

trajectory

THE OFFICIAL MAGAZINE

OF THE UNITED STATES GEOSPATIAL INTELLIGENCE FOUNDATION

After three decades of incremental integration, the **defense intelligence** community is leveraging IT advancements to pursue a new era of interoperability and agility.

Embracing *the Enterprise*

- > DHS S&T's First Responders Group
- > GEOINT Certification
- > Perspective:
NCIX Bill Evanina

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2017 ISSUE 2

The Marine Wing Communications Squadron 28 uses numerous systems, ranging from single-channel radios to beyond line-of-sight communications, for a broad spectrum of information services and interoperability.

PHOTO COURTESY OF U.S. MARINE CORPS



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Expanding our Reach



“The Foundation remains steadfast in its mission to lead, promulgate, and support the GEOINT tradecraft and its practitioners, now and into the future.”

I recently signed another set of USGIF academic GEOINT Certificates earned by students at several of our 14 accredited university programs. It is absolutely one of my favorite things to do as USGIF CEO, among many rewarding aspects of the job. I feel incredibly fortunate to have had the opportunity to spend my entire career in service to the Nation—first as an Army officer, next as a government senior executive, and then here for the last nine years at USGIF. The Foundation is indeed focused on service to the rapidly expanding GEOINT Community in support of the United States and our allies.

Establishing USGIF as an educational nonprofit foundation versus a trade association was a pivotal decision made by those who conceptualized the organization. This determined from day one there would be no lobbying and no explicit promise to help a member company win a contract or increase market share, but simply that a rising tide truly would raise all boats.

Through the downturn in the economy in 2008, through sequestration and a government shutdown, USGIF has continued to grow. Since 2008, we’ve doubled our number of Organizational Members, seen rapid uptake of a new Individual Membership program, more than quadrupled our accredited collegiate programs, awarded more than \$1 million in scholarships, and bestowed the USGIF academic GEOINT Certificate upon more than 700 students.

USGIF events and programs have grown in size and scope; our working groups have proliferated; we’ve launched a world-class professional Universal GEOINT Certification program; and our impact has been amplified via our Young Professionals Group and its support to our burgeoning K-12 engagement efforts.

We’ve stayed true to the vision of our founders, and in 2016 embarked upon our first campaign to raise funds in support of our expanding educational initiatives. Our member organizations have been incredibly generous over

time, creating the foundation upon which our current capacity is built. By raising additional funds, seeking grants, and working on innovative partnering arrangements, we plan to amplify that investment to support the accelerating GEOINT Revolution.

In this issue of *trajectory*, we illustrate the great examples of this educational work in action. You’ll also see myriad references to the wide-ranging engagements USGIF staff, members, and volunteers regularly conduct to build the community, advance the tradecraft, and accelerate innovation. We have an insightful feature on intelligence interoperability efforts underway in the U.S. Department of Defense—a companion piece to our seminal article in Q1 2016 on IC ITE, JI2E, and DI2E. Additionally, we have a great update on our professional GEOINT certification efforts, as the first to achieve those designations articulate what the accomplishment means to them and their organizations.

Whether you’re able to attend GEOINT 2017 in San Antonio or one of our other events throughout the year, I hope you’ll support our collective work by joining the Foundation as an Individual Member, volunteering on one of our working groups or committees, and considering USGIF in your charitable giving. The Foundation remains steadfast in its mission to lead, promulgate, and support the GEOINT tradecraft and its practitioners, now and into the future. We’d like you to be an integral part of these exciting endeavors.

I look forward to seeing you in San Antonio, around the D.C. metro area, and in the course of my travels sharing the power of GEOINT to audiences far and wide.

KEITH J. MASBACK | CEO, USGIF
@geointer

trajectory

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ANALYST REPORT: DIGITAL GOVERNMENT DEMANDS HYBRID CLOUD

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Intel Inside®.
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IDG report, "Hybrid cloud computing, the great enabler of digital business," January 2017.

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INTsider

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EVENTS, AND EDUCATION

 ARTIFICIAL INTELLIGENCE

 USGIF NEWS
 GEOINT COMMUNITY NEWS
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USGIF Hosts Machine Learning & AI Workshop

USGIF hosted its first Machine Learning (ML) and Artificial Intelligence (AI) Workshop Jan. 10 in Herndon, Va. Dr. Jason Matheny, director of the Intelligence Advanced Research Projects Activity (IARPA), gave the first keynote with a strong articulation of why nearly 300 people were gathered for a day of presentations and discussion.

“Finding some way of bringing machines to scale up and address our problems is a way of bridging the gap between the resources we have and the resources we need,” Matheny said. “It allows us to focus human brains and eyeballs on the problems where they’re most needed.”

IARPA funds about 500 organizations around the world studying everything “from AI to Zika,” but is perhaps best known for its work in high-performance computing, Matheny continued. Matheny pointed to IARPA’s many programs focused on automated analysis of speech, text, or video—such as Finder, CORE3D, Janus, Aladdin, and DIVA.



MEMBERS WANTED! USGIF recently launched a Machine Learning & Artificial Intelligence Working Group. The group, which held its first meeting March 16 at Riverside Research in Arlington, Va., is seeking members. Email MLAIWG@usgif.org to join or learn more.

Mo Islam, a senior associate with DFJ Venture Capital, spoke after Matheny.

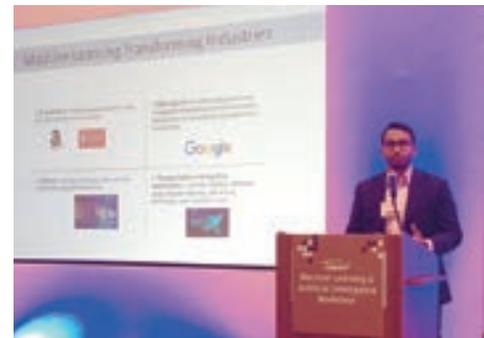
“The most valuable companies in the world currently are IT companies—and, I would argue, AI companies,” Islam said, referencing AI advancements by IT giants such as Google and IBM. “Every business is going to become an information business.”

Dr. Nina Berry, a science and technology advisor with the Joint Improvised-Threat Defeat Organization (JIDO), gave a presentation discussing the relevance of AI and ML for the warfighter. She highlighted JIDO’s video intelligence (VIDINT) framework, which helps analysts process video to identify individuals.

“The AI we’ve been doing so far in VIDINT is showing great promise,” Berry said, adding the initiative supports the Pentagon’s Third Offset Strategy and its goal to implement more automation technology.

The workshop also featured academic and industry flash talks from a variety of universities and companies, an In-Q-Tel brief on natural language processing, and an update on the collaborative SpaceNet Challenge.

USGIF FILE PHOTO



DFJ Venture Capital’s Mo Islam was one of many speakers at USGIF’s Machine Learning & Artificial Intelligence Workshop, which attracted nearly 300 attendees.

USGIF FILE PHOTO



ODNI's Dr. David Honey spoke about the many ways for industry to engage with his office at USGIF's GEOINTeraction Tuesday event in January.

GEOINTERACTION TUESDAY

ODNI on Partnering with Industry

The Intelligence Community's needs and communicating with industry were the main topics of Dr. David Honey's speech at USGIF's GEOINTeraction Tuesday event Jan. 10. Honey is deputy director of national intelligence for science and technology with the Office of the Director of National Intelligence (ODNI).

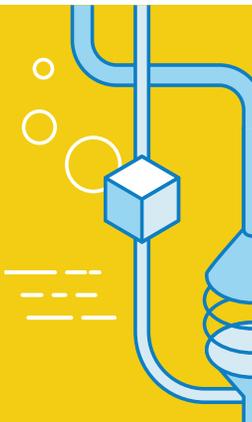
Honey spoke about three ODNI programs that promote strong relationships with industry to help solve intelligence integration challenges.

One initiative ODNI offers is the Intelligence Science and Technology Partnership (In-STeP) program, through which participating businesses can present their science and technology projects to Intelligence Community (IC) stakeholders in one-on-one meetings. Connected to that initiative is the Intelligence Formulation of Risk Management (In-ForM) program, which provides the IC and its partners with use-inspired, basic research approaches for advancing and transforming IC capabilities to resolve In-STeP-identified challenges.

Honey also announced ODNI is offering approximately \$1 million in prizes as part of the Xploratory Challenge Series under its Intelligence Ventures in Exploratory Science & Technology (In-VEST) program, which focuses on artificial intelligence, machine learning, and deep learning.

Eventually, the IT standards that are enabling interoperability across the defense intelligence community will enable interoperability at a global scale, uniting the DoD, the IC, and even their international mission partners through shared data.

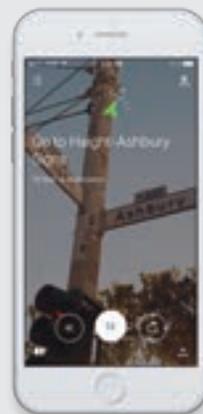
— EXCERPT FROM "EMBRACING THE ENTERPRISE."
SEE PAGE 18 FOR THE FULL STORY.



PROCRASTINATION TOOLS

VIIRS View

Created by Raytheon, the Visible Infrared Imaging Radiometer Suite (VIIRS) View app combines an interactive world map with major data sets from advanced weather satellites to reveal a dynamic presentation of the environmental factors that shape the globe. Cloud coverage maps predict the path and intensity of storms, low-light imagery shows global power consumption, and chlorophyll concentration filters suggest the presence of phytoplankton photosynthesis in oceans. VIIRS View is available to iPhone and Android mobile users as well as on most desktop platforms. raytheon.com/capabilities/products/viirs



Detour

When you reach your next destination, immerse yourself in its history with Detour—a GPS audio app that guides users on interactive walking tours of major cities such as San Francisco, Chicago, and New York. Detour features cinematic narration by locals who know the area best and guides users in real-time as they walk.

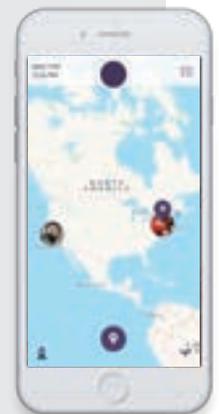
Those traveling with friends can sync their tours so the whole group can share the experience.

detour.com

Is

Location-sharing app "Is" shows users where their friends and family are and what they're up to. With the click of a button, users can share their whereabouts with a private group of friends who can populate the dropped location pin with photos, comments, and videos. Google's Firebase platform allows the app to track locations in real time, updating fluidly as the user moves.

isapp.com





USGIF FILE PHOTO

 YPG

3D Storytelling for the Xbox Generation

More than 25 young professionals gathered Feb. 23 at Mustang Sally’s Brewing Company in Chantilly, Va., for an evening of networking and a discussion with Vricon Vice President Craig Brower. The conversation focused on diversity in data, perspective, and age in the IC. Brower spoke about the age group he calls the “Xbox generation” and how to get more of these young professionals—who are used to thinking in 3D—interested in IC careers.

Vricon’s Craig Brower spoke to young professionals about ways to interest the “Xbox generation” in the Intelligence Community.

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 ACQUISITIONS

MDA to Acquire DigitalGlobe

MacDonald, Dettwiler, and Associates (MDA) announced Feb. 24 its intent to acquire DigitalGlobe for \$2.4 billion. The boards of directors of both companies have approved the deal, which they expect to close in the second half of this year. DigitalGlobe will retain its name and Colorado headquarters, and will become a subsidiary of SSL MDA Holdings, the U.S. operating company of MDA. The combination of the companies will bring together complementary space-related capabilities, creating a stronger organization positioned to capture growth in the U.S., Canadian, and global Earth observation and geospatial services markets.



PHOTO COURTESY OF DIGITALGLOBE

ACQUISITIONS

Rapid Growth for Planet

Planet announced Feb. 3 its intent to acquire Google's small satellite business, Terra Bella, along with its fleet of seven SkySat satellites—a deal that will make Planet the undisputed leader in small satellite commercial remote sensing. On the heels of the Terra Bella announcement, Planet launched 88 Dove satellites—the largest constellation ever to reach orbit—aboard a PSLV rocket from Satish Dhawan Space Centre in India. This marked a milestone Planet refers to as “Mission 1,” achieving the ability to image the entire surface of the Earth on a daily basis.

Leadership from both Planet and Terra Bella emphasized the complementary nature of the high-resolution SkySat constellation to Planet's current constellation of Doves—medium-resolution CubeSats that capture photos at three to five meters per pixel. The SkySats are more targeted and collect rapidly updated images of select areas of the globe at sub-meter resolution. The Doves continuously monitor huge swaths of land every day, and the SkySats operate on a command-based tasking model.

Financial details of Planet's Terra Bella acquisition have not been made public. In 2014, Google acquired Terra Bella, then known as Skybox Imaging, for \$500 million.

The Planet-Google agreement includes a multi-year contract through which Google will purchase access to Planet's Earth imaging data. Additionally, a significant but unspecified number of Terra Bella employees will transition from Google's campus in Mountain View, Calif., to Planet headquarters in San Francisco.

IMAGE COURTESY OF TERRA BELLA



An artist's conception shows Terra Bella's SkySat satellites in orbit.

STEM

USGIF Presents Awards at Area Science Fairs

Members of USGIF's Young Professionals Group (YPG) represented the Foundation as judges in the Fairfax County Regional Science and Engineering Fair March 18. YPG Members Bill Pilotte and Isaac Zaworski selected a first, second, and third place winner for best representation of GEOINT. The first place winner was Siona Prasad of Thomas Jefferson High School for Science and Technology, in second place was Kevin Duffy from Lake Braddock Secondary School, and in third place was Mikayla Huffman from Marshall High School. Each winner received a cash prize of \$300, \$200, and \$100, respectively.



USGIF COO Aimee McGranahan with Jonathan Kerr, one of the winners of USGIF's Special Achievement in GEOINT Award.

