenuity.

Logsdon said this is another area that relies upon a cultural adjustment within NGA's acquisition workforce—an adjustment that would return to program managers the right to authorize funding for inventive methods and research without needing to approach NGA's legal department to rewrite a contract.

She also highlighted the need to incentivize vendors within their contracts to push the envelope and explore ways to save time or money, even if those opportunities exist outside of the original project scope.

Michael Foster (left) of NGA and Peter Muend of NRO discussed the joint NGA-NRO Commercial GEOINT Activity at GEOINT 2017.



The group has also established an NGA/Industry Mock Acquisition Program, which seeks to increase transparency between industry and NGA throughout the acquisition lifecycle. The program allows stakeholders to observe, share, and discuss processes and experiences during mock acquisition scenarios, which walk government and industry participants through notional pre- and post-RFP steps to show the actions and reasoning behind each.

NGA Advisory Working Group co-chair Jim Kwolek said the group is planning future sessions that focus on communications, requirements, and market research in addition to more mock acquisition scenarios.

"As we increase shared understanding, we hope to create more effective acquisition outcomes," Kwolek said.

> To learn more about the group, email NAWG@usgif.org.

Small Business Advisory Working Group

USGIF's Small Business Advisory Working Group has more than 150 members and assists small business

members seeking to gain traction in the GEOINT marketplace by facilitating opportunities to build relationships with the Intelligence Community, Department of Defense, larger prime contractors, and other small businesses. The group works to raise the profile of small businesses and to respond to the concerns of small businesses seeking to contribute to NGA's mission.

At GEOINT 2017, the group hosted a discussion with senior acquisition leadership from NGA on "Creative Contracting Techniques for Meeting Small Business Goals." The session included discussion of a white paper the working group published in May titled "Small Business Challenges." The paper, developed in coordination with smaller companies, outlines small business challenges and lists corresponding recommendations for NGA.

Kathy Pherson, who served as co-chair of the Small Business Advisory Working Group for the past four years, said she looks forward to NGA expanding relationships with small businesses. Pherson described the white papers as a "roadmap for addressing and overcoming many of the hurdles to small business success."

> To learn more about the Small Business Advisory Working Group, email smallbusiness@usgif.org.



“I think we scared some small businesses away from doing business with us because maybe our RFP states that having past performance in an NGA environment is desired.”

—NICOLE PIERCE,
HEAD OF CONTRACT
SERVICES, NGA

The Department of Defense (DoD), for instance, directs a “value engineering” initiative that awards contracts to companies with ideas of any kind resulting in proven cost savings or product improvements. According to the Office of the Deputy Assistant Secretary of Defense, value engineering has resulted in cost avoidances of approximately \$1 billion per year for the DoD—savings NGA would also like to see in the coming years.

To help drive efficiencies, NGA has also begun to explore the use of government wide acquisition contracts (GWACs) through its new Commercial Initiative to Buy Operationally Responsive GEOINT (CIBORG) contract vehicle with the General Services Administration. CIBORG will allow NGA to take advantage of the explosion in geospatial sources and information while brokering commercial imagery products for other government agencies, the military, and first responders.

During a Government Pavilion Stage session on CIBORG at GEOINT 2017, NGA Director of Source Justin Poole described the program as “an excellent opportunity” for companies not used to doing business with the agency. Another primary goal of this nontraditional supply chain is to more quickly connect customers with solutions.

“MDA Information Systems is excited that NGA is looking for new ways to partner with commercial businesses,” said Don Schaefer, president of MDA Information Systems. “We were one of the first companies to offer our products and services under [CIBORG] and are looking forward to NGA utilizing faster, more direct methods to secure commercial products.”

However, NGA’s mission often requires vendors with experience in the geospatial domain that understand the intricacies of the GEOINT tradecraft. GWACs don’t always offer vendors with that detailed understanding, so government-wide contracts may not always be the most appropriate or effective route.

ENGAGING SMALL BUSINESS

Changes to contract language and processes would invite partnerships with a new population of innovative startups and small businesses—a population that has historically had trouble breaking into the market as a result of NGA’s past-performance requirements.

