

# trajectory

THE OFFICIAL MAGAZINE

OF THE UNITED STATES GEOSPATIAL INTELLIGENCE FOUNDATION

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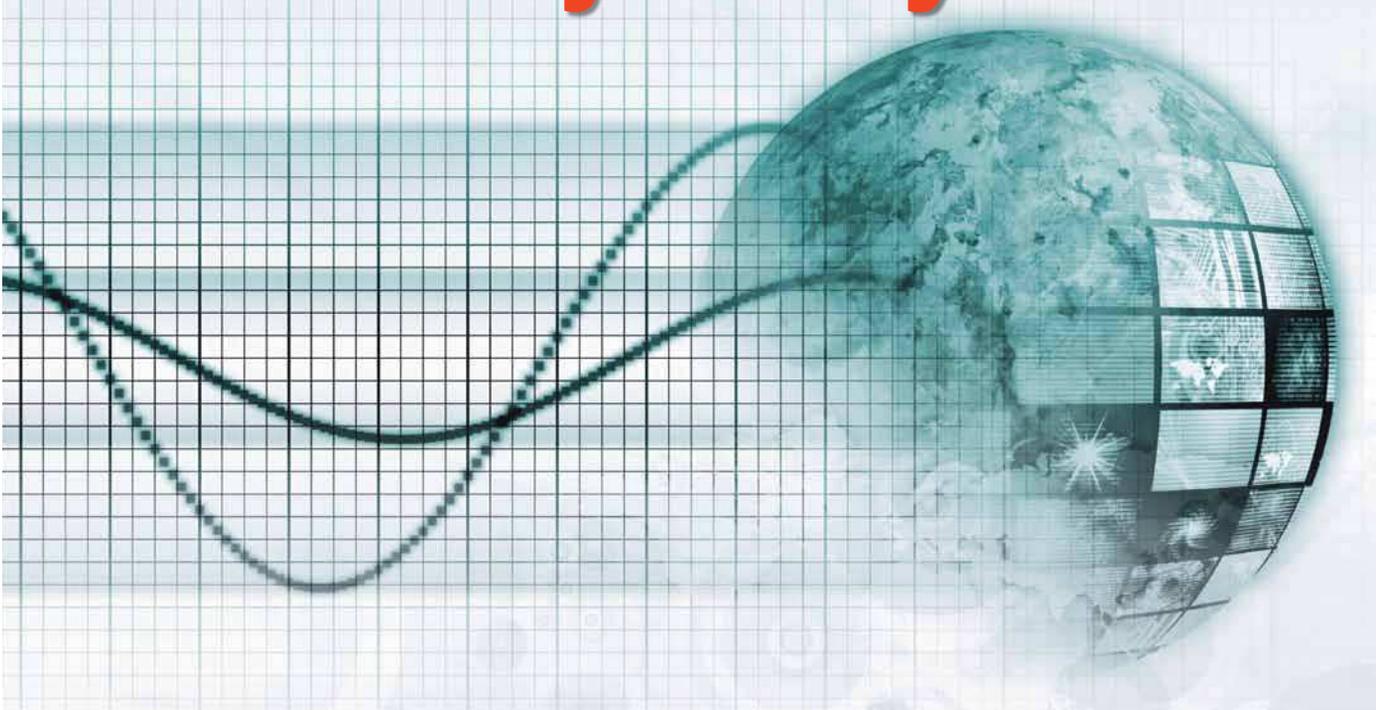
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# trajectory

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## PODCAST

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## ARTICLE

More about the DigitalGlobe-GeoEye merger.

## INVALUABLE INTERACTIONS

I'D LIKE TO EXTEND a sincere thanks to our readers and supporters. We at USGIF have been gratified by the fantastic response to our first issue of *trajectory* magazine. Our team worked hard to launch this publication and we remain committed to seeing that it remains a relevant, interesting, and entertaining source of information for the GEOINT Community. Since the magazine launch in June, we have continued to update *trajectorymagazine.com* with fresh content, and we've recently released our tablet edition in both the iTunes Store and the Android Market. I urge you to check out the app, which is embedded with enhanced multimedia content, such as slideshows, videos, and links to related documents and press releases. It's a great way to interact with the new magazine.



As we at USGIF strive to integrate our print, social media, and web presence for a more consistent ability to tell the story of our community, we also remain committed to a more basic, fundamental means of communication: face-to-face. Building the GEOINT Community is one of the core tenets of the Foundation, and at the heart of building community is building trust. In order to build trusting relationships, there is little that can replace personal interaction.

In late July of this year, the Center for Exhibition Industry Research released a study in which the majority of the 10,000 surveyed conference attendees and exhibitors ranked events such as our GEOINT Symposium at the top of all types of valuable face-to-face interaction opportunities. Unfortunately, due to the excesses of some, both real and perceived, conferences and exhibitions have received bad press this year. There is currently sort of a negative connotation to the idea of large professional gatherings. It's a shame the many should be tainted by the few, as the result of isolated incidents of poor judgment and wasteful spending.

Through our events and programs, we strive to provide the GEOINT Community—spanning defense, intelligence, and homeland security—with the right balance of content and business opportunities. We keep our priorities clear: Build the Community; Advance the Tradecraft; Accelerate Innovation. Anyone who has attended a GEOINT Symposium would be hard pressed to argue against the value of the high-profile keynote speakers, dynamic panel discussions, afternoon breakout sessions, daily networking events, the chance to experience 250-plus exhibiting organizations, and the opportunity to interact with over 4,000 fellow attendees.

In this issue, you'll find a preview of the GEOINT 2012 Symposium, taking place Oct. 8-11 in Orlando, as well as interesting features on open source intelligence and open source software. We're proud of how the event has grown over time, and hold it as an example of just how valuable a large gathering of professionals can be in terms of generating momentum for ideas and innovation.

I hope you continue to enjoy *trajectory*, and I hope to see you in Orlando in October. It promises to be another superb event which will leave the whole of our community better informed and better prepared to protect our nation.

**In order to build trusting relationships, there is little that can replace personal interaction.**

KEITH J. MASBACK | PRESIDENT, USGIF  
@geointer

# trajectory

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*Trajectory* is the official magazine of the United States Geospatial Intelligence Foundation (USGIF), in Herndon, Va.

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NEWS UPDATES AND HIGHLIGHTS FROM GOT GEOINT?