USGIF also presented an award at the Loudoun County Regional Science and Engineering Fair March 23. USGIF offered a Special Achievement in GEOINT Award to a student whose project demonstrated the best use of geospatial intelligence to solve a real-world problem. The prize included a \$250 check, a one-year USGIF Academic Individual Membership, and “got geoint?” swag. The winner was Jonathan Kerr from Broad Run High School in Ashburn, Va., for his project titled “Remote and Autonomous Seismic Vulnerability Evaluation Using Satellite Imagery.”



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 TRANSPARENCY

NGA Director Cardillo on the “Power of Transparency”

NGA’s commitment to transparency has helped advance public awareness of geospatial intelligence and led to many new partnerships, according to NGA Director Robert Cardillo.

Cardillo participated in a Q&A session co-hosted by the Atlantic Council and Thomson Reuters in January as part of the council’s “Power of Transparency” series. The director spoke with moderator John Walcott, Reuters’ foreign policy and national security editor, in a presentation titled “The Power of Transparency in Advancing Geospatial Intelligence.”

“[NGA is] striving to be more effective and relevant in the open in a way that’s meaningful to those we serve inside and outside the government,” Cardillo said.

With the agency celebrating its 20th anniversary last year, Cardillo explained how its mission has expanded beyond traditional GEOINT into areas such as humanitarian relief, disaster response, land reclamation, historic preservation, and security for special events—such as recently assisting the Department of Homeland Security with the Presidential Inauguration.

Cardillo concluded the conversation with a discussion of NGA’s Commercial Initiative to Buy Operationally Responsive GEOINT (CIBORG) program, a new contract vehicle with the General Services Administration. Through the CIBORG vehicle, companies new to the agency as well as those with established relationships can register their services to provide imagery and geospatial intelligence products for NGA.



USGIF FILE PHOTO
NGA Director Robert Cardillo spoke about transparency and new partnerships in an interview with Reuters at an event hosted by the Atlantic Council.



PHOTO COURTESY OF GDELT

GDELT is a free, open platform that gathers news from around the world to curate a “catalogue of society.”

 OSINT

A Database of World Events

Imagine a database that holds information on all world events and historic records reported in the global news media over the last 30 years, along with the narratives, emotions, and images that defined those events. What you’re envisioning is the real-life GDELT project.

 [VISIT **gdeltproject.org**](http://GDELTProject.org)
to learn more.

GDELT—which stands for Global Database of Events, Language, and Tone—is a free, open data platform that applies machine learning to gather news from all over the world and curate what GDELT creator Kalev Leetaru calls “a catalogue of society.”

“We have so much data about the natural Earth, but when it comes to the human Earth, to cataloging human ‘earthquakes’ like mass protests or coups, we were in the stone ages,” Leetaru said. “Before GDELT we never had a database that could give you a list of all the protests happening right now around the world. That’s the goal of GDELT—to let you see the human world just as well as you can the natural world, letting you map global protests as easily as you can map global earthquakes.”

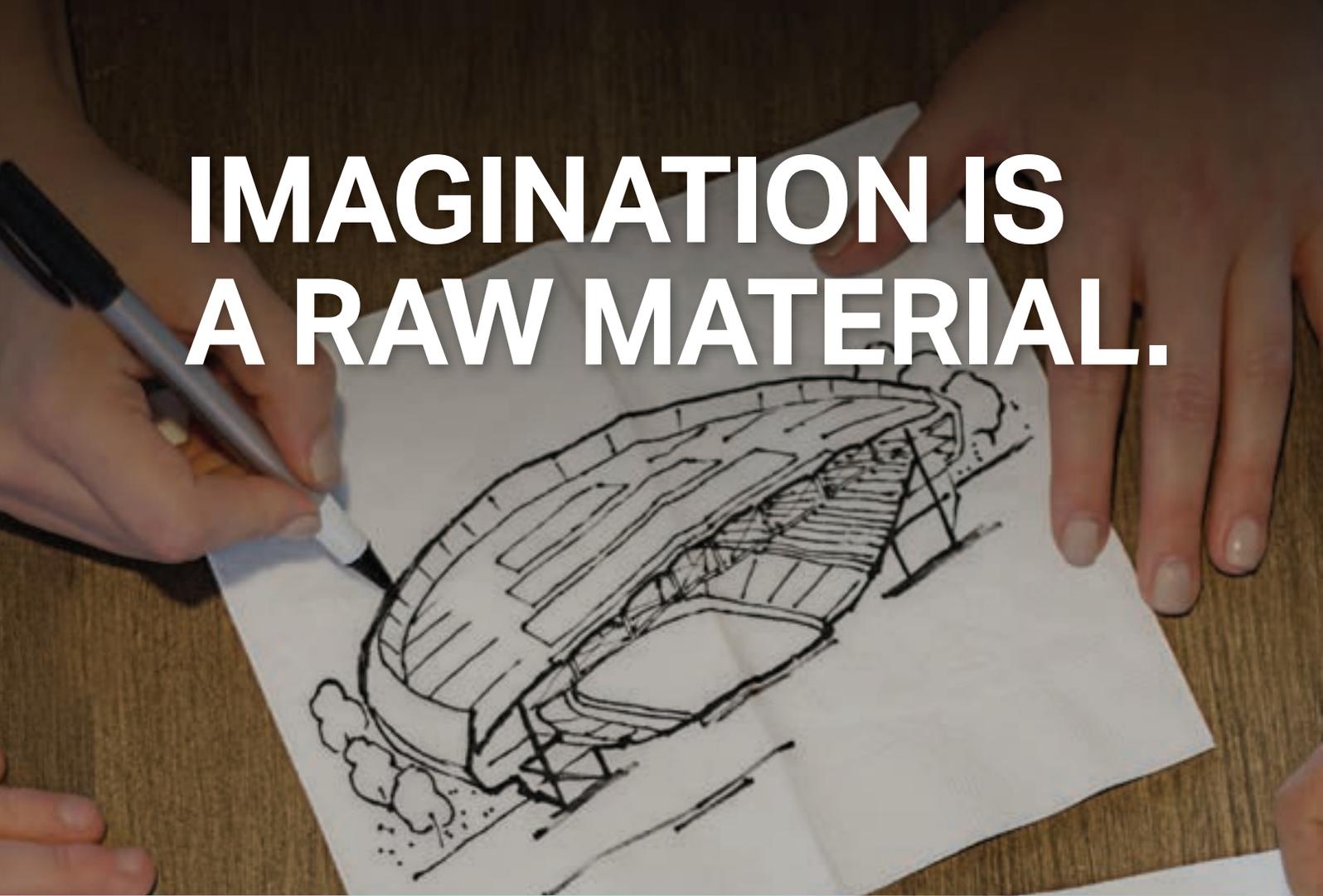
GDELT has evolved beyond its original scope, and now collects broadcast, print, and web news and images from around the world—updating every 15 minutes. Several different data sets bring together more than 400 million event records in 300 categories, more than a trillion emotional measures, two billion mentions of location, and more than 175 million images covering world events from 1979 to present.



Technology that can help find a downed, missing, or trapped firefighter faster and get the rescue team to that firefighter faster is going to save lives.

— EXCERPT FROM “PROTECTED, CONNECTED, & FULLY AWARE.” SEE PAGE 28 FOR THE FULL STORY.

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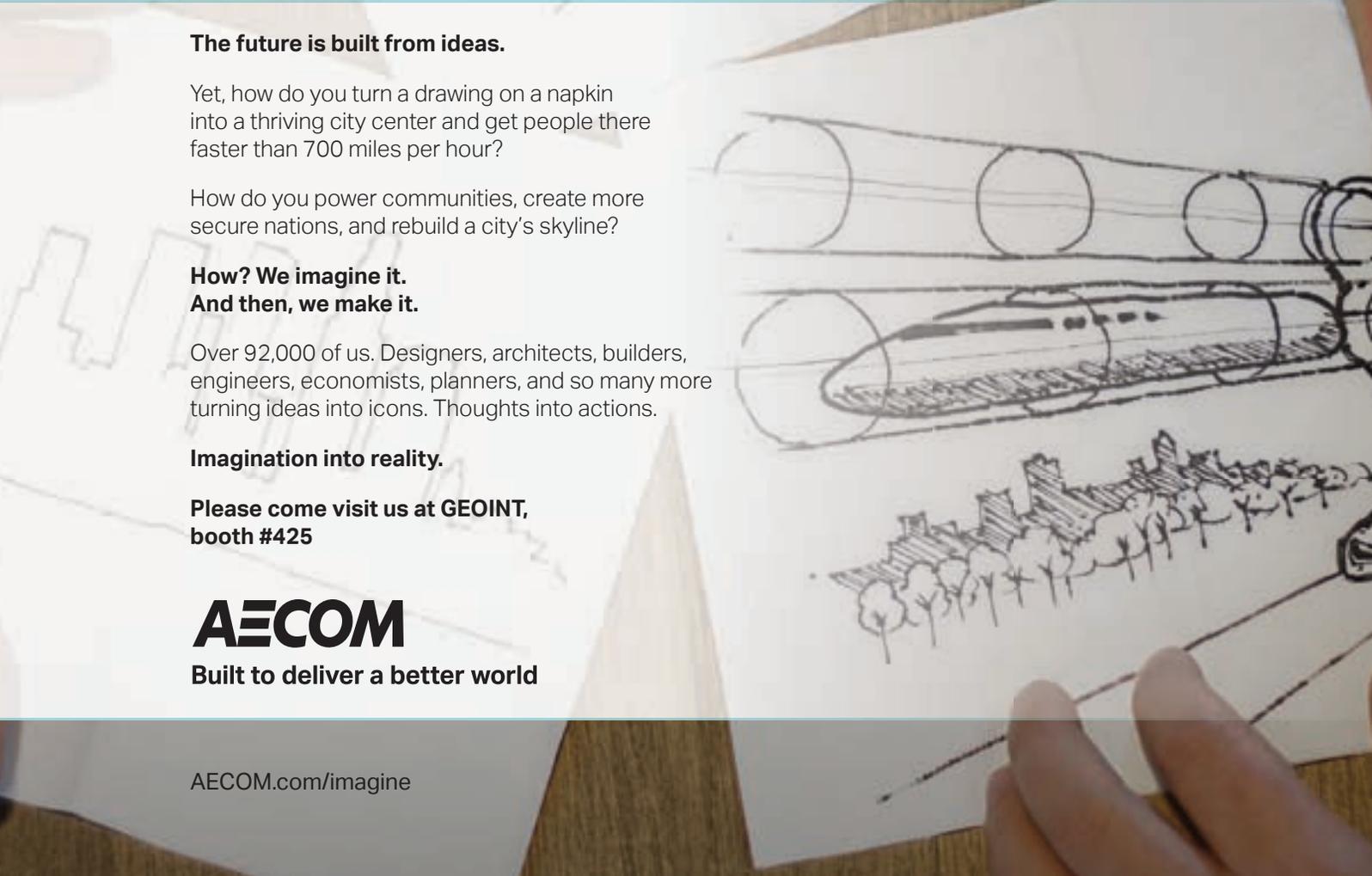
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USGIF FILE PHOTO

Young professionals introduced hundreds of families to satellites and imagery at the International Spy Museum's annual Spy Fest event.

More than
480
attendees
participated
in the
International
Spy
Museum's
Spy Fest
event
Jan. 27.

 SPY FEST

Teaching Families about GEOINT

More than 480 attendees participated in the International Spy Museum's Spy Fest event Jan. 27. Families were introduced to the IC and the world of espionage through fun and educational activities. At the USGIF booth, YPG volunteers taught families about satellites. A DigitalGlobe GeoEye-2 satellite model was on display and Vricon 3D imagery was available on tablets for attendees

to view. Using the imagery, participants got a space-based look at locations around the world and learned the power imagery can offer when interpreting events related to national security, humanitarian relief, and more. After a quick introduction to geospatial intelligence, children were invited to build their own satellite models using everyday household items.

 RESEARCH

High-Performance Computing at NGA

A culture change is essential to fully leverage the power of high-performance computing (HPC), according to experts from the National Geospatial-Intelligence Agency (NGA) and Oak Ridge National Laboratory (ORNL) at USGIF's Geocomputational Break-out Breakfast held Feb. 15 at NGA.

The breakfast was a follow-on to a summit NGA and ORNL hosted the previous day, which focused on the power of HPC and the data challenges it could help the agency address. USGIF's breakfast was an opportunity for those who were unable to attend the summit to hear a summarized overview.

NGA Director of Research Peter Highnam shared his thoughts on the potential of HPC for GEOINT analysis.

"Automation is a driving opportunity," Highnam said. "Machine and deep learning are just pieces of the puzzle. I see three [HPC]

objectives: automation, transition in practice, and enriching GEOINT to present information."

NGA also shared its announcement of the Magellan Project, which allows an analyst to view any location in the world in the past, present, and future to predict scenarios in order to make more informed decisions.

The breakfast concluded with a panel discussion including Justin Poole, director of NGA's Source Directorate, and Frank Avila, a senior scientist with the agency's Office of Sciences and Methodologies.

Both agreed there are not enough eyeballs on the explosion of GEOINT information.

"At the end of the day, a human will make judgment of what's going to happen," Avila said. "Analysts need to feel confident in how we bring [in HPC] technology ... It's exciting and there are going to be big challenges, but it's an opportunity to do things better."

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Visit us at GEOINT Booth 1139 to learn more.





STEM

EdGEOcation in Action

USGIF members and supporters helped the Foundation raise nearly \$9,000 during our first ever EdGEOcation Giving Campaign, and we are already putting those dollars to work.

In March, USGIF participated in STEM Night with Moorefield Station Elementary School in Ashburn, Va., and in STEAM Night at Hamilton Elementary School in Hamilton, Va. The added A in STEAM stands for art and design. USGIF staff discussed satellites with students, helped them conduct basic analysis of satellite imagery, and showed them before and after satellite images of natural disasters.