“I think we scared some small businesses away from doing business with us because maybe our RFP states that having past performance in an NGA environment is desired,” Pierce said. “A company that hasn’t done business with the government before isn’t going to be able to check that box, but is that really necessary?”

Instead, she proposes NGA seek proof that potential partners can deliver requested work quickly and effectively regardless of their experience in a government-contract environment.

To that end, NGA awarded a \$20 million contract last October to commercial remote sensing leader Planet for access to the small sat developer’s global imagery archive—a significant partnership for the company, which with less than 500 employees is considered a small business by most standards.

Engaging young, unconventional businesses is a steadily expanding initiative for NGA. In summer 2016, NGA opened an innovation center in Silicon Valley called NGA Outpost Valley, hoping to leverage the capabilities and novel energy of the area’s thriving startup community. Since then, NGA has established a presence in more tech-centric locales, including Boston, San Antonio, Austin, and New York City.

GEOINT 2017 audience report cards graded NGA’s industry engagement this year at a B-, which was an improvement from the C+ rating it gave the agency at GEOINT 2016. Though NGA’s efforts are not going unnoticed, room for improvement remains.

The agency has tested new strategies such as one-on-one meetings with prospective partners, which “industry really likes when we’re in the middle of a competitive procurement,” Pierce said.

Traditional industry days can foster an environment of secrecy—no small business wants to share its particular methods with contract competitors—so one-on-one sit-downs with NGA encourage more candid dialogues.

“[NGA] knows that we can’t solve all of GEOINT’s problems alone,” Takane said. “I don’t think industry can either.”

Rhonda Cornelsen, CEO of Helm Point Solutions, said she appreciates events such as the Acquisition Report Card Session, which provides industry a voice and offers insight into NGA’s efforts to modernize acquisition.

“As a cybersecurity contractor, we applaud NGA’s efforts to embrace agile acquisition and their candid dialogue with industry,” Helsen said. “Agile acquisition is a tall order to fill and may not fit every situation, but with a terrorist threat that can morph at will, the country needs the agility to quell the threat promptly.”

Collaboration between government and commercial industry is necessary to combat emerging threats and to secure the geospatial environment of tomorrow. While continuously seeking improvements to its acquisition processes, NGA aims to respond constructively to industry’s evolving needs and to build up and maintain a strong relationship between public and private GEOINT innovators. 🌐



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HPE Synergy is a new, hybrid IT engine built for composable infrastructure.

HPE: Revolutionizing IT

Ken Bruni, director, Advanced Programs Group; and Howard Clifford, distinguished technologist

Q How does HPE support the Intelligence Community (IC)?

Hewlett Packard Enterprise (HPE) has had a strong, long-term relationship with the IC, engineering and building information technology (IT), and providing consulting services in support of their unique and challenging missions. Additionally, HPE has worked with the IC to define technologies and techniques to address cyber vulnerabilities such as the advanced persistent threat, and as a result, HPE has created highly secure IT infrastructure. As part of HPE's cyber strategy, the company is implementing the National Institute of Standards and Technology (NIST) Cybersecurity Framework and NIST 800-171 to secure HPE's supply chain. Finally, HPE has cleared support

technologists worldwide and secure facilities in order to support the IC globally.

Q What is the background on HPE's Enterprise Services spin off to DXC Technology? How will this change HPE?

On April 1, we completed the spin-off of our Enterprise Services business with Computer Sciences Corp. to form DXC Technology. We believe this was an important move for HPE to create a more focused company dedicated to the solutions our customers and partners tell us they want most.

HPE will retain and continue to invest in Pointnext, its technology services organization, made up of more than 25,000 specialists in 80

countries to support customers across advisory and transformation services, professional services, and operational services. These teams collaborate with businesses worldwide to speed their adoption of emerging technologies, including cloud computing and hybrid IT, big data and analytics, the intelligent edge, and the Internet of Things (IoT).

Q How is HPE innovating in the GEOINT space?