IMAGE COURTESY OF GEOEYE

### TERRAGO ACQUIRES GEOSEMBLE

TerraGo Technologies acquired Geosemble Technologies in July. Visit [www.trajectorymagazine.com/got-geoint](http://www.trajectorymagazine.com/got-geoint) to hear a podcast with TerraGo President & CEO Rick Cobb, who discusses how the acquisition will create a comprehensive suite of geospatial intelligence software.

## LEADERSHIP PROVIDE INSIGHT ON DIGITALGLOBE, GEOEYE MERGER

Following months of uncertainty over impending budget cuts to the National Geospatial-Intelligence Agency's EnhancedView commercial imagery program, and unsuccessful bids by both companies to acquire one another, DigitalGlobe and GeoEye announced merger plans July 23.

"This brings together a number of pieces that were separate, where each of the two companies had chosen to make investments in a piece of the total puzzle as opposed to making investments across the board," said Walter Scott, founder of DigitalGlobe and now the company's chief technology officer.

The two companies will merge in a cash and stock transaction valued at around \$900 million. The combined company will be called DigitalGlobe and be headquartered in Colorado.

Jeffrey Tarr, the current DigitalGlobe CEO and president, will maintain his position. Matt O'Connell, GeoEye CEO and president, is expected to assist the management of the combined company in an advisory capacity following the merger.

Scott heralded the complementary strengths of DigitalGlobe and GeoEye, and he said the combined company will be able to manage its total satellite constellation more efficiently as well as take advantage of the capabilities of each of the sensors.

O'Connell said the combined company will speed timelines, enhance persistence, and deliver higher value for the taxpayer.

"This is very good for the U.S. government," O'Connell said. "It's what they need when they need it."

*To learn more about what company leadership had to say regarding this merger, visit [www.trajectorymagazine.com/web-exclusives](http://www.trajectorymagazine.com/web-exclusives).*

### GEO-JOURNAL



### WHAT'S YOUR SAGA?

A new iPhone app called Saga was released in August, designed to allow users to record a history of and create a better life all through location. The app uses your smartphone's GPS, Wi-Fi capabilities, and accelerometer

to record your real-world activity. "Saga knows where you've gone, how you got there, and who you were with—all without you having to check in," according to its website. Once the app "gets to know you," it can also start suggesting places to go and things for you to do based upon your previous experiences.

*To find out more, visit [www.getssaga.com](http://www.getssaga.com).*

got geoint? got geoint?

A recent study found most organizations are now enabling "bring your own device" (BYOD) in the enterprise, with



of respondents saying their organizations permit employee-owned devices in some way, shape, or form in the workplace.

## AN EARLY FASCINATION

Brittany Williams became fascinated in defense technology when she had the opportunity to “fly” an Osprey flight simulator at Camp Lejeune, N.C.

Today, the 15-year-old junior at E.A. Laney High School in Wilmington, N.C., is becoming well known in the GEOINT and stealth technology communities for her outstanding research projects.

“I love stealth technology and geospatial intelligence,” Williams said. “It’s fascinating to me.”

In 7th grade, Williams won a regional science fair with a project related to energy absorption, emissivity, and the reflectivity of materials. Her project placed second in the state of North Carolina, and in 2011 landed her a spot as a finalist at the Intel International Science and Engineering Fair in Los Angeles.

Williams presented her more recent research as part of a high school science and technology exhibit at USGIF’s GEOINT Community Week (shown below, with Maj. Gen. James O. Poss, Assistant Deputy Chief of Staff for ISR, U.S. Air Force). Her project, “Stealth Technology Hiding in Plain Sight,” examined the correlation between the angle of incidence and the bi-directional reflectivity of stealth aircraft.

“I had a wonderful time visiting the different exhibits and learning about various GEOINT technologies in use presently,” she said.

Williams has been working with her mentor Leon Hicks, a Raytheon GEOINT systems architect, as well as USGIF Director of Academic Programs Dr. Max Baber, to explore options for internships and future areas of study. Although several organizations have expressed interest in hosting Williams as an intern, including the National Air and Space Intelligence Center (NASIC), she is still too young to accept most offers. Next summer, Williams will participate in an internship at Duke University’s Metamaterials and Integrated Plasmonics lab.



## BIG DATA STORAGE

### BEST OF BOTH WORLDS

DataDirect Networks (DDN) has partnered with YottaStor, a division of Alliance Technology group, to sell its Web Object Scaler (WOS) as an integrated system within YottaDrive, YottaStor’s mobile computing and big data storage system. WOS will be sold as an integrated system within YottaDrive, YottaStor’s mobile computing and big data storage system.

DDN takes a non-traditional approach to big data storage, focusing on object storage as opposed to block storage, to create better efficiency. YottaStor produces cloud appliances that can be controlled locally in the environment but still take advantage of cloud architecture and pricing.

“[WOS] allows people to retain their data locally but still connect to a cloud,” said Mike Dillard, executive director and founder of YottaStor. “That way you can protect your data and keep it local, but still use analytics that are up on the cloud. It’s a great combination of both products.”

WOS also has the potential to generate considerable cost savings, according to Dillard.

“The government currently pays about \$1.50 to store a gigabyte of information per month,” Dillard said. “If you look at the cloud, it’s more like about 10 cents.”

In addition to reduced cost, the product also supports a growing need for storing big data—especially with the increased use of UAVs to collect imagery in theater, said Jon Douglas, federal marketing director with DDN.

“The DOD is finding that as they collect these huge amounts of data, it must remain as close to the collection point as possible,” Douglas said. “You don’t want to bring it all the way back to the U.S. to get an analyst to look at it. With this the analyst can look at what’s important to them and only bring back a small percentage.”

## FSU RECEIVES NGA GRANT TO PURSUE USGIF ACCREDITATION

Fayetteville State University in North Carolina announced it has received a five-year, \$443,000 research grant from the National Geospatial-Intelligence Agency (NGA) to support the development of a geospatial intelligence certificate to be offered to students pursuing undergraduate degrees in geography, computer science, and intelligence studies at the university.

The initiative will be led by Dr. Rakesh Malhotra, a member of the USGIF Academic Advisory Board. If accredited, FSU will become the first historically black college or university (HBCU) program to achieve USGIF accreditation.

Developing an accredited program at FSU will serve two purposes, according to Dr. Max Baber, USGIF director of academic programs: helping NGA with workforce development among underrepresented populations and providing GEOINT professional development opportunities for military personnel at Fort Bragg who are preparing for transition to the civilian workforce.