Also in March, the Foundation collaborated with Loudoun County Public Schools in Virginia to bring the National Geographic Giant Traveling Map of North America to several area schools. USGIF staff visited Hamilton and Seldens Landing Elementary Schools, where they gave a GEOINT 101 presentation and led imagery analysis games on the giant map. USGIF Individual Member John Mills sponsored the Giant Traveling Map.



PHOTO COURTESY OF LOUDOUN COUNTY PUBLIC SCHOOLS

USGIF staff visited several schools to give a GEOINT 101 presentation and lead activities on National Geographic's Giant Traveling Map of North America.

TO SUPPORT USGIF's EdGEOcation Giving Campaign visit usgif.org/donate.



USGIF FILE PHOTO

Many families from Moorefield Station Elementary School stopped by the USGIF table to learn about satellites and analyze imagery at the school's STEM Night.



YPG

Young Professional Spotlight: Heather FitzGerald



PHOTO BY HEATHER FITZGERALD

Young professional Heather FitzGerald chose a new career path when she discovered GEOINT and is now an analyst with NGA.

Heather FitzGerald graduated from Virginia Tech with a bachelor's degree in marketing management. She then owned and operated a local construction company before discovering her passion for geospatial intelligence. FitzGerald earned a geographic information systems certificate from Northern Virginia Community College and now works at NGA as a geospatial analyst.

How did you become interested in GEOINT?

I have always loved the outdoors and hiking. I can stare at travel and trail maps for hours while planning my next adventure. When I read about GIS and learned of all the exciting applications that are

possible, I realized I had found what I was looking for—an intellectually challenging career that I remain excited about every day.

What groups/committees are you involved with at USGIF?

I'm involved with the Young Professionals Working Group (YPWG), which meets monthly to plan workshops and social events for young professionals entering the GEOINT field. I also became a member of USGIF's Tradecraft and Professional Development Committee at the beginning of the year, which serves USGIF members in all stages of their professional and career

development. In collaboration with both groups, I'm helping create a mentoring program that we plan to launch at the GEOINT 2017 Symposium.

GET INVOLVED! To learn more about the YPG visit usgif.org/community/YPG.

What advice would you give to students just beginning a GEOINT career?

Get involved. I've had so many opportunities to meet people in the GEOINT field and to learn about how the IC works without having a clearance. Volunteering with USGIF introduces you to new people and experiences.

How has USGIF Individual Membership benefited you?

I have belonged to numerous trade groups and associations through my previous career and during college. However, USGIF has given me the most in return. Everyone I meet is welcoming, whether it is a colleague on the YPWG or NGA Deputy Director Sue Gordon, who I met at Geography 2050 in November. The opportunities to learn, have fun, and meet new people are constant.

Join Today as an Individual Member



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Young Professional	\$35
Industry/Contractor	\$99

3 year, 5 year and Lifetime memberships also available

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Booth #1647**

connect.usgif.org

This image, created by OGSystems graphic facilitators, captures the discussion from the visioneering session as part of USGIF's new "St. Louis Initiative."

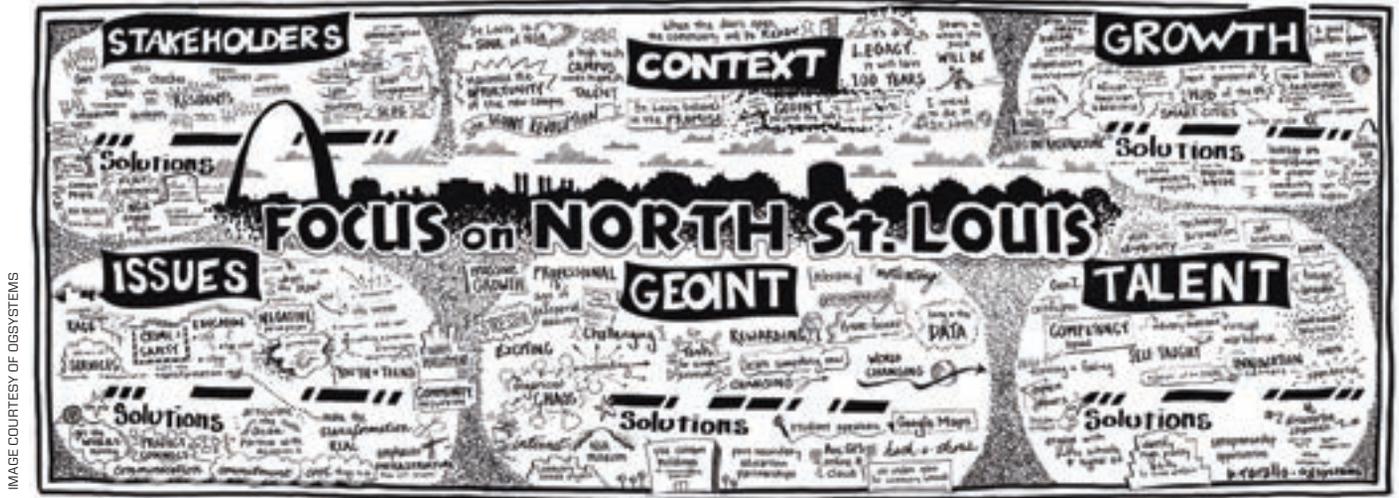


IMAGE COURTESY OF OGSYSTEMS

PERSON GEOINT WORKFORCE

USGIF Launches Initiative to Grow GEOINT Workforce in St. Louis

USGIF launched the "St. Louis Initiative" to expand the geospatial intelligence workforce pipeline in the city of St. Louis. As the city experiences an innovation boom and the National Geospatial-Intelligence Agency (NGA) prepares to build its new Western campus in north St. Louis, it's more important than ever to discuss the future of the city's GEOINT profession.

While USGIF leadership has been meeting with NGA leaders, industry, and others for months, the initiative formally launched March 28 at a visioneering session held in St. Louis in partnership with USGIF Organizational Member OGSystems.

Hosted at the T-REX coworking space and technology incubator in downtown St. Louis, the visioneering session was dedicated to capturing a discussion about

the future GEOINT workforce in the city via graphic recording and visual thinking. More than 30 stakeholders from the St. Louis region attended, including representatives from academia, government, and industry. Attendees provided thoughts on the current workforce and articulated needs for the future. The discussion will be used to help USGIF determine next steps for the initiative.

Through the St. Louis Initiative, USGIF also intends to bolster professional development opportunities for the current GEOINT workforce in St. Louis. Additionally, the Foundation would like to introduce GEOINT and the industry's myriad career opportunities to K-12 classrooms and expand GEOINT curricula at colleges and universities in the region.

More than **30** stakeholders from the St. Louis region attended, including representatives from academia, government, and industry.

PERSON GEOINT CAREERS

USGIF Hosts Job Fair and Launches Online Career Center

More than 300 professionals attended USGIF's GEOINT Community Job Fair in January. Thirty hiring companies exhibited and attendees also had the opportunity to sit for complimentary headshots. During the job fair, USGIF debuted its USGIF Career Center, an online portal to help GEOINT professionals find job and internship opportunities and also for organizations to reach qualified candidates. Visit careers.usgif.org to search available jobs or to post an opportunity.





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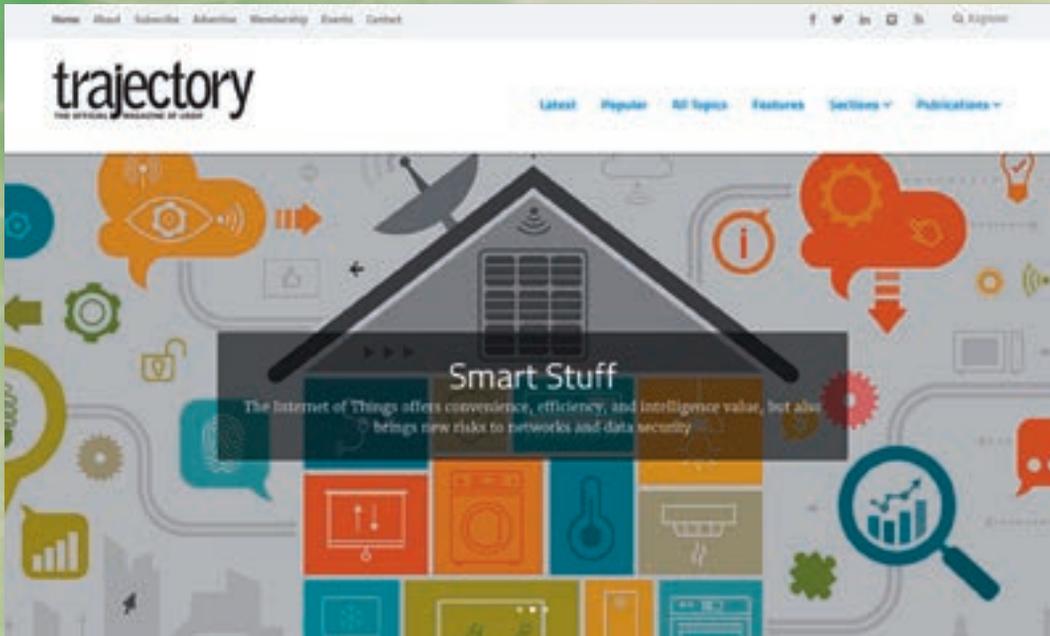
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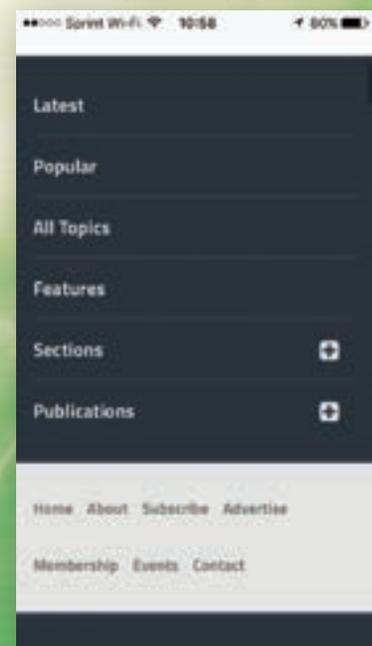
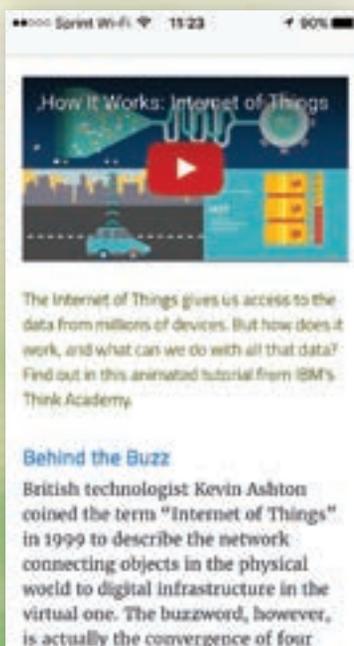
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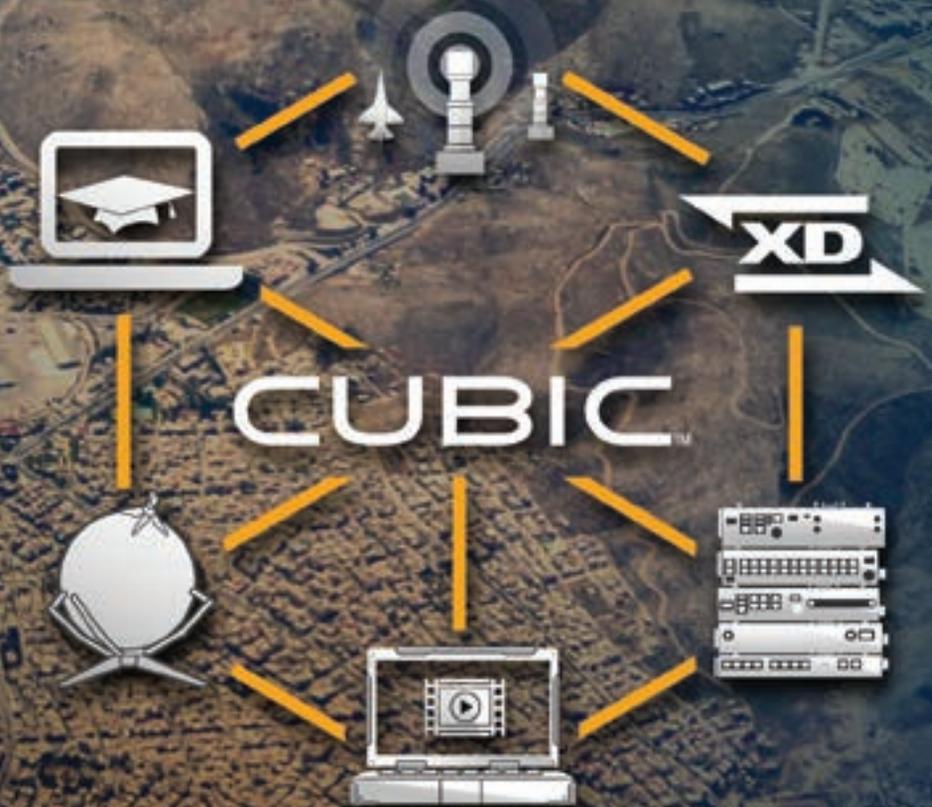
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After three decades of incremental integration, the defense intelligence community is leveraging IT advancements to pursue a new era of interoperability and agility.