HPE is innovating across IT, from the core to the edge. One focus area is what we call "hybrid IT." HPE recognizes some workloads are best deployed in public or private clouds, while others are best deployed in traditional IT infrastructure. Building and helping to create hybrid IT is a core strategy of

HPE, since that is what our customers are asking for. To deliver on that strategy, HPE has engineered and built new hardware and software technologies to deliver the same dynamic configuration flexibility and economics of cloud across traditional computing, storage, and networking solutions. This innovation allows our customers to deploy the right workload on the right platform within the right economic model. Most importantly, this directly supports the GEOINT Community's desire for rapid development and widely-shared apps and data hosted in the cloud while keeping data collection, high performance data processing, and mature workloads on traditional infrastructure.

Another major innovation is in the area of mobility with HPE's Aruba Wi-Fi hardware and software. The IC now has its community cloud and HPE has worked with the IC to create a National Security Agency-approved way of handling sensitive and classified data over Wi-Fi. While Wi-Fi is likely not appropriate for use everywhere in the IC, it does have its place and its use will grow over time.

Q What are your thoughts on how IT will transform in the next five years?

A huge change is already underway and will become more apparent in the next several years. If you look at the IT industry since its inception, there have been several tectonic shifts and we are at the beginning of a fourth shift. Now, we are rapidly moving toward a world where everything imaginable has some kind of connectivity and processing. This is the Internet of Things, where processing is decentralized and pushed out to the edge close to where data is created, whether by autonomous cars and planes, smart cities, or sensors adorning nearly every item imaginable. With IoT the number of "users" or data creators could reach the hundreds of trillions and the resulting amount of data generated will grow exponentially.

The computers we rely on today, from smartphones to supercomputers, are hitting a wall in terms of physical size, efficiency, and computing capacity, because today's computers are based on an architecture that's more than 60 years old. To address this challenge, HPE envisioned an entirely new computing

architecture called "memory-driven computing," which enables a massive leap in our ability to process data. It allows the development of new ways of extracting knowledge and insights from large, complex data sources. Massive performance gains can be obtained from rethinking and re-architecting how data is processed and analyzed. All of this has huge implications for the IC, allowing the community to leverage the power of the IoT.

Machine learning will cease to be a novelty and will soon become a necessity as the data volumes continue to grow beyond what human eyes can view and analyze. And, the IC will need to learn how to protect its own IoT from exploitation as well as how to exploit the intelligent things deployed by adversaries. For the IC, our adversaries' secrets hide in plain sight within that ocean of data, and it's critical they have the systems and know-how to discover those secrets.

Q What benefits has HPE seen from its USGIF Organizational Membership?

HPE has maintained a great relationship with USGIF. The GEOINT Symposium is one of HPE Federal's most important shows to attend. The breakout sessions, networking events, and access to senior executives within IC leadership are outstanding. HPE also greatly benefited from attending USGIF's Powering GEOINT Analytics: Big Data from Small Sats workshop in

April at NGA Campus East in Virginia. The theme of collecting data from small satellites was right on target and of great interest to HPE. We see computing at the intelligent edge as a significant area of opportunity for many years ahead.

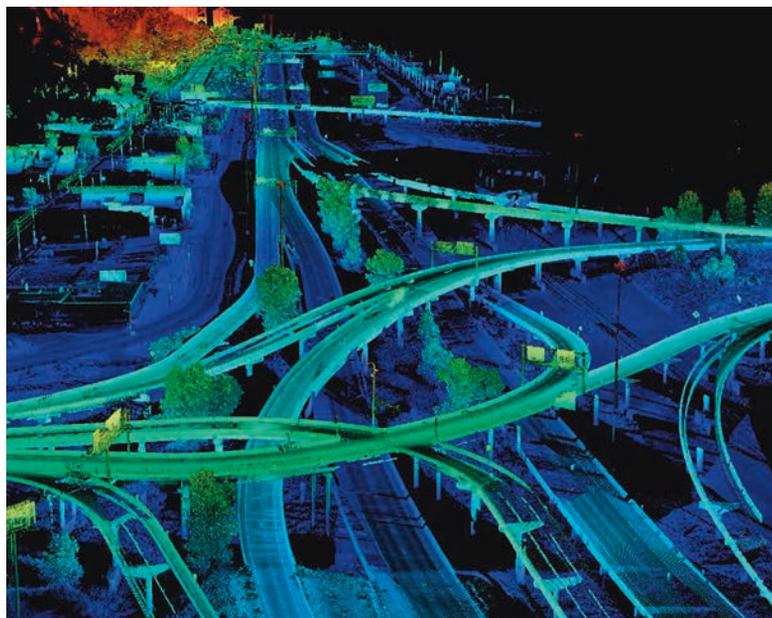
Continental Mapping: Small Business, Big Capabilities