*To learn more about USGIF academic accreditation, visit [www.usgif.org/education/accreditation](http://www.usgif.org/education/accreditation).*

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**This study also concluded that the average number of connected devices per knowledge worker is expected to reach**



**by 2014, up from an average of 2.8 in 2012.**



SOURCE: CISCO IBSG HORIZONS STUDY FROM MAY, 2012

TrajectoryMagazine.com is more than a digital magazine website—it is a central communications hub and timely news source for the entire GEOINT Community with feature stories and enhanced online content not seen in the print edition.

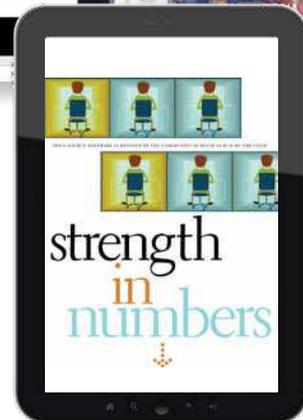
## WEB EXCLUSIVE MULTIMEDIA CONTENT INCLUDES:

- The widely read, one-and-only *got geoint?* blog
- Podcasts with experts and leaders from the GEOINT Community
- Expanded photo galleries and video content
- Follow us through social media

## TABLET APP

Check out the free tablet app to get the best of both print and website content, seamlessly merged for an engaging interactive experience. The trajectory app is available at the iTunes Store and Android Market.

The screenshot shows the homepage of trajectorymagazine.com. At the top, there is a banner for 'geoint 2012' with the tagline 'CREATING THE INNOVATION ADVANTAGE' and dates 'OCT. 8-11 - ORLANDO, FLORIDA'. Below this is the 'trajectory' logo and 'USGIF' branding. A navigation bar includes categories like 'WEB EXCLUSIVES', 'DEFENSE & INTELLIGENCE', 'BUSINESS & TECHNOLOGY', 'GOVERNMENT', 'CIVIL', 'EDUCATION', 'MULTIMEDIA', and 'GOT GEOINT?'. A search bar is located on the right. Below the navigation bar, there are buttons for 'Download the App Today' and 'KEEP UP TO DATE WITH TRAJECTORY SUBSCRIBE'. The main content area features a large image of people holding a globe, with several article teasers: 'AT A CROSSROADS' (SUMMER 2012), 'THE \$4B GLOBAL PIE' (SUMMER 2012), and 'PIGEONHOLED' (SUMMER 2012). Below these are three multimedia content blocks: 'PODCAST SEQUESTRATION', 'VIDEO "EARTH ILLUMINATED"', and 'PHOTO OSINT'. At the bottom, there is a 'got geoint?' section with a list of recent posts, a 'FOLLOW US ON TWITTER' section with tweets, and a 'YPPG' (Young Professionals Group) advertisement.





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***NORTHROP GRUMMAN***



STUDENTS from the Washington College Geospatial Discoveries Summer Program show off their robotics projects.

## FOUNDATION SPONSORS SUMMER PROGRAMS

**THIS YEAR, USGIF PRESENTED** three \$3,000 sponsorships to geospatially related summer programs, including the Northern Virginia College Geospatial Leaders Summer Camp, the Washington College Geospatial Discoveries Summer Program, and the Central Florida GIS Workshop.

The Washington College program is for students entering grades 7-12 and provides them with the opportunity to choose from three tracks: 3D visualization and virtual worlds, CSI crime analysis and mapping, and marine exploration and discovery.

The Northern Virginia College program is intended to introduce at-risk high school students to GIS and help them realize a college education is within their grasp, according to Michael Krimmer, a GIS professor with the college.

USGIF will also sponsor a lunch at the Central Florida GIS Workshop in late September, during which Dr. Max Baber, USGIF's director of academic programs, will serve as keynote speaker.

"Relatively small grants to small organizations that are doing good work may not change the world with respect to GEOINT," said Keith Masback, USGIF president. "But, it's going to spark the imagination of a few more young people to get involved in the world of all the things that are encompassed by our definition of GEOINT."



**IN SCHOLARSHIPS AWARDED BY USGIF TO GEOINT AND GIS STUDENTS SINCE 2004.**

## USGIF SCHOLARSHIP PROGRAM AWARDS MORE THAN \$100,000 IN 2012

**THE USGIF ACADEMIC COMMITTEE** this summer selected 25 students for scholarship awards totaling \$104,000. This year's awards bring the total amount of scholarship dollars given out by USGIF to \$584,000 since launching the program in 2004.

The 2012 scholarship winners include:

### DOCTORAL

- Rachel Bianchetti (Penn State)
- Katarina Doctor (George Mason Univ.)
- David Kelbe (Rochester Institute of Technology)
- Leanne Sulewski (Univ. of South Carolina)
- Andrew Thorpe (UC Santa Barbara)

### MASTERS

- Shawn Baldwin (Univ. of Southern California)
- Daniel Giordano (Univ. of Maryland)
- Sara Flecher (Univ. of South Carolina)
- Nicole Grams (Univ. of Oklahoma)
- Nouman Hussain (Penn State)
- Jordan Lawver (Ohio State Univ.)

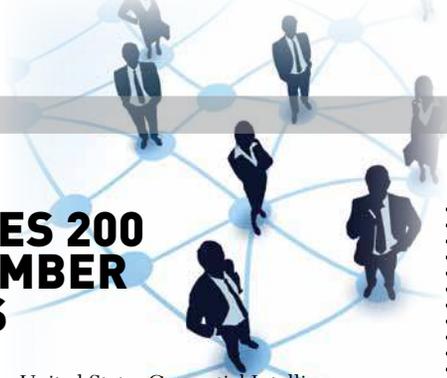
### UNDERGRADUATE

- Anthony Barron (Univ. of Texas at Austin)
- John Byers (Univ. of Idaho)
- Alysha Heckman (Univ. of Maryland)
- Mariah Perkins (Washington College)
- Tanya Petach (Harvard Univ.)
- Kyle Smith (James Madison Univ.)
- Everleigh Stokes (Penn State)

### HIGH SCHOOL SENIOR

- Travis Browning (Dover Area High School, Pa.)
- Ehsan Jafree (Loudoun County Academy of Science, Va.)
- Johnathan Johnston (Sebastian River High School, Fla.)
- Stephen McFall (Smethport Area Junior Senior High School, Pa.)
- Chandler Morrell (Loudoun County High School, Va.)
- Briana Neuberger (Chantilly High School, Va.)
- Kim Noriega (Centreville High School, Va.)