BY MATT ALDERTON



prise

IN MODERN BUSINESS PARLANCE, “stovepipe” is a dirty word. Believe it or not, however, stovepipes used to be useful. When they became commonplace in the 19th century, wood-burning stoves were connected to literal stovepipes that drew smoke out of the stove’s belly into a flue or chimney, which coughed it into the sky. In business and government, figurative stovepipes likewise move information from the bottom of an organization to the top. Like smoke from a wood-burning stove, the information flows upward to senior leaders, then out in the form of streamlined decision-making. Because it’s rigid and linear, the stovepipe promotes security, ensures accountability, and reinforces the chain of command, all of which can yield benefits in highly regimented organizations.

There's just one problem: Stovepipes only flow in one direction. If you're trying to move smoke through a chimney, that's ideal. If you're trying to move information through an enterprise, however, it's problematic, as vertical processes are prone to inefficiency, duplication, and myopia. In that case, stovepipes don't always eliminate smoke; often, they create more of it.

The Department of Defense (DoD) came to this realization when it transitioned from analog to digital imagery for airborne intelligence, surveillance, and reconnaissance (ISR), said Ralph Wade, a former Air Force imagery analyst and now vice president of Booz Allen Hamilton's Strategic Innovation Group.

"The technology for digital sensors came about in the mid-1980s, when electronic communication made it possible to send information digitally from an airplane to a ground station in near real time," explained Wade, who served as program manager for one of the first and largest such ground stations. "It was a huge increase in capability."

It was also a huge increase in cost, as each newly acquired platform in turn acquired its own dedicated data link and ground station.

"What you started seeing in the late 1980s and early 1990s was a proliferation of platforms with one-of-a-kind ground stations that were stovepiped," Wade said. "Every time you wanted to put a sensor onboard an airplane, you had people reinventing the wheel by building custom systems. Congress looked at that and began challenging the Department of Defense: Why aren't we getting more commonality?"

When Operation Desert Storm exposed a need for more and better imagery, the DoD began asking itself the same question. And when Congress subsequently reduced defense spending under President Bill Clinton, it felt compelled to answer it.

"Budgets were being cut and ISR was on the chopping block because ... many of the services at that time didn't see ISR as their core mission," Wade recalled. "At the same time, a lot of new technology was coming along—particularly,

Stovepipes only flow in one direction. If you're trying to move smoke through a chimney, that's ideal. If you're trying to move information through an enterprise, however, it's problematic.



Marines assigned to Special Operations Task Force-West in Herat province, Afghanistan, review images taken by the team during an area assessment. DCGS-MC provides Marine intelligence analysts capabilities for enterprise search, content discovery, collaboration, and workflow management.

unmanned vehicles—that wasn't getting enough attention."

To protect and prioritize airborne ISR funding, in 1993 the DoD created the Defense Airborne Reconnaissance Office (DARO) to develop and acquire department-wide airborne ISR capabilities.

The objective is the same now as it was then: interoperability. And it's getting nearer every day, thanks to ongoing horizontal integration efforts within and among the services.

EMBRACING THE ENTERPRISE

Although the business case for interoperability is clear today, it wasn't always apparent at the outset of DARO. Fortunately, the Air Force had already sown the seeds.

"It started somewhat by accident," recalled Col. Jason Brown, commander of the Air Force's 480th ISR Wing. "When digital imagery platforms came about, the Air Force put a digital imagery sensor on the U-2 so that the ones and zeros, if you will, would go down to a ground station ... They later decided to put signals intelligence sensors on the same U-2, which went down to the same ground station. So, here you had imagery analysts and signals intelligence analysts all working in the same spot."

It was an unorthodox but effective arrangement.

"You had folks who didn't normally work together working together, which was a very powerful capability," Brown continued.

When the Cold War ended, the Air Force saw an opportunity to exploit that capability even further. Therefore, in 1992 it established the Contingency Airborne Reconnaissance System (CARS). Encompassing mobile ground stations in deployable vans, the system migrated in 1994 to a trio of permanent shelters that collected, processed, and exploited data from multiple airborne ISR platforms, then distributed it through a federated architecture to sites across the globe. In 1996, the permanent shelters—Distributed Ground Stations 1, 2, and 3—became known holistically as the Air Force Distributed Common Ground System (AF DCGS), which now includes 27 regionally aligned, globally networked sites around the world.



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Sailors aboard the USS Carl Vinson experiment with Naval Integrated Tactical-Cloud Reference for Operational Superiority (NITROS) capability within various systems, including DCGS-N Increment 2 and the Maritime Tactical Command and Control system.

Grumman, Lockheed Martin, and other industry partners has contracted with the DoD to build the systems necessary to achieve interoperability. “It’s foundational, and without that foundation it’s difficult to do sharing at speed.”

In humans, the spine integrates the body’s various anatomical systems via a shared nervous system through which they can communicate and share resources while still performing their own independent functions. In the DCGS FoS, the DIB is the spine. Although each service-specific DCGS architecture has its own functions and applications, it must be configured to store and share data through the DIB.

“DCGS was the first attempt at saying: When data comes off a sensor and gets processed, it’s got to be made ‘enterprise-able’—which means, it’s got to be made for use by all,” explained John Snevely, who leads the DCGS FoS at the Office of the Under Secretary of Defense for Intelligence OUSD(I). “It took us away from proprietary intelligence data and forced us to start meeting and testing to standards.”

Inspired by the Air Force, DARO and the National Imagery and Mapping Agency (NGA’s predecessor) began to consider the idea of interoperable ground stations across the services in 1994. The idea didn’t fully mature, however, until some time after the dissolution of DARO, when OUSD(I) assumed the work of standing up the DCGS FoS.

Prior to DARO’s termination in 1998, each of the services had formed a DCGS program office. Under OUSD(I) oversight, the program managers transitioned from an informal working group to a formal structure called the Multi-Service Execution Team (MET). MET collaborated—and still does—to determine the requirements and configuration of the DIB software. When this work was completed in 2003, OUSD(I) issued a mandate requiring the services to develop and acquire technology to DIB standards, which was made easier on the services by

By leveraging multi-source inputs and federated architecture, AF DCGS had solved the problems posed by stovepiped Air Force ground stations. As a result, the DoD sought sister systems to work in the same fashion across all services. And so was born the Distributed Common Ground System (DCGS) Family of Systems (FoS), consisting of AF DCGS, DCGS-A, DCGS-N, DCGS-MC, and DCGS-SOF—belonging to the Air Force, Army, Navy, Marine Corps, and Special Operations Forces, respectively—each of which integrates with the next via a common software construct known as the DCGS Integration Backbone, or DIB.

“The DIB is essentially a data architecture that everybody publishes to and exploits from,” said Todd Probert, vice president of mission sustainment and modernization at Raytheon, which along with Northrop

the provision of extra resources.

“We invested in enterprise governance,” Snevely said. “We paid for engineering support at the enterprise level so the program offices didn’t have to figure things out for themselves. It was done for them. All they had to do was take the technology off the shelf and implement it.”

The result was seamless discovery and dissemination.

“Sometimes, I anecdotally call DCGS ‘the Napster for intelligence,’” said retired Marine Col. Phillip Chudoba, assistant director of intelligence at Marine Corps headquarters, recalling the popular music-sharing platform of the early aughts. “That file-sharing platform allowed you to look on my computer and see what music files existed there that you might want to have. The same kind of logic exists with DCGS. A user at the tactical level theoretically has the ability via DCGS and the DIB to look across the joint services and see what information products and data are available.”

CURRENT STATE: OPERATIONAL INTEROPERABILITY

Since OUSD(I) issued its DIB mandate, implementation of interoperability in general—and DCGS in particular—has unfolded in different ways and at different speeds across the services. In the last five years, however, the maturation of mobile computing and cloud architecture has allowed the defense intelligence community to enter a new phase of execution toward horizontal integration.

“You used to have intelligence analysts sitting in very specific seats doing very specific things with very specific intelligence types,” said Sean Love, director of business development at Northrop Grumman. “And that was fine, because the technology—the bandwidth and sheer connectivity—didn’t exist to do a whole lot more than

“DCGS was the first attempt at saying: When data comes off a sensor and gets processed, it’s got to be made ‘enterprise-able’—which means, it’s got to be made for use by all.”

—JOHN SNEVELY, DCGS FOS LEADER, OUSD(I)

that. Now that those barriers are coming down very quickly, you're starting to see a lot more cross-sharing."

The evolution of DCGS from concept to reality began with GEOINT. For example, within the Marine Corps—which initiated its DCGS-MC program in 2007—the first DIB-enabled systems were the Tactical Exploitation Group, an imagery system, and the Topographic Production Capability, which provides topographic and mapping capabilities.

"The GEOINT layer is the first intelligence capability that we elected to pursue in DCGS because the GEOINT layer offers us tremendous potential for enhancing our decision support to commanders," explained Chudoba.

He added the Marine Corps wants to move from what he calls a "mall cop" environment—intelligence analysts trying to make cognitive sense of a single, limited-view input, like a mall cop monitoring a security-camera feed—to a multi-INT environment wherein analysts can get a more holistic view.

"We want to have a single integrated system consisting of a synoptic GEOINT layer on top of which we can toggle all the other intelligence disciplines in order to look at a problem from different dimensions and make good, timely, accurate decisions."

With foundation GEOINT in place, the Marine Corps can now pursue DIB-enabled capabilities for other intelligence disciplines.

"DCGS started with sharing only GEOINT," Snevely said. "We've since taken that model and used it to establish sharing in HUMINT, MASINT, and SIGINT. Each of those threads is growing and has its own level of success."

The Navy is focused on data fusion as it develops the next generation of DCGS-N. The Navy's forthcoming upgrade, DCGS-N Increment 2, which recently entered its initial development phase, will likewise allow users to synchronize intelligence data from multiple sources within a single computing environment.

"I'm taking tools that sailors have seen, and I'm integrating them at the data layer so the individual can use them from a single work page without having to jump from product to product," said Capt. Mark Kempf, program manager for the Navy's Battlespace Awareness and Information Operations Program Office, which oversees DCGS-N.

UNLOCKING AGILITY

In many ways, DCGS-N Increment 2 represents the future of the DCGS FoS in that it will embrace automation.

"What we've seen is an explosive growth in collected data," said Capt. Jeffrey Czerewko, who serves in the Navy's newly formed Office of Digital Warfare within the Office of the Chief of Naval Operations. "Historically, we've done what we had to do, which is throwing a ton of manpower at the problem. But we're starting to realize that we need automation to assist. The goal is to remove hay from the haystack."

DCGS-N Increment 2 will "remove hay" via real-time automated aggregation, correlation, and fusion of all-source intelligence.

"I want the analyst to be able to do analysis instead of having to do production," Kempf said. "The button pushing should all be automated."

Automation isn't the only forward-looking aspect of DCGS-N Increment 2. Another is the way in which the program is being delivered: using an agile software development framework whereby new capabilities are tested by and delivered to users on a rolling basis through a series of incremental releases.

That approach to developing and acquiring capabilities is the future of DCGS and the key to DoD ISR interoperability, according to Wade, who says the entire defense intelligence community must go the way of the Navy by transitioning the focus from hardware to software. Consider, for example, the difference between navigating in your car using a dash-mounted GPS unit, like a



"What we've seen is an explosive growth in collected data. Historically, we've done what we had to do, which is throwing a ton of manpower at the problem. But we're starting to realize that we need automation to assist. The goal is to remove hay from the haystack."

—CAPT. JEFFREY CZEREWKO, OFFICE OF DIGITAL WARFARE WITHIN THE OFFICE OF THE CHIEF OF NAVAL OPERATIONS

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Garmin or TomTom, versus a smartphone app such as Google Maps or Waze.

“The way we buy things right now in DoD is we buy Garmin- and TomTom-type systems. These are single-capability systems,” explained Wade, who said such hardware takes the DoD many years and extensive manpower to design, develop, manufacture, test, deploy, install, integrate, and maintain. “Contrast that to the Waze application that provides the same capability, but can be developed by a handful of people and deployed on millions of smartphones around the world in a matter of minutes.”

What’s missing, according to Wade, is the common IT platform—the DoD version of Apple’s iOS or Google’s Android—on which to run the software. “When you talk about the future vision for DCGS, what you want to have is a common ISR IT platform that you can rapidly build out with applications and services.”

That’s exactly where the Air Force intends to take its DCGS platform, according to Col. Kristofer Gifford, chief of the Air Intelligence Staff’s Multi-Domain Operations Division.

“Historically, the way we’ve acquired and fielded DCGS is like acquiring and fielding an aircraft carrier or a fighter jet, which is a five- to seven-year process of block fielding,” Gifford said. “At the end of that you get one thing: Everything from the tires to the software to the navigation system and the weapons is all rolled up. If you acquired [DCGS like a consumer acquires an] iPhone [then downloads apps], you’d break it apart into bits and pieces, and you’d field the separate pieces as you go.”

Members of the 102nd Intelligence Wing analyze data as part of their mission to provide multi-discipline ISR to U.S., allied, and coalition military forces, government agencies, and first responders across the full range of military operations.



PHOTO BY MASTER SGT. SANDRA NIEDZWIECKI

INTEROPERABILITY IS MORE than an IT buzzword. Investment in interoperability will yield significant returns for the defense intelligence enterprise.

“There are more things to do than we have money to go and do them with,” said Todd Probert, vice president of mission sustainment and modernization at Raytheon. “So, we have to make the best use of what we have, including not only data, but also all the underpinnings that allow maximum use of that data.”

It’s a simple concept: As sharing increases, duplication and spending decrease. Efficiency, meanwhile, surges. That leads to an even more important benefit of interoperability: speed, which is a key tenet of the Third Offset, the Pentagon’s strategy to ensure the long-term competitive advantage of the U.S. military.

RETURN ON INTEROPERABILITY: THE BENEFITS OF HORIZONTAL INTEGRATION

“The principle of the Third Offset is really important,” Probert said. “A tentative offset is speed, and you can’t have speed if you don’t have the ability to talk to each other.”