Andy Dougherty, chief executive officer

Q How would you describe Continental Mapping's role in the geospatial intelligence community?

We've been working with the National Geospatial-Intelligence Agency (NGA) since it was still known as the National Imagery and Mapping Agency. We've been an engineering, survey, and mapping firm for 20 years and have grown up in the GEOINT world. We started out bringing survey and planimetric mapping to the industry and then got into content management and feature extraction and attribution.

We have a significant workload in our defense intelligence sector, and we supplement that with work for the U.S. Air Force and Army as well as significant contract work with the U.S. Army Corps of Engineers for survey, mapping, and LiDAR. We aren't so



Continental Mapping's dense, high-accuracy LiDAR point cloud mapping for infrastructure supports asset inventory and engineering design.

IMAGE COURTESY OF CONTINENTAL MAPPING

much in the sensor game except for our mobile LiDAR scanning and mapping services.

Q What are your core offerings?
 Feature extraction, content management, mapping, survey, GIS, and photogrammetry are the heart of what we do. We have a pretty sizeable group called GeoFoundry that is dedicated to creating tools to improve our mapping skills. In the last five years, we have developed more than 50 tools that are used by our quality control and quality assurance people as well as our planimetrics and photogrammetry programs. GeoFoundry has its own website where we sell those tools. We used to keep them internal, but in an increasingly open-source world, there's no reason not to share these tools.

One area we've seen real promise in is information brokerage. Our tools automate the process of looking for errors—they capture statistically relevant mistakes by going after things you normally cannot automate. These capabilities minimize the amount of human labor necessary to implement a quality control effort. In the world of information brokerage, we see a role for those tools to rapidly map an area or quickly decide whether your data set is relevant. We create a score index for the data sets we review—what we refer to as “Data Fitness.”

Q How has Continental Mapping grown since its founding in 1999?

We started as a small firm with two photogrammetrists who wanted to branch out on their own from a larger company. Since then, Continental has developed a robust defense and intelligence portfolio. We recently expanded to transportation and infrastructure in the last year to answer the need for autonomous vehicle mapping and asset management for the Department of Transportation at the federal and state levels.

In photogrammetry and the GEOINT world, the autonomous vehicle has the potential to launch a whole sector unto itself for mapping infrastructure so these vehicles can operate safely on our roads. There is a ton of effort in that—it's probably our next largest growth area.

Q What differentiates Continental Mapping from similar organizations?

Large business primes want small business contractors who are forthright and honest in their dealings and who deliver quality products on time and on schedule. We've built and maintained a reputation for delivering quality work the first time, on schedule and for a good price. That reputation and our “above and beyond” GEOINT products have kept us in the marketplace where, if you can't deliver, you'll quickly be removed from the contract or you won't see return work. We've kept large businesses happy with our performance while still growing and picking up side contracts where we can.

Q What emerging GEOINT trends is your company currently responding to?

We've been monitoring the continuing use of new sensors and GPU processing, as well as taking advantage of some artificial intelligence that's been coming out of Silicon Valley. Sensors have matured dramatically in the last 10 years to where they have multiple uses for gathering desired information. We've continued to update our software processing capability to keep it fast, keep it clean, deliver quality products, and deliver to the customer the sensors and data sets they really need.