Visit [usgif.org/education/scholarships](http://usgif.org/education/scholarships) or email [scholarships@usgif.org](mailto:scholarships@usgif.org)



## USGIF SURPASSES 200 SUSTAINING MEMBER ORGANIZATIONS

**TWELVE RECENT ADDITIONS** to the United States Geospatial Intelligence Foundation (USGIF), allowed the Foundation to surpass the 200-member mark and reach a total of 212 member organizations, as of press time.

Intelligent Decisions became the 200th member when it joined USGIF. "It was a natural transition for us," said Michael Walsh, Intelligent Decision's senior director for Virginia intelligence programs. "The benefits of joining [USGIF] have allowed us to begin to network within the geospatial community, and that allows us to foster and support the NGA mission in a similar manner that we have with other IC customers."

Intelligent Decisions has experienced recent rapid growth, specifically around their professional services practice. The professional services division, which provides high level systems engineers for IT support, server and desktop virtualization, networking, simulation, and cybersecurity, has grown from less than 40 to more than 300 employees in the last five years, Walsh said.

In addition to Intelligent Decisions, companies that recently joined the Foundation, driving membership above 200, include Tresys Technology, Aptima Inc., Ergo, S2 Analytical Solutions, Thermopylae Sciences & Technology, Bosh Global Services, Technology Management Associates, Eizo Nanao Technologies Inc., Solid Terrain Modeling, Whiteboard Federal Technologies Corp., and Fulcrum IT Services.

*For more information on USGIF membership, contact [membership@usgif.org](mailto:membership@usgif.org).*

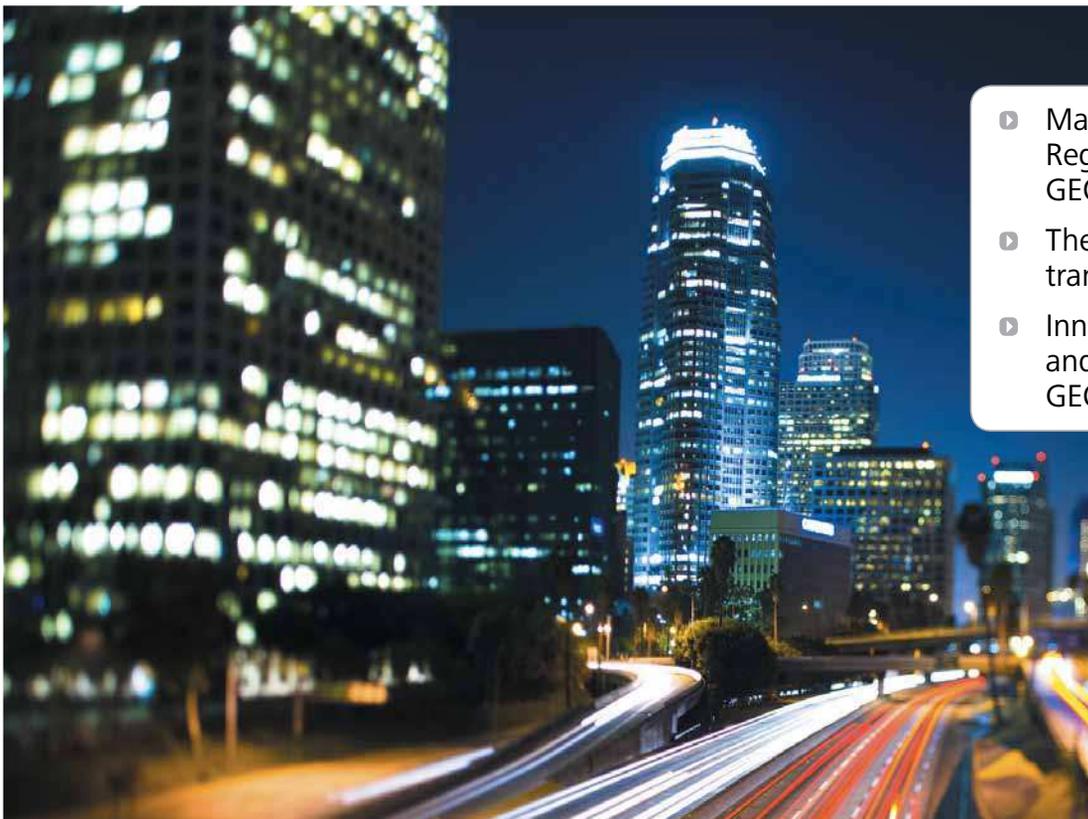
## THE UNIVERSITY OF UTAH BECOMES 7TH ACCREDITED SCHOOL

**THE UNIVERSITY OF UTAH'S DEPARTMENT OF GEOGRAPHY**, with support from the College of Social and Behavioral Science, has achieved USGIF accreditation for its Geospatial Intelligence Certificate Program.

After completion of its self-study report, Utah submitted its documents to the USGIF Academic Committee for re-view. The program is initially approved for a two-year period, with full accreditation status to be awarded after the probation period.



To date, USGIF has accredited seven college or university Geospatial Intelligence Certificate Programs: Utah, George Mason University, Pennsylvania State University, University of Missouri-Columbia, University of Texas at Dallas, the U.S. Air Force Academy, and the U.S. Military Academy at West Point.



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## USGIF SUMMER INTERNS AND EXTERNS

**AS A NONPROFIT EDUCATIONAL ORGANIZATION**, USGIF has several initiatives to foster learning and scholarship beyond its most well-known events and programs, like the annual GEOINT Symposium.

Each summer, the Foundation partners with Gettysburg College for an “extern” program and also hires summer interns at its headquarters in Herndon, Va.

“USGIF student interns and externs are exposed to the breadth of GEOINT community activities and capabilities, enabling deeper appreciation for professional opportunities that exist in service to the interests of national security. This experience enables students with a passion for geospatial intelligence to cultivate important connections and opens the door to long and rewarding careers within our community,” said Dr. Max Baber, USGIF’s director of academic programs.

The USGIF-Gettysburg College Externship Program provides opportunities for students to gain insider perspectives on a wide variety of geospatial intelligence professional career fields. USGIF hosted four Gettysburg externs this summer who were able to visit USGIF member organizations SAIC, GeoEye, Booz Allen Hamilton, the Army Geospatial Center, and the National Geospatial-Intelligence Agency.