Communicating standardized data via shared systems also bears critical mission fruit. When ISR systems are interoperable, for example, they can accept and integrate a host of different inputs, giving intelligence analysts access to a more holistic picture that enables better and faster decision-making, according to Sean Love, director of business development at Northrop Grumman.

“When you’re bringing together the diversity of an imagery analyst with the expertise of a SIGINT analyst with the reach of a HUMINT analyst, all of a sudden you’ve got a picture that is painted a little more clearly and a lot more rapidly,” Love said.

Consider, for example, a combat scenario in which SIGINT sensors detect potential activity from enemy forces. Interoperability ensures SIGINT sensors can queue IMINT sensors on a separate platform to confirm the presence of hostile forces before a bomb is dropped.

“Interoperability is only possible if those two sensors know about each other, if they have a data

format that’s compatible, and if they have the ability to communicate with one another,” Love explained.

What makes the intelligence picture truly complete isn’t merely that sensors are interoperable; it’s that the services are, too.

“The idea of collaborating across organizations is something that enables us to make the knowable known,” said retired Marine Col. Phillip Chudoba, assistant director of intelligence at Marine Corps headquarters. “Sometimes, there is specialized intelligence work that I need right now; I should not have to produce that myself if it already exists somewhere else. Having that kind of analytic and production transparency across organizational boundaries is incredibly powerful in an environment where decision-making has to be supported rapidly.”

Capt. Jeffrey Czerewko, who serves in the Navy’s newly formed Office of Digital Warfare within the Office of the Chief of Naval Operations, echoed support of joint intelligence.

“Being able to be interoperable across the services increases our capacity, obviously,” Czerewko said. “And in certain cases it increases our capability—especially for niche intelligence collection requirements.”

When that increased capability reaches the tactical edge, the case for interoperability is clear.

“In a strike group, I need to sense the environment in a distributed manner,” Czerewko concluded. “With an analytic engine [that’s interoperable] I get the ability to do a fairly effective first-pass look. That provides a deep value to the leading edge because you get more effective intelligence far forward in a more timely manner. I see the enemy and I have a decent idea now what their intent is at the forward edge.”

Across the services, the key to breaking DCGS apart is breaking it open. As in, open architecture.

Although the DIB and its core component, the Distributed Data Framework, unlocked the door to open architecture, they didn’t completely open it, according to Jerry Mamrol, director of ISR systems at Lockheed Martin, which helped develop the DIB.

“The DIB took an important step toward an open architecture by providing a standardized method to query and access finished intel product data,” Mamrol said. “This provided some degree of openness by enabling interoperability and sharing of finished products between the services via the DDF. For the architecture to be fully open, it also needs a standardized, common infrastructure that allows

applications to be developed and 'plugged in' by different providers."

A plug-and-play infrastructure will activate a whole new level of interoperability by way of flexibility.

"If you have an open architecture, you can horse trade what tools you like better for any given mission," Love said. "You're not going to send a really geospatial-heavy system out into the field, for example, because you won't have the power you need and you won't have the bandwidth. So, being able to use something that's a lot lighter without having to change your data standards to make it happen is absolutely key."

Ultimately, DCGS open architecture will be similar to that of a smart home environment, according to Love. "There are five or six different standards out there for [connected home devices]. If you put all those in your house and you don't have a way for them to interconnect, you're going to need four different pieces of software to control your house, which is super irritating," he continued. "Now there's a single hub out there that accepts all the different signals so you can control

"The weapons that matter most in the next war won't be hardware...they will be software and data, and our decisive advantage will be how quickly our airmen can access, leverage, develop, and create those software and data."

—COL. JASON BROWN, COMMANDER, 480TH ISR WING, U.S. AIR FORCE

your entire house with one app. It's truly a system of systems."

This plug-and-play approach allows data to flow freely between service- and mission-specific applications that can be created cheaper and deployed faster, according to Brown, who said the Air Force is currently piloting an "open architecture" version of AF DCGS, known as OADCGS, that allows airmen to develop their own scripts and apps.

"The weapons that matter most in the next war won't be hardware—a stealth aircraft, a ship, or a tank," Brown said. "They will be software and data, and our decisive advantage will be how quickly our airmen can access, leverage, develop, and create those software and data."

NEXT-LEVEL INTEGRATION

Although technology will continue to advance the DCGS FoS, strategic governance will drive it. While there are several constructs through which the services manage ISR interoperability, principal among them is the Defense Intelligence Information Enterprise (DI2E), an umbrella under which OUSD(I) organizes and unites disparate defense intelligence systems, including the DCGS FoS. The DCGS Multi-Service Execution Team, made up of the DCGS program managers from each of the services, meets regularly to prioritize, establish, and resolve issues with DCGS

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Eventually, the IT standards that are enabling interoperability across the defense intelligence community will enable interoperability at a global scale, uniting the DoD, the IC, and even their international mission partners through shared data.

The aircraft carrier USS Carl Vinson and the Arleigh Burke-class guided-missile destroyer USS Wayne E. Meyer transit the East China Sea March 9 with the Japan Maritime Self-Defense Force. DCGS-N is the primary conduit for intelligence support to deployed U.S. Naval forces around the world.

standards, specifications, and architecture. This group operates under the auspices of a high-level governance group known as the DI2E Council.

“We use the DI2E Council to bring all the services together along with the [intelligence] agencies—anybody who has a role to play in DCGS—to make sure we’re [aligned],” said retired Air Force intelligence analyst Jack Jones, director of ISR infrastructure at OUSD(I). “Because if everybody’s in charge and has their own unique budget set and their own idea about where they want to go, then nobody’s in charge and you end up with non-compatible solutions.”

As the fountainhead of DCGS objectives, the DI2E Council is responsible in large part for the services’ drive toward open architecture, having laid out the standards by which such architectures will be executed. Likewise, it’s the driving force behind the next major milestone in DoD ISR interoperability: IT integration with the larger defense enterprise—via the Joint Information Environment (JIE)—and with the Intelligence Community (IC) via the IC Information Technology Enterprise (IC ITE).

“The challenge is making sure that as these large enterprise deliveries and concepts get put in place that they don’t ignore the need for interoperability to go all the way down to the Joint Task Force-level and below, which is where DCGS is,” Snevely said. “We spend a lot of time ensuring that IC ITE standards and specifications, and JIE vision, are going to be executable at the DCGS level.”

The challenge is significant, but so are the promised returns, according to Chudoba, who said a number of IC organizations already share intelligence products and data across the DCGS FoS via their own versions of the DIB.

“Stuff I previously had to request through formal processes and linear channels now can be exposed to me through the same methodology as commercial file-sharing capabilities,” Chudoba said. “The power there is incredible.”

Progress is incremental. Eventually, the IT standards enabling interoperability across the defense intelligence community will enable interoperability at a global scale, uniting the DoD, the IC, and even their international mission partners through shared data.

“We’re looking for ways for intelligence information to be readily shared at the appropriate level with partners in all regions of the world,” explained Snevely, who said such sharing would happen by automatically extracting intelligence from DCGS and distributing it within the combatant commands via the U.S. Battlefield Information Collection and Exploitation Systems program. “It’s very difficult to do, but that’s the future.”

A ‘FUNGIBLE’ FUTURE

Good governance and cutting-edge technology have turned interoperability from an ethereal goal into a tangible reality. As a result, stovepipes are crumbling. And yet, work remains.

“I think we’re doing OK, but we have a long way to go,” Jones said, citing DoD’s size, complexity, and culture as major challenges to overcome on the way to increased interoperability. “We’re in an environment that’s used to building planes, ships, and tanks. Even with our ISR capabilities, we build a collector, a sensor, a link, and a ground station—a point-to-point solution. Instead, we need to be more focused on data as an asset. If we do that, then build backward, it won’t be about the collector; it will be about what we’re trying to do with the data. That, in turn, will help us get better synchronized.”

When that happens, DoD ISR will truly become a team sport.

“We’re evolving into an enterprise construct that makes intelligence capability and capacity fungible,” Chudoba concluded. “By that, I mean systems like DCGS give us the ability to play [young children’s] soccer when a problem arises. Most people say that in a pejorative fashion. To me it’s a positive thing. When a problem arises—when we see the ball—we can get everyone to converge around it and kick it into the goal. That’s what [interoperability] does for us, and that’s how we want to operate.” 🌐

EDITOR’S NOTE

The Army has not yet decided how to modernize DCGS-A amid ongoing litigation with Palantir Technologies Inc. The service declined an interview request from trajectory.

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BY KRISTIN QUINN

nnected,



IN 2013, 19 ELITE GROUND FIREFIGHTERS—most of them under

30 years old—were killed while battling the Yarnell Hill wildfire northwest of Phoenix, Ariz. The highly trained, highly specialized Granite Mountain Hotshot crew departed their safe zone and descended into rough terrain shortly before high winds whipped the fire into a deadly inferno. Investigators never fully determined why the crew was on the move at this time, but many agree better situational awareness—perhaps in the form of a real-time meteorological update—could have helped prevent this devastating loss of life.

A NASA Jet Propulsion Laboratory (JPL) engineer wears a prototype POINTER location device during testing at JPL labs in Pasadena, Calif.



PHOTO COURTESY OF DHS S&T

The POINTER project tracks first responders via low-frequency magnetic fields that can transmit through dense materials such as brick and concrete.

The Yarnell tragedy marked the nation's deadliest wildfire since 1933—and the U.S. Department of Homeland Security's (DHS) First Responders Group (FRG) aims to keep it this way.

The DHS Under Secretary for Science and Technology (S&T) stood up FRG in 2010. The group partners with first responders and emergency preparedness professionals at the federal, state, local, and tribal levels to develop innovative solutions to public safety challenges—from the everyday to those encountered during large-scale emergencies. In every initiative it undertakes, FRG's objective is to make first responders safer and more effective.

FRG Director Dan Cotter said his group strives to ensure first responders are "protected, connected, and fully aware." This extends beyond new uniforms and hardware to include less tangible technologies that help first responders and emergency planners share data and other critical information.

In an ideal world, each first responder is protected with high-tech uniforms and equipment; connected with proper communications and interoperability; and fully aware with access to continuous information on his or her device of choice—delivered in time to provide decision advantage. According to Cotter, the GEOINT Community is instrumental in creating well-informed first responders and emergency planners—and therefore preventing calamities such as that which struck the Granite Mountain crew.

FRG Chief Geospatial Scientist Dr. David Alexander said the group often meets with first responders to discuss their needs and research gaps.

"The No. 1 worry pretty much boils down to 'Where am I? Where is my team? What is my proximity to hazards?' Those hazards are diverse and on the move," Alexander said. "The level of threat those hazards pose changes, and their relation to the people and things we want to keep safe changes. First responders work in a very dynamic environment and we're trying to get them the critical information they need to do their job effectively."

INDOOR WAYFINDING

Most first responders lack the ability to transmit their location once they enter a building to confront potential dangers. In most cases, leadership can only manually confirm their responders are in the structure.

"Firefighters put a magnetic placard on a board that tells the incident commander they're in the building fighting the fire," said Bill Stout, deputy director of FRG's First Responder Technologies Division (R-Tech), which focuses on the rapid development of technologies for first responders. "Imagine if instead the incident commander was able to look at a viewer and tell at any given time where the firefighters are in that building."

A new geospatial technology might soon make this a reality. R-Tech has a major effort underway with NASA's Jet Propulsion Laboratory (JPL) to achieve high-fidelity indoor wayfinding for first responders. The POINTER (Precision Outdoor and Indoor Navigation and Tracking for Emergency Responders) project tracks first responders via low-frequency magnetic fields that can transmit through dense materials such as brick and concrete.

Current capabilities such as inertial measurement units, pedometers, and GPS devices either cannot or take too long to transmit a signal outside of a building. For example, if a first responders' device attempts to send a signal once they are three feet into a building,

the signal might bounce off other objects and not reach the incident commander until the responder is actually 10 feet into the building.

Andrew Wordin, a battalion chief for the Los Angeles Fire Department, said POINTER provides an enhanced degree of fidelity compared with current methods, including the ability to tell whether a first responder is standing or lying flat.

“This could be valuable information for an incident commander to make a decision to send rescue teams to a downed firefighter,” said Wordin, who is also a member of R-Tech’s First Responder Resource Group—a volunteer working group comprising 120 active and retired first responders from across the nation.

R-Tech leads solutions addressing identified capability gaps from development to prototype in less than 18 months. Once the division—with the help of the working group—identifies a first responder need, it drafts a statement of objectives and solicits industry for proposals, according to R-Tech Director Greg Price. R-Tech



PHOTO COURTESY OF DHS&T

Responders from Mesa Police Department in Arizona evaluate their communications during the 2016 First Responder Electronic Jamming Exercise at White Sands Missile Range, N.M.

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HEARTBEATS IN THE RUBBLE

IN THE EVENT of an earthquake, tsunami, or other natural disaster that could leave people buried under destruction, first responders refer to the window of time when a victim has the greatest chance of survival as the “golden hour.”

FINDER (Finding Individuals for Disaster and Emergency Response)—a collaboration between FRG’s R-Tech division and NASA JPL—employs low-power microwave radar to locate small movements from respiration or heartbeats in the rubble and lead emergency response workers directly to victims in need.

“It’s not just suspecting there might be someone under the rubble,” said FRG Chief Geospatial Scientist Dr. David Alexander. “FINDER detects where they are and locates their position to help prioritize rescue and recovery.”

FINDER has been available commercially for about three years, and in that time 166 units have been sold, including to many international urban search and rescue teams. It was reported in the aftermath of the 2015 Nepal earthquake that FINDER helped detect and rescue four individuals.

The technology, more formally known as laser Doppler vibrometer, is a portable, suitcase-sized device now manufactured by SpecOps Group and R4.

R-Tech Director Greg Price said FINDER is significant because it helps prioritize recovery of those that are still alive. Search and rescue dogs, for example, locate both dead and living bodies at the same time. The device can even help responders know how many people to look for.