Individual Membership Spotlight: Opening New Doors

Lt. Joseph Flynn, assistant commander, Fairfax County Police Department's Criminal Intelligence Division; deputy director, Northern Virginia Regional Intelligence Center (NVRIC)

In 24 years with the Fairfax County Police Department, Lt. Joseph Flynn has held many roles—patrol officer, air and SWAT paramedic, and more. He has also held leadership positions in case and branch management. Recently, Flynn was elected chair of



Lt. Joseph Flynn, Fairfax County Police

the Metropolitan Washington Council of Governments' Subcommittee for Intelligence. Flynn has been a USGIF Individual Member since fall 2016.

Q What led you to become a USGIF Individual Member?

When I transferred into the Criminal Intelligence Division, one of the big things I noticed was that NVRIC analysts and staff were very isolated. The NVRIC itself has numerous analysts—cyber, critical infrastructure and key resources, threat assessment, gangs, narcotics. I wanted to see what else was out there in the intelligence world—other organizations or groups we could tap into to possibly expand our resources. Through the good graces of Google, USGIF came up.

Through my research, I learned USGIF was very involved with the Defense Department and the federal side of geospatial technology, so I reached out to see if they would allow U.S. law enforcement into the organization and be interested in partnering with law enforcement agencies. My email received a prompt response from USGIF CEO Keith Masback, and he actually visited us with USGIF staff. They spoke with our analysts and our commander to explain what the Foundation does and to share more about some of the outlets they could provide to us. They also wanted to learn about the trends law enforcement is following with regard to GEOINT. I wanted my analysts to have opportunities for networking and outreach and to see other technologies out there that they may be unaware of.

Q How do Fairfax County police use geospatial intelligence to prevent crime and protect the community?

We have several different layers of crime analysts throughout the county. A lot of stuff we do is related to GPS search warrant information we're allowed to receive from that type of data dump. We also use a lot of cell phone tower information when dealing with specific cases. For plotting information, we use a system called Tableau to highlight where events are happening.

There are two avenues we go down with geospatial information. The first is plotting an event and the historical marker of it. That information is used to help highlight, for example, whether the event occurred in a high accident traffic area. Then we'd push our efforts that way. Or to determine whether the event occurred in an area with high gang activity. And we'd push our activity that way. We break it down into the specifics of the crime and then determine what resources we're going to direct to that area to help reduce

crime and have more of a presence.

The second part of our geospatial aspect is plotting evidence data to reveal a timetable of how an individual person is moving and discover correlation between one or more targets to determine if there's a relationship. This is where companies are starting to come to us to see if they can help or if we can help them with a product that performs the geospatial evidentiary role.

Q What advice do you have for students and young professionals hoping to join or who recently joined the law enforcement community?

I think you need to sit back and determine what type of law enforcement you want to do. I enjoyed starting my career as a beat cop, going out, pounding the street, driving, meeting people, and investigating certain levels of crime. There are those who want to go straight into working the crime scene processing or the forensics. You also have people who don't want to get their hands dirty but are very analytical

and think deeply—the people that can correlate and see the bigger picture and bring it into perspective. Decide whether that's something you want to go into. Also, technology is still big in all aspects; you have to get very comfortable with the current technology and always think forward. If you're not doing that, you're going to handcuff yourself from advancing your career and your abilities.

Q How have you benefited from USGIF Membership?

Professionally, it's opening up eyes and doors. There are opportunities for law enforcement intelligence folks to meet and network with people who are experts in the field and are willing to assist us. I'm bringing geospatial intelligence specialists into NVRIC to talk with our analysts and to see how the workflows go and how they set their goals. Then, we can ask those outside groups for advice on how we can improve. USGIF is starting to open up doors for us to people and technologies that we may not have thought of in the past. 🌐