In addition to the extern program, USGIF also hires summer interns who provide staff support across all Foundation activities, including

academic programs. This summer’s interns are Megan Dunegan, a geography major at Virginia Tech, Natalie Fontanella, who graduated in 2012 with a bachelor’s in psychology from Stephen F. Austin State University, and Briana Neuberger, a 2012 graduate of Chantilly High School who will attend Rochester Institute of Technology this fall.



**NATALIE FONTANELLA** (left) and Briana Neuberger participated in USGIF’s summer intern program.

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[www.worldcampus.psu.edu/trajectory](http://www.worldcampus.psu.edu/trajectory)



**GMU'S GEOSOCIAL** Gauge system, shows streaming feeds discussing the conflict in Syria, and a map of the hotspots from where this traffic originates (above). Researchers from GMU's Center for Geospatial Intelligence, working on the harvesting of geospatial intelligence from social media feeds and volunteered geographic information (below).

## VISUALIZING THE INVISIBLE

GMU pioneers a new approach to harvesting GEOINT

**T**HE CENTER FOR GEOSPATIAL Intelligence at George Mason University is conducting extensive hands-on studies to understand how “people act as a new type of sensor,” according to Anthony Stefanidis, director of the center.

“The question then is how to extract actionable knowledge from this new type of sensor,” Stefanidis said.

Stefanidis, also the director of GMU's USGIF-accredited graduate programs in geospatial intelligence, collaborates with professor Arie Croitoru and senior researcher Jacek Radzikowski, both of the GEOINT center, as well as professor Andrew Crooks of GMU's computational social science department, to harvest data from various social media sites using keywords or locations. They then parse the data using geolocation information and store it into a “social media ingestor” for analysis to contribute to many different projects.

Analysis of social media data is in the process of being integrated into the program's overall curriculum, Stefanidis said. The department anticipates introducing a graduate course in geosocial analysis by spring 2013.

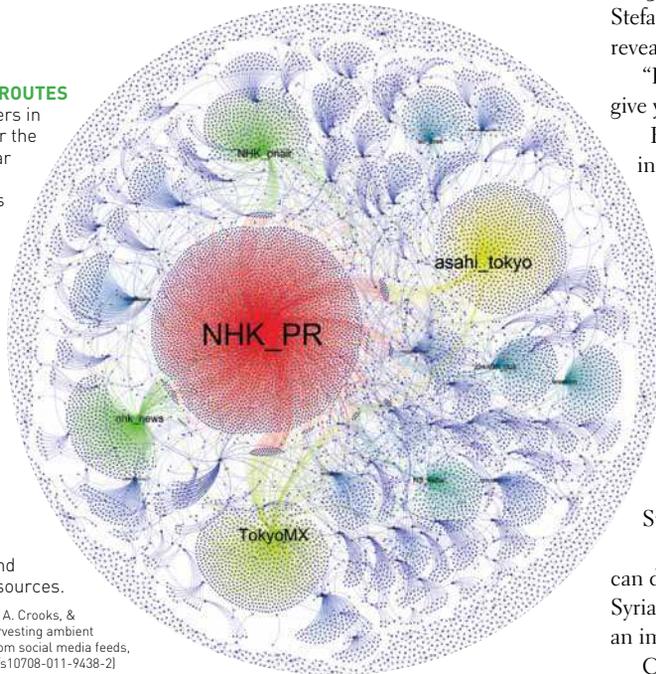
Analyzing the words and photos in social media provides first-hand understanding and knowledge directly from the field that you can't get from the news. For example, during the Occupy Wall Street protests, the team was able to analyze space and time patterns to pinpoint clusters of activity and determine which clusters were doing what. Or, as was the case with Occupy Oakland in California, they were able to identify key players in the movement and track their influence over a particular period of time. This level of analysis, the GMU team said, wasn't available five years ago.



**INFORMATION  
DISSEMINATION ROUTES**

among Twitter users in Japan shortly after the Fukushima nuclear plant malfunction (3/11/2011). Nodes are users, and lines connecting these nodes indicate active re-tweets (i.e. re-broadcasts) over a period of a few hours during that day. The major identified nodes (NHK, Asahi, TokyoMX) are news organizations. Clusters identify groups of users and their information sources.

[Reference: A. Stefanidis, A. Crooks, & J. Radzikowski (2012) Harvesting ambient geospatial information from social media feeds, GeoJournal, DOI 10.1007/s10708-011-9438-2]



This new data is significant, because it yields understanding of the human landscape and moves beyond standard terrain features. Satellite images of buildings don't say much when examining a particular event, Stefanidis said. But a keyword search for places, people, or news can reveal an understanding of connections and how spaces are shaped.

"For all of the multibillion dollar satellites in the U.S., nothing will give you all of this information," he said.

But, what is the relevance of this form of data collection for the intelligence community?

"No building came over from Afghanistan to attack us," Stefanidis said. "People came over, and you can track them, their movements and connections."

In addition to monitoring individuals, this type of analysis can help draw conclusions from current events. An example of this is the conflict in Syria. The team pulled a map of the country from Al Jazeera and started mining social media feeds for the keyword "Syria." What they found were tweets coming out of certain urban spaces in the country, and then references to Syria coming out of Western Europe.

"We try to reveal and map all of these invisible connections," Stefanidis said.

For example, the high concentration of tweets in Western Europe can demonstrate which European communities have an interest in Syria, or help answer questions such as whether the British election has an impact on Syria or vice versa.

Croitoru said the lab is constantly changing and evolving its methods, and has its system set up and ready to provide real-time, rapid assessment as soon as an event occurs. He used as an example the August 2011 earthquake in Mineral, Va.

Monitoring tweets allowed the team to generate a much quicker assessment of what was happening versus waiting for the announcement from the U.S. Geological Survey, Croitoru said. More than 15,000 earthquake-related tweets flooded Twitter within about an hour. The challenge then was to differentiate between the actual event—the people who felt the earthquake and were tweeting from the East Coast—and the cyber event generated by the response, such as that from earthquake veterans in California.

Stefanidis said analyzing tweets generated from the Washington, D.C., area is a good example of how studying social media can provide intelligence about where people work, live, and have the most access to technology.

"What D.C. looks like at 2 p.m., and what it looks like at night—it is two different cities," Stefanidis said.

Croitoru pointed to the March 2011 tsunami in Japan as an example of how this method can help analyze the way information promulgates throughout a society. Immediately following the disaster, Japanese broadcasting station Nippon Hoso Kyokai was highly successful at communicating information to the public through the use of Twitter and retweets.