“If one heart is beating fast and another is beating slow, the responder will know there are two individuals under that rubble pile,” Price said.

Price added the device is popular on the international market, where events such as earthquakes and tsunamis are more likely to occur, but it is ready for deployment in the event of such a disaster in the U.S.

PHOTO COURTESY OF DHS S&T



FRG and NASA JPL teamed with the Fairfax County Fire and Rescue Department’s Virginia Task Force 1 (VA-TF1) international search and rescue team several years ago to test and prove FINDER.

“I am fortunate to have seen the FINDER device continue to develop from its first generation to the current state-of-the-art machine,” said Fire Captain II Randal Bittinger, a station commander with Fairfax County Fire and Rescue as well as a search team manager and rescue officer with VA-TF1. “I hope the device will continue to improve and save countless lives.”

A first responder from Virginia Task Force 1 during final field testing in Lorton, Va., of the FINDER system, which helps locate people trapped under rubble in the event of a natural disaster.

solicits proposals for about eight to 10 projects a year, resulting in approximately five awards annually. If a prototype is successful in field tests, it typically takes another six months to get to market.

“R-Tech has successfully put through that process 15 items that can be purchased by first responders today,” Price said.

With continued success, POINTER will soon be one of them. The prototype is undergoing three iterations of testing and is currently in Phase 3. Phase 1 tested the technology outdoors on a football field to make sure it could accurately track X and Y coordinates. Phase 2 took the technology indoors and added the Z coordinate—height—demonstrating it could transmit through structures at a range of up to 25 meters. Phase 3 will include miniaturizing the transmitter to about the size of a smartphone and improving the technology to a range of up to 75 meters.

Although the testing focused on homes, warehouses, and buildings no taller than 12 stories—which encompass about 85 percent of the environments to which firefighters are usually dispatched—the hope is to be effective in buildings as tall as 100 stories or more. The technology will also be adapted for other types of first responders.

POINTER shows promise for law enforcement as well, particularly for tracking officers during situations such as active shooter incidents, Alexander said. This

spring, law enforcement representatives were invited to NASA JPL in California to witness POINTER and make recommendations for tailoring the capability to their mission. R-Tech anticipates POINTER will be commercially available in mid-to-late 2018.

Price describes POINTER as “truly a lifesaver.” For example, he continued, a major concern for firefighters is having their self-contained breathing apparatus (SCBA) run low on oxygen—an example of a “mayday” situation. In 1999, six firefighters died responding to a fire at Worcester Cold Storage & Warehouse Co. in Massachusetts. The first firefighters to enter the warehouse became disoriented when their SCBAs ran low, then fellow firefighters became

trapped attempting to locate and rescue them.

“The mayday situation is the most dynamic situation when fighting fire,” Wordin said. “We call it ‘the incident within the incident.’ We are always fighting the clock during any incident. Technology that can help find a downed, missing, or trapped firefighter faster and get the rescue team to that firefighter faster is going to save lives.”

BUILDING RESILIENCY

Resiliency against disasters at the local level begins with first responders, especially when it comes to an effective emergency response that minimizes loss of life and property damage, according to Alexander.

FRG created its Flood Apex Program in 2016 at the request of the Federal Emergency Management Agency with the goal to bring together new and emerging technologies to improve communities’ resiliency to flooding—America’s most costly disaster. Property damage caused by floods totals approximately \$7.9 billion annually and each year about 80 to 90 people in the U.S. lose their lives during flooding events.

The program’s research and development tracks focus on six areas: reduce flood fatalities; reduce uninsured losses; improve mitigation investment decisions; enhance community resiliency; improve management of flood support data; and improve predictive flood analytics. Each of these tracks will contribute products to the Flood Apex toolbox throughout the four-year program. GEOINT is a common thread across all aspects of Flood Apex, Alexander said.

“Understanding the hazards in your community is a geospatial activity,” he said. “When you combine land use, flood plain, meteorological, and elevation data, then you understand your hazard. The lack of detailed elevation data for the nation is the No. 1 gap we face when it comes to understanding flood hazards. If you understand where the hazard is, you understand the locations at risk and can compare those with the locations of homes, critical infrastructure, and more.”

The ability to predict which areas are most at risk could allow DHS to implement preventative measures such as increasing storm water capacity or changing building codes; automatically knowing where to concentrate response efforts when an emergency occurs; and encouraging home and business owners as well as private critical infrastructure operators to invest in proper insurance and flood proofing.

“We’re not going to prevent all floods, but we can improve our ability to be resilient—to deal with the event and bounce back,” Alexander said. “But we can’t fully model and anticipate the risk if we don’t use GEOINT to improve our predictive analytics.”

Following Hurricane Matthew in 2016, FRG began working with the State of North Carolina to determine how sophisticated



PHOTO COURTESY OF LOWER COLORADO RIVER AUTHORITY

Texas Rangers assess flood waters in the Lower Colorado River Basin in April 2016 following heavy rainfall.

RADIANCE TECHNOLOGIES

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Regarding connectivity, FRG is conducting exercises and researching technologies to mitigate **the jamming** of radio, GPS, and wireless communication systems.



PHOTO COURTESY OF DHS S&T

Stanford University and U.S. Air Force personnel examine the JAGER drone before a test flight at the 2016 First Responder Electronic Jamming Exercise. JAGER, which stands for Jammer Acquisition with GPS Exploration and Reconnaissance, was created by Stanford University staff and students and triangulates jammer signals from the air.

3D elevation data sets derived from LiDAR can improve the ability to understand flood risks. The state is at the forefront of fusing LiDAR with weather forecasting in an emergency operations environment.

At the federal level, FRG is collaborating with NOAA's Office for Coastal Management in Charleston, S.C., to model future conditions including potential effects of sea level rise at different depths and to predict surge levels during an event such as a hurricane.

"Flooding isn't the only concern," Alexander said. "The force of a wave could knock a building off its foundation."

In an embrace of emerging technology, the program is seeking inspiration from the Internet of Things (IoT) to construct a network of low-cost, disposable smart sensors. The rising water sensors will be deployed on critical infrastructure such as levees, dams, water storage systems, and low water crossings or other hazardous intersections to automatically report when flooding is starting to accrue and provide early warnings to first responders.

The disposable sensors could potentially cost less than \$1,000 each when brought to market—"orders of magnitude" less than permanent sensors, which can run upward of \$20,000, according to Jeffrey Booth, director of FRG's Information, Applications, and Standards Division. Booth described the sensors as "a global game changer" because of the low cost and ability to deploy them to underdeveloped nations.

FRG recently awarded Phase 2 contracts through the DHS Small Business Innovative Research program to three companies—Evgia, Physical Optics, and

Progeny—to continue developing the sensors. In Phase 2, the companies will transition the sensors from proof of concept and build 100 to be tested by the Lower Colorado River Authority (LCRA) in Texas.

Eventually, FRG hopes these sensors will trigger automated alerts to individuals and help prevent flood-related deaths. For example, when a sensor detects flooding, it could send an alert to all smartphones within a designated radius.



STAY TUNED! Want to read more about geospatial applications for first responders and emergency planning? In August, *trajectory* will publish a special edition on public safety that will be available for download at trajectorymagazine.com.

“Imagine if three to five years from now you’re driving and your intelligent dashboard tells you there’s a flood a half mile away,” Booth said. “That’s pretty useful for you to be able to make a decision and turn around. It’s a mobile geography. The citizen is in essence a sensor receiver with their smartphone, so as they move about the geography they can be alerted of changing events.”

In addition to reaching individual citizens, these technological advances have the potential to transform how public works and utility providers support emergency management.

“Sensors placed with the right density can create a live map of where the water is,” said Mike Davis, smart alerts principal program architect with LCRA. “This allows first responders to focus their resources on areas affected by the event instead of trying to spread out and cover every possible scenario related to the flooding.”

Ultimately, the sensors are one of many initiatives under way to create the first responder of the future.

“It’s about whether we’re providing meaningful information to the first

responder,” Alexander said. “We want them to be fully aware of what they need to carry with them, of what they might be encountering, and of what is happening around them at all times during a rescue mission.”

THE FIRST RESPONDER OF THE FUTURE

What other technologies will equip the first responder of the future? And how will future responders analyze and make decisions based on the influx of information from smart sensors?

It all comes back to ensuring first responders are protected, connected, and fully aware, according to John Merrill, lead for FRG’s Next Generation First Responder (NGFR) Apex Program as well as director of the group’s Office for Interoperability and Compatibility.

Programs such as POINTER and other efforts to develop wearable devices will help protect responders. Regarding connectivity, FRG is conducting exercises and researching technologies to mitigate the jamming of radio, GPS, and wireless communication systems. To facilitate better situational awareness, FRG developed a Next-Generation Incident Command System (NICS) that manages and distributes to first responders and decision-makers real-time feeds such as vehicle locations, airborne images, video, weather, and terrain. More than 2,000 responders in more than 250 organizations have been trained on NICS.

Looking to the future, NGFR hopes to ensure the viability of IoT to generate even more enhanced situational awareness. Merrill’s team is working with

“[The technology] has to be easy and intuitive because if they make a mistake ... someone could die. That’s a pretty strong statement of requirements.”

— DAN COTTER, DIRECTOR, DHS FIRST RESPONDERS GROUP

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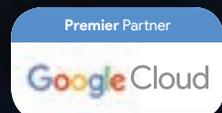
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A natural gas sensor prototype detects a leak during an integration demonstration for the Next Generation First Responder Program. This sensor and other Internet of Things devices are virtually connected via a common data reporting platform that makes it easy for responders to receive and digest data from a number of remote sensors.

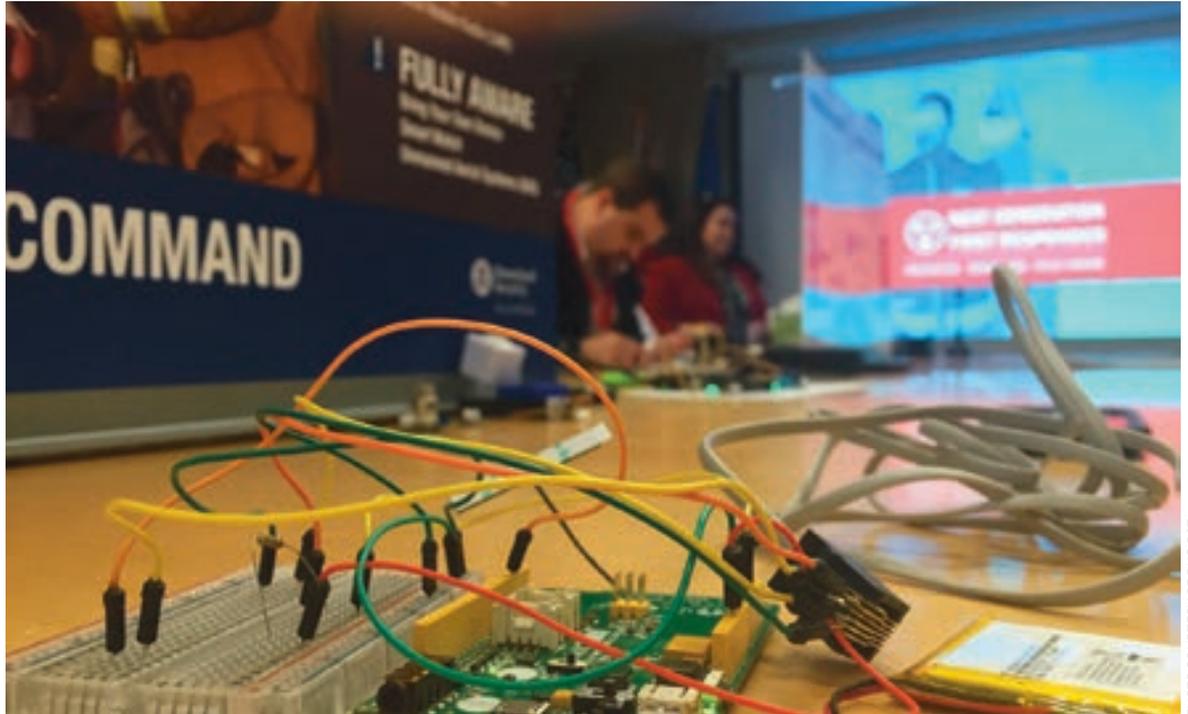


PHOTO COURTESY OF DHS S&T

“This will help electrical crews, highway departments, and other key stakeholders become more active and effective members of emergency management and first response teams.”

— DR. DAVID ALEXANDER, CHIEF GEOSPATIAL SCIENTIST, DHS FIRST RESPONDERS GROUP

the Integrated Justice Information Systems Institute and the Open Geospatial Consortium to develop and test architectures and standards to tailor IoT capabilities for first responders. FRG is also harnessing artificial intelligence with the AUDREY (Assistant for Understanding Data through Reasoning, Extraction, and Synthesis) platform, being created in partnership with JPL.

“We’ve received a lot of feedback from first responders that they’re being inundated with data and they don’t know how to extract the information they need,” Merrill said.

Designed to act like a personal assistant, AUDREY will pull in data from various sensors such as those in development under the Flood Apex Program, and notify first responders to, for example, close a road, evacuate an area, or deploy resources to a certain location. Additionally, the platform can provide contextual insight from similar events that occurred elsewhere in the country.

AUDREY is also scalable, meaning those on the front lines see a more simplified version than those in the command vehicle, who in turn see a

less complex version than those at the command center.

“We know first responders are not analysts and we do not want them to be analysts. We want them to focus on their particular mission,” Merrill said. “We want them to ingest the information but we don’t want them to be so engrossed in the analysis that it deters from accomplishing their mission.”

Cotter said he often tells the FRG team they must develop technology for those who are “tired, dirty, and hungry.”