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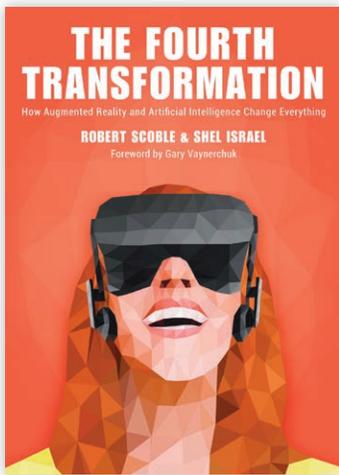
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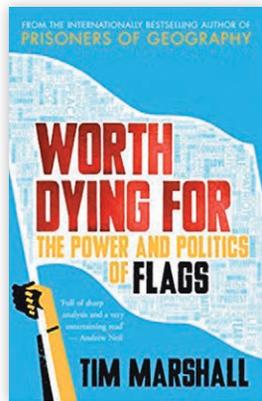
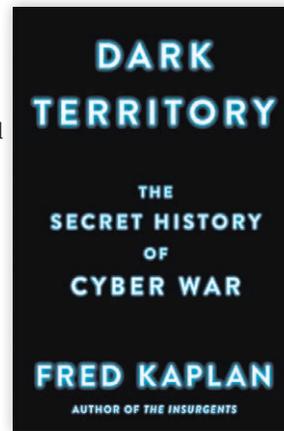
By Robert Scoble and Shel Israel

Augmented reality and artificial intelligence are among today's fastest growing technologies, and this book examines the vast extent to which they will revolutionize life in the modern world. From health care and education to business and entertainment, a paradigm shift is underway and forward-thinkers need to adapt now. According to the authors, connectivity and globalization are just beginning.

Dark Territory: The Secret History of Cyber War

By Fred Kaplan

This historic account of cyber warfare investigates stories from inside the National Security Agency, the Pentagon, the U.S. military, and even the White House, analyzing how the world quietly relies on hacking during times of conflict. The narrative reveals a startling trend: the cyber capabilities the United States employs against its enemies could also be used against us. Kaplan argues cyber is the next frontier in military strategy and will have a hand in determining the next global superpowers.



Worth Dying for: The Power and Politics of Flags

By Tim Marshall

Geopolitical history meets current events in this investigation of national symbolism. Flags have the power to unite and divide populations—they confirm identities and define eras and territories. To understand the conflicts of the modern world, we must understand the symbols of its people. This book explores the human condition through the ensigns of Japanese imperialism, the fall of Nazism, American patriotism, and more.

SEPT. 12
GEOINteraction
 Tuesday
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OCT. 1-3
USGIF Accredited Schools Summit
 Herndon, Va.

OCT. 17-18
Tech Showcase West
 St. Louis, Mo.

NOV. 11
12th Annual GEOGala
 McLean, Va.

NOV. 13-17
GEOINT Community Week
 Northern Virginia

PEER INTEL

The Center for a New American Security (CNAS) announced **THE HONORABLE JAMES CLAPPER** joined the organization as the distinguished senior fellow for Intelligence and National Security as well as joined the CNAS Board of Advisors. Clapper will contribute to research, mentor the next generation of national security leaders, and provide his perspective on today's most pressing intelligence and national security issues.

President Trump nominated **SUSAN M. GORDON** to serve as the next Principal Deputy Director of National Intelligence. Gordon is currently deputy director at the National Geospatial-Intelligence Agency and previously spent much of her career with the CIA.

Dewberry promoted **ELISE MACPHERSON** to associate at the firm's Tampa, Fla., office. MacPherson has more than 20 years of experience in the geospatial industry, specializing in LiDAR, photogrammetry, and other remote sensing technologies.

USGIF CEO **KEITH J. MASBACK** was appointed to the International Spy Museum's Advisory Board of Directors. The board includes leading intelligence experts, scholars, and practitioners.

K. STUART SHEA was named CEO of Harris Corp.'s former government IT business, which was recently spun off and sold to investor Veritas Capital. Formerly COO of Leidos, Shea is also one of the founders of USGIF and a former Chairman of its Board of Directors.

Defense Intelligence Agency Director **LT. GEN. VINCENT STEWART** was nominated to become deputy commander of U.S. Cyber Command. Stewart formerly served as the head of Marine Forces Cyber.