"This is a new type of geography that we are pursuing," Stefanidis said. "We are looking at the non-obvious, and detecting and visualizing the invisible."

Stefanidis and Croitoru said mining social media is becoming more prevalent across many disciplines, including computer science, GIS, and social sciences. While this new approach offers many opportunities, it also holds potential future challenges such as validation and biases that will need to be addressed. But, the potential benefits from such an approach far outweigh the relevant scientific and research challenges, Stefanidis said. ■ BY KRISTIN QUINN

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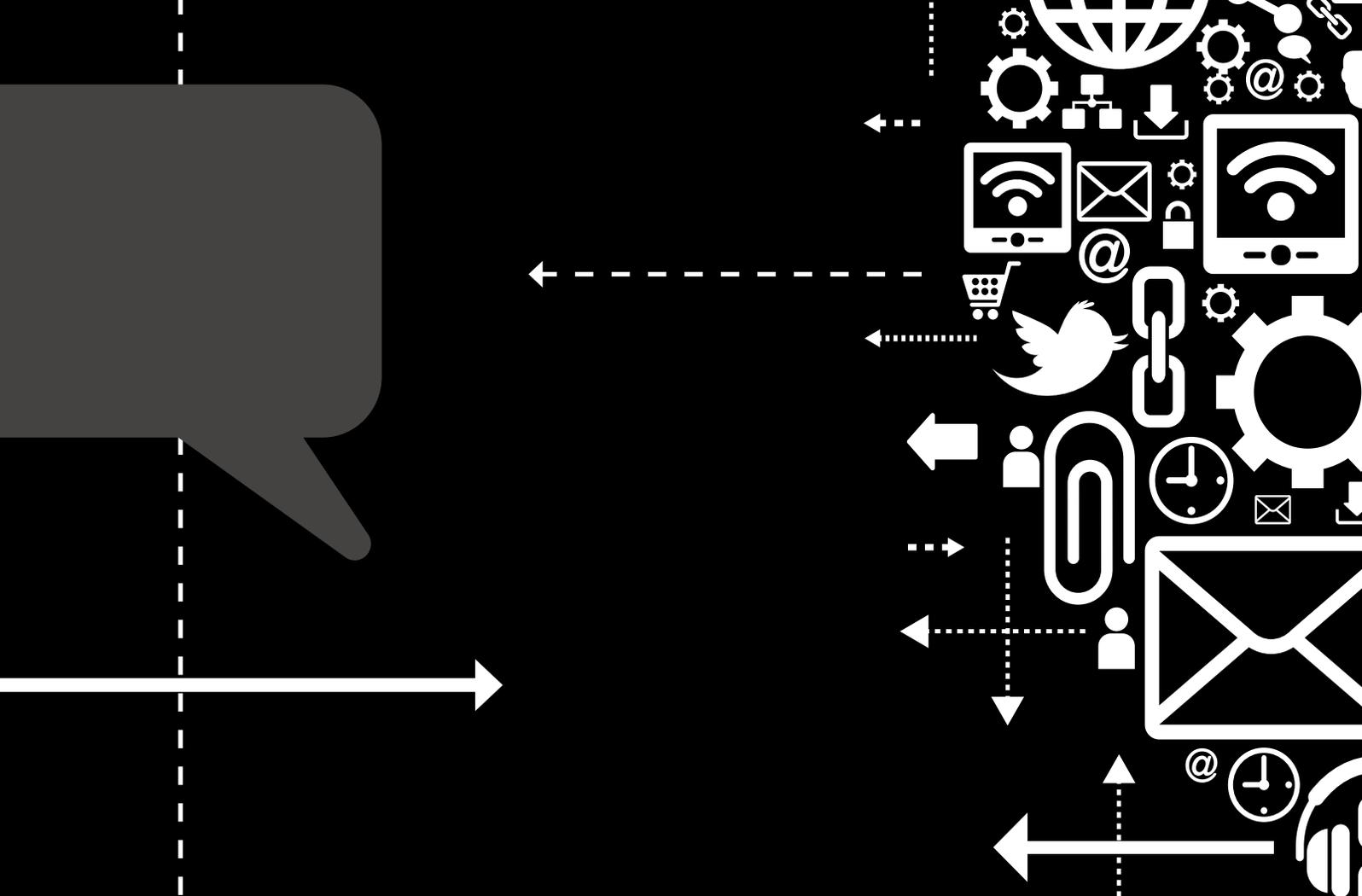
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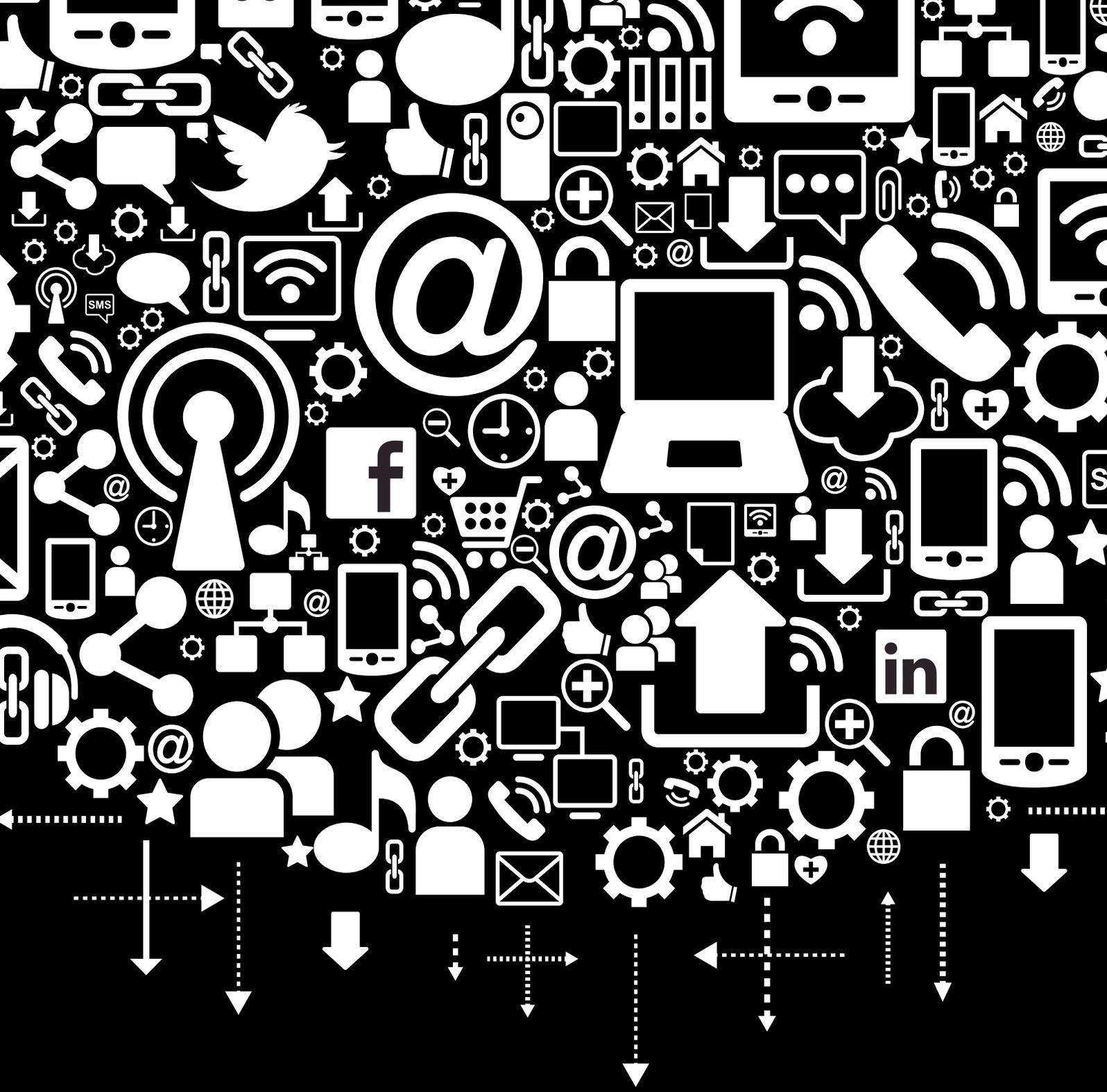
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**SOCIAL MEDIA PRESENTS NEW  
OPPORTUNITIES AND CHALLENGES FOR  
DERIVING OPEN SOURCE INTELLIGENCE**