“It means the technology has to be simple because the user may be on a 14-hour shift with little sleep,” Cotter said. “The device has to work even if it is dropped in the mud. It has to work well for someone who might be hungry, low on patience, or not feeling well. It has to be easy and intuitive because if they make a mistake—tell someone to go the wrong way or mark a map incorrectly—someone could die. That’s a pretty strong statement of requirements.” 🌐

PARTNERING WITH FRG

DHS S&T offers a variety of ways—often referred to as technology transfer mechanisms—for interested parties to engage with the organization, including:

- > Long-Range Broad Agency Announcements that allow industry, academic, and nonprofit partners to submit white papers on ideas that could potentially turn into funded projects
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LEADING BY example



 **USGIF OFFICIALLY LAUNCHED** its Universal GEOINT Certification Program at the GEOINT 2016 Symposium. The program offers first-of-its-kind transparent and transportable professional designations that prove a deep and balanced understanding of the GEOINT tradecraft.

USGIF offers three Certified GEOINT Professional (CGP) certifications: GIS & Analysis Tools (CGP-G); Remote Sensing and Imagery Analysis (CGP-R); and Geospatial Data Management (CGP-D). Those who pass all three CGP exams are then eligible to apply for USGIF's more rigorous Universal GEOINT Professional (UGP) designation.

As the program approaches its first anniversary, USGIF certification holders shared their various reasons for seeking certification as well as what they have gained from their new designations.

USGIF certification holders share their reasons for becoming certified—and the returns on investment they’ve seen since.

BY ANDREW FOERCH



LAURRE CHARLEUX, CGP-G; THE UNIVERSITY OF MINNESOTA DULUTH

Charleux, an assistant professor and leader of the GIS program at the University of Minnesota Duluth, took USGIF’s GIS & Analysis Tools exam with the goal to better advise her students. She participated in the exam during the pilot-testing phase hoping to give back to the profession and gain insight on how to best prepare students to seek certifications.

“The most important thing I hope I teach my students is that they will have to be lifelong learners,” Charleux said, adding that she revamps her classes on a five-year cycle to adapt to the evolution of GIS technologies as well as the evolution of the background students bring with them.

“We are now getting students who have been exposed to online mapping in K-12, for instance, which was not the case five years ago,” she said. “I am telling my students that, most likely, what will be their favorite ‘tool’ in 10 years does not exist yet. They will need to keep up.”



BRANDON KRUMWIEDE, CGP-R; THE BALDWIN GROUP AT NOAA

Krumwiede is a remote sensing specialist and Great Lakes regional geospatial coordinator with the Baldwin Group at the National Oceanic and Atmospheric Administration’s (NOAA) Office for Coastal Management. He views coastal intelligence as a subset of GEOINT, and combines GEOINT technologies with environmental data to help decision-makers along the coast strengthen their communities, economies, and ecosystems.

Krumwiede’s interest in remote sensing and GIS began when he enlisted in the U.S. Army and served at the Space and Missile Defense Command. After his military service, Krumwiede worked for the National Weather Service, was a procurement officer for East View Geospatial, and was a contractor with the World Bank doing research in India, Pakistan, and Nepal.

He sought GEOINT certification to see if he could demonstrate technical expertise. In his latest performance review, Krumwiede’s manager recognized the designation and expressed continued support for Krumwiede’s professional development.

“When I use the CGP-R designation in presentations, sometimes I am asked what it means, and I am happy to share,” Krumwiede said. “People take an interest, understand that I am committed to the profession, and want to learn more about geospatial intelligence and its application. I feel that it helps to build the community and at the same time strengthens trust in the work that I perform.”



DAVID GROSSO, CGP-D; TESLA GOVERNMENT

Grosso, a senior geospatial analyst for Tesla Government, builds interactive products on his company's GIS portal and creates new databases to store vast amounts of geospatial data.

According to Grosso, becoming certified is much appreciated by his department. He's earned a raise since achieving the certification, and his company has offered to pay for him to take the other two exams and pursue USGIF's UGP designation.

Grosso relocated to Washington, D.C., about two years ago after earning his master's degree in geography from the University of Nebraska-Lincoln. He got his foot in the industry conducting heads-up data conflation for another company before landing an analytics position with Tesla Government, where he was later promoted. Grosso advises those interested in the field of geospatial analytics to study Python, a programming language used to automate processes and build web tools.

"If I could tell a college student or someone who is new to the field to pick up a skill or focus on anything, I'd highly recommend learning as much Python as possible and thinking about how that can affect your workflow and make things go faster," he said.



CHRISTOPHER STAHL, UGP; U.S. ARMY TENCAP

Stahl is a physical scientist providing geospatial analytics and science and technology leadership to the national/tactical GEOINT mission held by the U.S. Army's Tactical Exploitation of National Capabilities (TENCAP) program. Stahl has worked in the geospatial industry since 1999 and held varied positions in the academic, nonprofit, private, and government sectors.

Stahl pursued certification because he considers it an opportunity to lead by example within the GEOINT Community. He also appreciates that USGIF's program validates and verifies his technical knowledge, education, and experience in addition to encouraging him to maintain his expertise.

Stahl's directorate supported his pursuit of certification and congratulated him on his success. Since passing all three CGP exams and also becoming a UGP, Stahl said he has connected with a number of high-caliber professionals and had a platform to share why certification is of value to the GEOINT Community.

"Geospatial technology is ubiquitous and many organizations have varying levels of understanding as to what geospatial intelligence is," Stahl said. "Not only has USGIF set a standard, but it cuts across organizations and industries by providing independent and unbiased verification of one's geospatial knowledge." ☺



A PROFESSIONAL BASELINE

Industry leaders share their thoughts on why GEOINT certification is important to the company's bottom line.



DON WIDENER, TECHNICAL DIRECTOR OF ISR ANALYSIS AND OPERATIONS, BAE SYSTEMS

Widener has been a USGIF member for more than 10 years and played a role in standing up

USGIF's Universal GEOINT Certification Program as both a test taker for one of the first pilot exams as well as a member of the committee that helped develop the final exams. He is also a member of the Foundation's Tradecraft and Professional Development Committee.

"[Certification] is a great starting point for analysts coming into the intelligence workforce," he said. "GEOINT professionals can prove they've gone through some geospatial training, that they have the background, and that they understand tradecraft standards."

BAE has prioritized training its staff—one of the largest in the GEOINT world. A number of its employees are already USGIF certified, and BAE offers incentive bonuses to employees that achieve USGIF certification. Additionally, the company has developed in-house, pre-certification training for its workforce.

"We pride ourselves that our professionals are best in class, and the certification proves they live up to those standards," Widener said.



CHRIS POWELL, CTO, NT CONCEPTS

Powell is co-chair of USGIF's Emerging Technologies Subcommittee and believes certification creates an important baseline for assessing an individual's expertise.

Certification can help employers know what to look for when seeking professional GEOINT skills to fill a particular role.

"When we interview a data manager and that person [is certified], we can expect that person has a certain level of skills, expertise, maybe years of experience doing that type of work," Powell said.

NT Concepts encourages its employees to consider USGIF certification. The company also has an initiative called "NTC University," which trains the NT Concepts workforce for specific projects and leadership.

"[USGIF certification is] definitely something we'd consider adding to the [NTC University] curriculum," Powell said.



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National Geospatial-Intelligence Agency Director Robert Cardillo visits the Engility booth at the GEOINT 2016 Symposium.

Engility: Team-Driven GEOINT

Amanda Brownfield, senior vice president; group executive, Intelligence Solutions Group

Q How has Engility grown and changed since acquiring TASC in 2014?
With the integration behind us, Engility is a larger, stronger company with a broader range of experts and services. We operate on a singular mindset—to support our customers’ missions through our engineering and programmatic skills. TASC and Engility came into the merger with strong customer relationships and domain experience, resulting in our team delivering a wider variety of solutions.

To ensure we stay ahead of the shifting needs of our U.S. government customers, we streamlined the organization and invested in the talent and expertise of our team. Our specialties include systems engineering and integration, high-performance computing and analytics, cybersecurity, and IT/enterprise modernization.

Q What does Engility offer with regard to GEOINT services and capabilities?

We offer solutions across the entire spectrum of GEOINT, reaching well beyond the engineering and acquisition lifecycle services we’re known for. Our expertise in space systems, GEOINT, and intelligence operations leverages emergent tech market partnerships and practices to provide high-value results. We deliver resilient solutions with shorter time to market, substantial cost savings, and robust performance—creating pathways to nontraditional innovation.

This includes advanced modeling and simulation, data science, analytics and methodologies, brokering services, and data/content management tools. We recognize the importance of GEOINT and are working hard to continue to grow in these areas.

Q What GEOINT trends are you seeing right now?

There are a number of ways to view evolving GEOINT trends; I like to think of them in three separate categories: data, utilization, and sources.

Data science and advanced methodologies will continue to evolve and become more sophisticated. We’re seeing algorithm development, deep learning, and machine learning/artificial intelligence capabilities emerge that accelerate the discovery of patterns

and answers not previously conceived. This will become commonplace and expected within the next two to three years, if not sooner.

New markets are new missions. GEOINT is becoming foundational for competitive markets. We'll see pattern-of-life recognition and human geography expand, becoming vital as state actors battle over boundaries or resources. Technical targeting and cyber offensives will become more dependent on current, accurate, and relevant GEOINT.

We can anticipate expansive industry growth in small and micro-satellite constellations. Unmanned sources will be the next thrust for collection, and we should expect to see simple devices collecting complex data to be analyzed and turned into answers for sale. Open-source data will continue to expand and we should not anticipate any slowing of that harvesting. Automation of workflows, processes, and analysis will be the key focus.

Talent is the key to our success and our team is working on solutions to address needs in these three areas.

RGi: Reinventing GEOINT for the Nation's Soldiers

Stephen Gillotte, president and CEO

Q What does RGi stand for?

'Reinventing Geospatial Inc.' When we first started in 2009, you didn't come across the word 'reinventing' very often, but at this point it's a common concept. Every third commercial I see is reinventing this, reinventing that. It has really moved away from the negative cliché of 'there's no need to reinvent the wheel.'

I designed RGi to be a bold statement to drive the GEOINT Community to do better. Reinventing how we continue to achieve dominance over our adversary is a common theme for us. We believe our nation's soldiers deserve the best through innovation and rapid delivery of capability. So many people in our community come to us with problems, not solutions. We need to reinvent solutions to existing problems to move forward.

Q Who are RGi's core customers and how does your technology make a difference?

Our primary customer is the U.S. Army as well as other federal agencies. We specialize in consulting and engineering services, focusing on C3I (Command, Control, Communications, and Intelligence) and in operational and tactical environments. We specialize in how to make capabilities from the agencies accessible in the field across very low bandwidth. We're making a direct impact by developing innovative GEOINT capabilities designed to operate in our Army's austere, unclean environment.

Over the past few years we've improved soldiers' abilities to share GEOINT data from our enterprise and cloud providers and brought that to them at the tactical level. We've also helped improve interoperability and the sharing of content among Army systems so the commander has better situational awareness. We take pride in improving the performance and usability of capabilities we're deploying to the tactical edge, enabling soldiers to adapt to the dynamic tactics of our adversary.

Q What are RGi's current research and development initiatives?

We are pursuing a number of R&D initiatives. One is cyber terrain and how we define situational awareness. Our goal is to enable the commander to affect the battle space by giving him or her the ability to align both cyber and warfare tactics to create insight.

"We've also helped improve interoperability and the sharing of content among Army systems so the commander has better situational awareness."

—STEPHEN GILLOTTE, PRESIDENT AND CEO, RGI



PHOTO COURTESY OF RGI

RGi delivers data directly into the hands of soldiers in austere environments.

The second is predictive, activity-based intelligence planning. This is one of our two machine learning initiatives in which we're developing a language processing algorithm that analyzes open-source intelligence and pairs it with tactical operational data to predict where and when an event will occur.

Q RGi was named a "2017 Best Place to Work in Virginia" by Virginia Business and Best Companies Group. How would you describe your office culture?

We were honored with the award and attribute it to the fact that we hire great people that do great work, and make work fun along the way. We only hire the brightest and best engineers, and one of the key aspects of our culture is allowing employees the freedom to make a difference for the customers.

We also have a strong team culture in which employees are expected to push themselves to consistently deliver the best capabilities to our customers. We believe we've found the sweet spot of embracing and encouraging the natural creativity of our engineers, while keeping focused on the very real issues facing our defense and intelligence customers.

Q What are some GEOINT trends you are witnessing and how are you responding to them?

The big trend in the Department of Defense (DoD) and Intelligence Community is an increasing reliance on enterprise and cloud-based infrastructures to store, analyze, and exploit an exponentially growing amount of GEOINT data. This is a huge issue, especially for the DoD and Army because of the austere and disconnected, intermittent, and limited networked environments. Our users, either by necessity, mission, requirement, or choice, need to operate in these environments. In the future, in terms of Army networks, tactical commanders will also require more bandwidth than what's available. To address this challenge, RGi has prepositioned terabytes of users, systems, and mission-required data at the tactical edge.

Individual Member Spotlight: Beyond Points on the Map

Al Di Leonardo, U.S. Army (Ret.); founder, HumanGeo; president, The Radiant Group, now DigitalGlobe-Radiant

Al Di Leonardo started HumanGeo with Abe Usher in 2011 after leaving a position with the Joint Special Operations Command (JSOC). HumanGeo was acquired in 2015 by The Radiant Group, which was later acquired by DigitalGlobe in 2016. Di Leonardo recently became a Lifetime USGIF Individual Member.

Q What advice do you have for other GEOINT professionals considering making the leap from government to industry or starting their own business?