KeyW appointed **JOHN SUTTON** as chief operating officer and Marion Ruzecki as chief people officer. Sutton joins KeyW from Vencore, where he led the operations and growth of the Defense, Civilian, and Homeland Security Group. Ruzecki has more than 20 years of experience developing and implementing personnel strategy for technology firms.



perspective

valuable assets such as cutters and other equipment in that potentially dangerous area.

Q Is S&T doing any research in artificial intelligence (AI) and machine learning?

Absolutely. Within the Homeland Security Advanced Research Projects Agency (HSARPA) we have a data analytics engine and right now they are conducting research into the latest developments in machine learning. We are partnering with many organizations interested in machine learning and AI. In recent work with TSA, we examined the performance of risk assessment algorithms for aviation security. This will result in technical information used by TSA in considering future operations. HSARPA also hosts regular workshops where a variety of big data techniques are discussed.

In the area of cargo transportation, we have an initiative in which we're trying to characterize and give organizations like the Coast Guard and Customs and Border Protection better assurance that cargo coming into the United States truly aligns with the manifest that's sent ahead. One of our novel approaches seeks to better characterize the pollen discharges on shipping containers to see whether the native origin of the pollen matches what's stated. Machine learning and AI will assist in accelerating these use cases.

Q How are advanced data analytics and visualization changing S&T's approach to its research?

All of the data in the world, if not taken advantage of, is just all the data in the world. We're always trying to figure out novel ways to give an enhanced view of what the data means to decision-makers. The user interface associated with how data is displayed to a decision-maker is one part of the puzzle. We try to eliminate the proverbial 'crap on a map.'

Q What advice do you have for young professionals interested in careers in homeland security and/or R&D?

If you're seeking the geek or nerd cred, by all means, go forward and chase that passion. At DHS we are always looking for talented individuals, especially in areas of S&T as things come online like nontraditional financing, blockchain technology, synthetic biology, and the maker movement with 3D printing and other additive manufacturing. We need sharp, innovative, forward-thinkers who have a natural appetite for curiosity in these arenas. We make no assumption that we know everything. 🌐

INNOVATING FOR THE HOMELAND

Q&A with Andre Hentz, acting deputy under secretary for S&T, DHS
Andre Hentz is acting deputy under secretary for Science & Technology (S&T) with the Department of Homeland Security (DHS).

Q How do S&T's R&D efforts contribute to the DHS mission space?

We ensure DHS and the homeland security community have the resources needed to prevent manmade natural disasters and also to provide response and recovery from threats manmade and natural. We develop tools to protect the nation and infrastructure from chemical, biological, radiological, and cyber attacks.

We seek to leverage other technological advancements throughout the government and make them appropriate for domestic use, and we directly provide the Secretary of Homeland Security with fact-based information to aid in decision-making.

Q What is the importance of precision location information and ISR assets across DHS mission sets?

We consider precision location a key research area. As automated vehicles come online, our cyber division is working with the Department of Transportation to have a safety and security layer embedded in the engineering process. We are trying to ascertain how to add a layer of geospatial location information in this domain to ensure a vehicle is on its correct path and that it is where it believes it is.

Another example of how we're looking to take advantage of geospatial data is Polar Scout—an endeavor in which the Coast Guard is partnering with S&T to see if we can enhance maritime awareness in the Polar North. Recently, the first cruise ships started sailing in the Northwest Passage. That's going to bring into consideration other business opportunities through that northern passage and that will ultimately yield an increased workload for the Coast Guard. We're doing an analysis of alternatives to determine whether an inexpensive satellite constellation for the purposes of search and rescue would be appropriate. This would give the Coast Guard better intelligence in terms of who's up there. It might also offer common opportunities and provide persistent geospatial information to understand when to deploy

Read the extended interview at trajectorymagazine.com/perspective.

QUICK FACTS

CAREER INSPIRATION: Neil deGrasse Tyson

FAVORITE MOVIES: *Apocalypto* and *Troy*

CURRENTLY READING: *The Never Paradox* by T. Ellery Hodges

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