BY JIM HODGES





# In the aftermath of Haiti's 7.0 earthquake in 2010,

Twitter, Facebook, YouTube, Flickr, and other social media earned their bona fides as data-generating vehicles in support of disaster relief.

They also showed their warts.

A year later, groups in Libya revolted against the government of Col. Moammar Gadhafi. Social media was there, guiding the United Nations humanitarian support as well as reporting—and, to some extent, fomenting—the rebellion.

Tweeting became an act of bravery when the Libyan government began to locate sources.

Social media offers data that can be good, bad, even ugly, but its impact on today's society, largely because it's driven by that society, is too great to ignore. Those seeking to harness social media to make it part of the open source intelligence (OSINT) aggregate are operating in a wildfire-like confluence of technology, political upheaval, and natural disaster.

## HISTORICAL CONTINUUM

Social media is the latest in a continuum of OSINT elements that go as far back as the earliest newspapers and speeches, and later, radio, television, and public government documents, including budgets.

The value of OSINT was seen vividly in World War II, when the Foreign Broadcast Information Service (FBIS) was created to record and analyze shortwave broadcasts aimed at the U.S. by Axis powers. The FBIS moved from the Federal Communications Commission to the CIA in 1948, and continued to collect publicly available information, adding television.

The advent of the Internet altered OSINT once again, offering databases, online news sources, and quicker access to public information, including blogs. But the Internet also complicated the already complex task of separating facts from opinion and propaganda, still a key concern among OSINT operatives. With the Internet, their mission became even more complicated, in an era bursting with possible facts to balance against one another in an effort to provide the clearest picture possible.

Add social media and the phenomenon of crowd-sourced information to that mix, and the task looms both mountainous and frenetic. Twitter's emergence in 2007 provided a significant forum for public information, albeit

**“The big guys, like CNN and MSNBC and Fox News, still exist, but they’re definitely not as fast as the sensor network of millions of people communicating by using these informal social media.”**

—Abe Usher, CTO, HumanGeo

with considerable noise. It also added an immediacy that was unprecedented by any other medium.

“The big guys, like CNN and MSNBC and Fox News, still exist, but they’re definitely not as fast as the sensor network of millions of people communicating by using these informal social media,” said Abe Usher, who leads technology development for HumanGeo.

## TAHRIR SQUARE

Egyptians use their mobile phones to record celebrations in Cairo's Tahrir Square, the epicentre of the popular revolt that drove veteran strongman Hosni Mubarak from power on Feb. 12, 2011.



Some companies, such as HumanGeo, are developing geospatial applications and tools to synthesize, manage, and exploit large data sets derived from social media.

There is an ongoing rush to keep up with advancing technology for the social media mix. Take Google Goggles for example. This technology provides geospatial information when viewing pictures and video on a smartphone.

OSINT operatives in and out of government continuously strive to keep abreast of emerging technologies as well. The FBIS became the DNI Open Source Center in 2005, and two years later established an Emerging Media Group to study and learn how to exploit social media.

The DNI Open Source Center (OSC) was harnessing social media “before it was cool,” quipped Doug Naquin, formerly director of FBIS and now the recently retired director of the OSC.

“As you can imagine, it opened up a whole new realm of possibilities,” Naquin said.

But can a medium like Twitter, which can often be fixated on trivial topics such as Justin Bieber’s latest haircut, also be taken seriously as an intelligence source? Can it add to the geospatial construct necessary to tell a story that can be acted upon?

### COMBINING RESOURCES

Following the earthquake in Haiti, volunteer groups, in particular OpenStreetMap, used a geospatial wiki to build a street map of Haiti in two weeks—a task that ordinarily would have taken a year.

As more data streamed in, new maps were created. It was a challenge to piece together the geospatial information accompanying tweets and other social media messages. Still, the maps provided relief agencies with the story of a Haitian population on the move from the devastation in Port-au-Prince, seeking help.

Disaster relief efforts in Haiti proved that the method could, and should be taken seriously, when social media messages revealed the locations of

people still alive under the rubble days after the earthquake. Videos posted online showed some of the hardest-hit neighborhoods, and those reports were confirmed when aid workers rushed in with supplies.

The combination of traditional OSINT with geo-tagged social media data provided an invaluable resource to the large conglomerate of response organizations and those watching around the world.