Always surround yourself with bright people when starting your own business—don't do it alone. Building a strong team from the start is critical to success when you're a government or military officer starting your own company in the private industry. Also make sure you combine complementary skill sets and relationships as you build your team. If you're a GEOINT analyst and you want to create a GEOINT startup, just because you have the knowledge and domain expertise doesn't mean you can translate that into a business.

Q What is the most important thing you've learned about entrepreneurship in the GEOINT Community?

Abe Usher and I always use a line from the rapper Ice-T—"game knows game." What he meant by that, relating it to GEOINT, is you have to bring your best ideas and integrate them into the system to have an impact on the U.S. government. Move beyond the basics—it's not enough to put points on a map when you develop a capability. You have to create GEOINT solutions

Al Di Leonardo, U.S. Army (Ret.); founder, HumanGeo; president, The Radiant Group, now DigitalGlobe-Radiant



that solve a specific problem for your customer. Additionally, you have to create to integrate. There are many legacy systems in the government and you can't scrap them and start over, you have to think about integrating with them in order to be successful in this space. You have to create a culture of collaboration to successfully create and sustain a business.

Q Do you have any lessons learned to share regarding mergers and acquisitions?

When you're a small business owner, what you really care about is your shareholders, employees, and the mission. In the end, it's how you create value for your shareholders and employees. Make sure you want to sell—don't do it because you think you have to. Check that the team you're joining is aligned with your vision of and mission for the future. Also make sure the team you sell to will help your people and your business. Lastly, join a confident and ethical team.

“You have to create a culture of collaboration to successfully create and sustain a business.”

—AL DI LEONARDO, FOUNDER, HUMANGED; PRESIDENT, THE RADIANT GROUP

Q How has USGIF membership helped your business as well as your individual career?

At every stage, USGIF has played an important developmental role in my career. While at JSOC, USGIF helped educate me about the larger role of GEOINT. While founding HumanGeo, USGIF helped me provide branding and recognition within the community that I'm absolutely certain I could not have achieved otherwise. More recently, with The Radiant Group and DigitalGlobe, the Foundation allowed me to showcase some of our formal ideas around rapid feedback with multi-disciplined teams and GEOINT services to help change the ways agencies look at GEOINT. I trust USGIF will keep me innovative and continually push the GEOINT Community to educate, train, and create awareness about the many mission-focused companies that support the government.

Q What excites you about the future of the GEOINT Community?

The convergence of machine learning with imagery. We're moving beyond the pixel in a GEOINT-centric world to an era in which computers can see and help humans better understand activities occurring all over the planet. Also exciting is the emergence of open-source software as a trend enabling more rapid GEOINT innovation. 🌐

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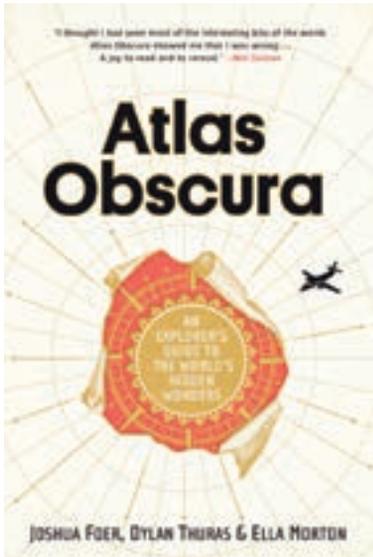
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**Atlas Obscura:
An Explorer's Guide to
the World's
Hidden Wonders**

By Joshua Foer, Dylan Thuras, and Ella Morton

This *New York Times* best-seller features more than 700 of the world's most mysterious and spectacular places.

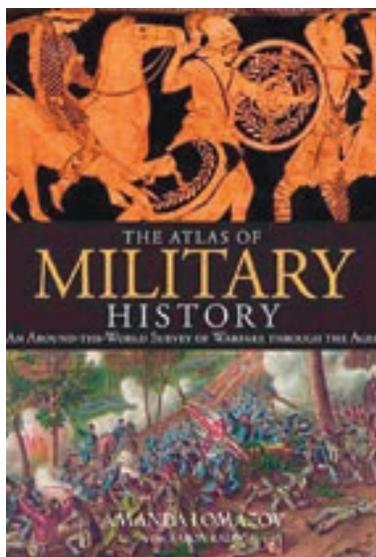
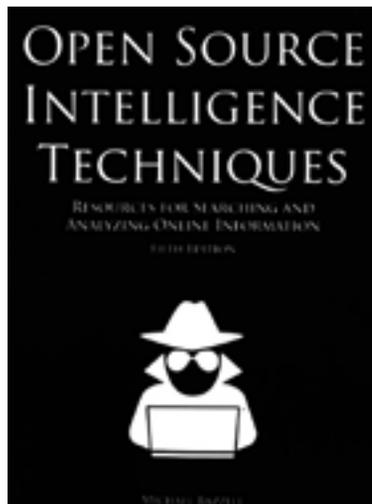
These aren't your classic tourist spots. The book celebrates social events such as Spain's bizarre Baby Jumping Festival, inventions like a leech-powered weather forecaster in England, natural wonders such as New Zealand's glowworm caves, and more to demonstrate just how strange and wonderful the world really is.



Open Source Intelligence Techniques: Resources for Searching and Analyzing Online Information

By Michael Bazzell

This book, penned by a former computer crime investigator with the FBI Cyber Crimes Task Force, examines methods for searching and analyzing large swaths of online information. Bazzell identifies more than 250 resources, along with tutorials, screen captures, software suggestions, and search techniques. The book's writing is accessible and hands-on, encouraging active participation from the reader.



The Atlas of Military History: An Around-the-World Survey of Warfare Through the Ages

By Amanda Lomazoff and Aaron Ralby

This atlas is a comprehensive portrait of military conflict from 247 BCE to the Arab Spring, with conflicts organized by geographic location and chronology. Each section includes detailed maps, full-color photos, and information on important battles, leaders, weapons, and more.



MAY 9

GEOINteraction Tuesday

Springfield, Va.

JUNE 4-7

GEOINT 2017 Symposium

San Antonio, Texas

JULY 11

GEOINteraction Tuesday

San Diego, Calif.

AUG. 7-9

National Geospatial Preparedness Summit

Tuscaloosa, Ala.

SEPT. 12

GEOINteraction Tuesday

Herndon, Va.

OCT. 17-18

NGA Tech Showcase West

St. Louis, Mo.

NOV. 11

12th Annual GEOGala

McLean, Va.

NOV. 13-17

GEOINT Community Week

Northern Virginia

JEFF BOHLING recently joined Vencore as senior vice president and general manager of the company's Civilian and Defense Group. Bohling is responsible for the business operations and growth of the group as well as expansion of Vencore's civilian and defense programs and portfolio.

Former Director of National Intelligence (DNI) **JAMES CLAPPER** will join Harvard's Belfer Center for Science and International Affairs as a non-resident senior fellow. Clapper served as DNI from 2010 through the end of President Obama's administration.

PlanetRisk appointed **DR. LISA COSTA** vice president of intelligence and chief scientist, a newly created position at the company. Costa has more than 30 years of experience in the Intelligence Community in field investigations and technology research and development.

The Library of Congress (LOC) appointed **PAULETTE MARIE HASIER** chief of its geography and map division. Hasier most recently served as branch chief of the National Geospatial-Intelligence Agency's GEOINT Research Center and Pentagon Map Library. She is the ninth person and first woman to be named chief of the LOC geography and map division.

USGIF CEO **KEITH J. MASBACK** was reappointed to a second three-year term as a member of the National Geospatial Advisory Committee (NGAC). He was also reappointed as NGAC's vice chair. The NGAC provides recommendations to the Federal Geographic Data Committee, the interagency executive group responsible for providing leadership and direction in federal geospatial programs.

Lyft hired **LUC VINCENT** as vice president of engineering to improve the company's real-time navigation capabilities. Previously, Vincent founded and led Google's Street View team.

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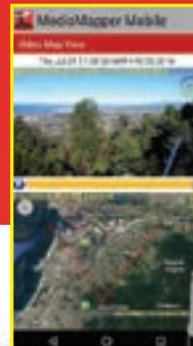
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perspective

PLAYING OFFENSE AND DEFENSE

WILLIAM “BILL” EVANINA serves as the National Counterintelligence Executive (NCIX) and director of the National Counterintelligence and Security Center (NCSC) with the Office of the Director of National Intelligence (ODNI). Prior to being appointed by the DNI, Evanina held positions as chief of the CIA’s Counterespionage Group and as assistant special agent in charge of the FBI’s Washington Field Office, where he led both the counterintelligence and counterterrorism divisions.

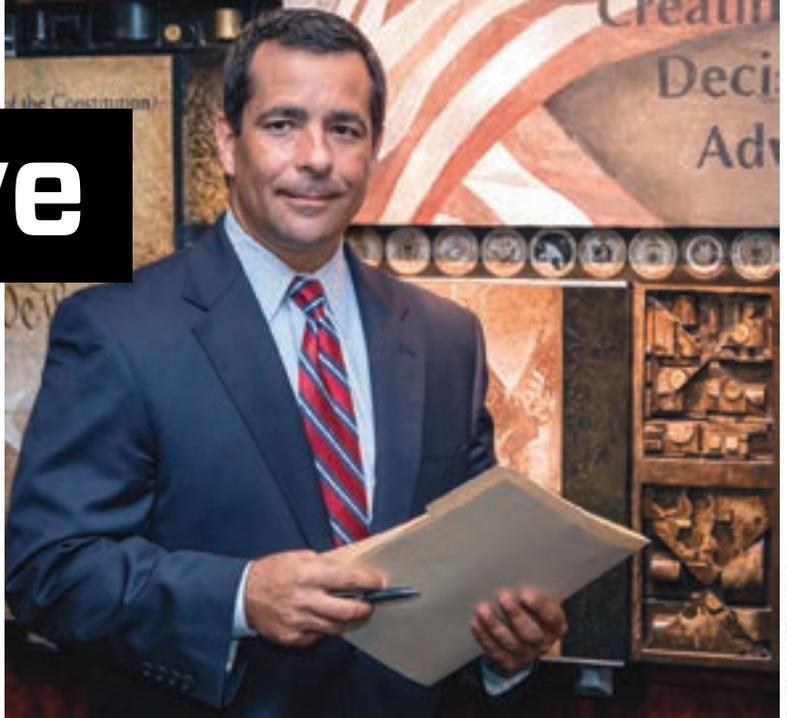


PHOTO COURTESY OF ODNI

Q How would you describe your role as NCIX? What is your day-to-day like?

My job is eclectic and different every single day. For example, today I’m going to the White House to deal with background investigation issues and reform efforts. In the past few months, with Russia [in the news], something new comes up all the time. We’re often defending against threats, but the good thing I get to see is the offensive excellence we have in the U.S. government—and that rarely gets reported.

Q What first drew you to counterintelligence (CI)?

In 2005 we had an insider threat at the FBI in New Jersey who we believed was spying and I got to head up that investigation. His name was Leandro Aragoncillo and he had previously worked at the White House. We investigated and charged him and he pleaded guilty to spying for the Philippines. After that I was sort of obsessed with spying and espionage. Coming from the terrorism side I wasn’t always aware of the insider threat. When I got promoted to the FBI in Washington, D.C., we were about a year away from taking down the Russian spy ring in 2010. It was just fascinating—the investigation, the arrest, working with the CIA and the spy swap that occurred.

Q What role does geospatial intelligence play in NCSC’s mission?

GEOINT is probably the least appreciated INT in national security. It’s the fastest growing and most complex for multiple reasons. The globalization, privatization, and the capabilities being developed in the private sector have significant use and implications for the IC. But it’s a double-edged sword for the CI community. We look at GEOINT as an amazing tool that we’re able to exploit, ultimately to track the adversary and identify what they’re doing and how. But we

also have to keep in mind our adversaries are doing the same thing.

Q How does CI help prevent theft of technology and mitigate supply chain risks?

We’re in an aggressive campaign to educate the community about supply chain risks, starting with overhead platforms and the GEOINT Community. Our vector here in the next 10 to 20 years as we move to space is to provide uncompromised capabilities and analytics. Our adversaries are trying to compromise those things. If you look at it from a procurement/acquisition perspective on the supply chain side we need to add that layer of CI to ensure systems, rocketry, communications, and even widgets and micro-tech from the ground to the satellite aren’t compromised.

Q As the IC, and in particular the GEOINT Community, begins to welcome more unclassified, open-source intelligence and consider the use of wireless devices, how does that change and heighten your mission?

It makes it very difficult. I’m a big proponent and understand the globalization and speed of technology. My office worked with the DNI to put out an interim policy on wireless devices in the IC, and it ruffled some feathers. It said not only are they a threat, but we need to understand the risks.

We have to work to improve efficiency in the workplace, but are unclassified and wireless really more

Read the complete interview with Bill Evanina at trajectorymagazine.com.

efficient? I’m not totally against either. I don’t want to restrict progress, but I want to continue to put a risk structure in place.

Q How is artificial intelligence (AI) changing the CI mission and insider threat detection?

We use AI very effectively in the IC, and it’s even more effective in the private sector. But once again our adversaries are doing the same thing. How do we get to a place where we can utilize AI in its purest form—add AI and machine learning with biometrics and you’re almost undefeatable in terms of what you could identify and analyze. AI is here to stay, and it’s going to get bigger, faster, and more efficient.

Q What other thoughts would you like to share with the GEOINT Community?

The race to use space as an intelligence gathering apparatus is on and in full swing with the U.S. and our adversaries all in. And that race has to be won on our part, but it also has to be won in a careful manner because we don’t want to race to space and then have our stuff not work. Getting there uncompromised or minimally compromised is one thing we’re pushing in Congress. Let’s be patient and make sure we understand the threats. 🌐

QUICK FACTS

CAREER INSPIRATION: 1979 bank robbery in my hometown

FAVORITE MOVIES: *Rocky* or *The Godfather*

CURRENTLY READING: *Spy* by David Wise



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