### OPENSTREETMAP

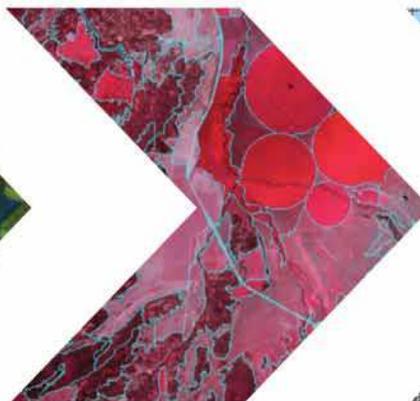
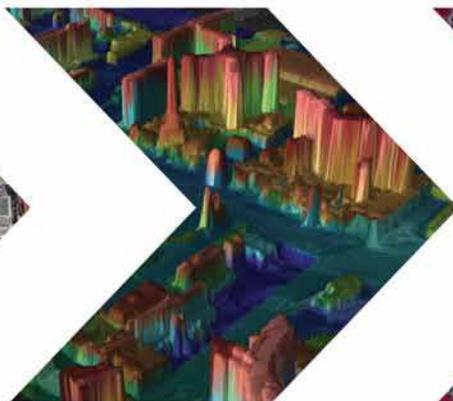
*This map shows damaged buildings and camps following the earthquake in Haiti.*

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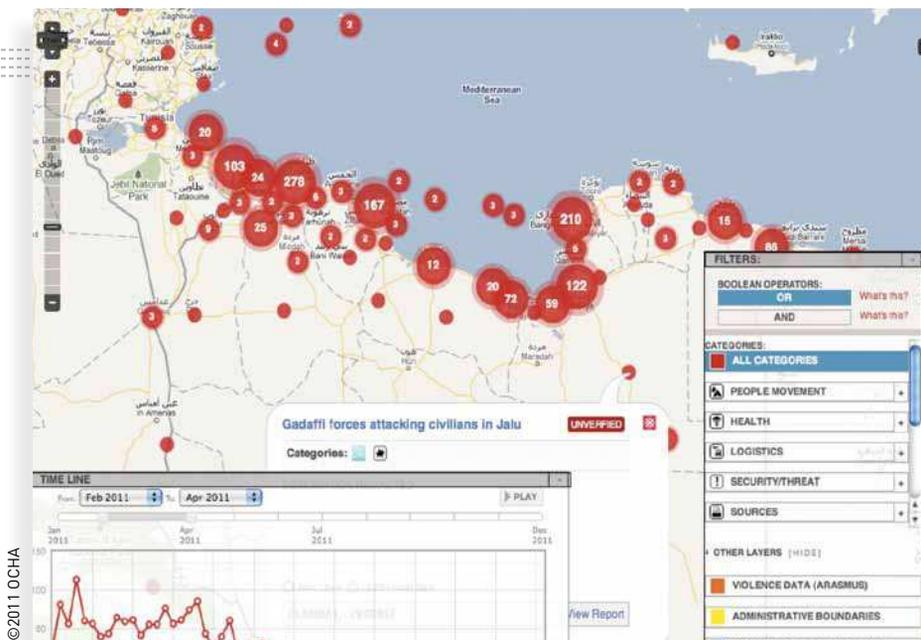
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### LIBYA CRISIS MAP

*LibyaCrisisMap.net was developed by the United Nation's Office for the Coordination of Humanitarian Affairs (OCHA) Standby Task Force to assist with the upheaval in Libya.*

### CRISIS MAPPING

In early 2008, Ushahidi was formed as a website to map reports of violence in Kenya after the post-election fallout. Today, Ushahidi is a full-blown nonprofit tech company, specializing in information collection, visualization, and interactive mapping. Its platform is among the most commonly used in public geospatial mapping, and encourages the public to contribute information to an open online resource.

Following the earthquake in Haiti, Ushahidi joined with the Fletcher School of Law and Diplomacy at Tufts University, the United Nations, and the International Network of Crisis Mappers, to gather reports from social media and other sources. It then sent the data to U.S. Southern Command, which combined the geospatially enabled information with more traditional intelligence sources to help target relief efforts. The beauty of this resource was its openness: non-governmental organizations were able to immediately access and use the information, too.

The International Network of Crisis Mappers, co-founded and co-directed by Jen Ziemke and Patrick Meier, was created in 2009, just months before the disaster in Haiti. The network meets annually to share ideas and accomplishments, and experts applauded its work with Ushahidi in Haiti.

"High-ranking [military] officers and officials from the [United Nations] Office for the Coordination of Humanitarian Affairs came to our conference in 2010," said Ziemke. "They said, 'What you did in Haiti was amazing.'"

Volunteer crisis mappers turned out some 40,000 reports of 4,000 events. But with all of this crowd-sourced, geo-tagged information, the data threatened to overwhelm what was at first an ad hoc, and very new, system.

"To be honest, Haiti was a double-edged sword," said Shadrock Roberts, a former USGIF scholarship winner who is launching the USA GeoCenter as a contractor with the U.S. Agency for International Development (USAID). Roberts gathered data in Haiti and points to the United Nations after-action report, Disaster Relief 2.0, which acknowledged the technological shortcomings in the Haiti relief effort.

"These sorts of new methods, tools and technologies received an awful lot of visibility," Roberts said. "At the same time, I don't think the utility of these tools and methods in Haiti matched the visibility. It became sort of an information circus that probably caused as many headaches as it solved."

### DEVELOPING BEST PRACTICES

In the wake of the Haiti response, GIS experts are implementing new processes during new opportunities that best utilize the vast amount of data coming out of the social and crowd-sourced media.

"We are all now trying to show fresh examples of how social media can be used," Roberts said. "There's a real interest in best practices."

Standby Task Force, an on-call volunteer group, was created after the Haiti earthquake to collect, process and analyze social media as needed, but in a more organized way than before. Meier

of the International Network of Crisis Mappers was a founder, and Ziemke is also a member.

The task force has also played a role throughout the Arab Spring, as social media reported public unrest and government atrocities that led to successful revolutions in Tunisia and Egypt, helped embolden Libyans to overthrow Gadhafi, and continues to influence events in Syria.

"Social media was a weapon for people who didn't have weapons," said Anthony Stefanidis, director of the Center for Geospatial Intelligence at George Mason University. "The government had conventional weapons, and the people had tweets. There was a cartoon in which there was a gun, and a kid said, 'Stop, or I'll tweet.' It showed that this was a very powerful weapon in the hands of people who didn't have power yet."

Early in March 2011, the United Nation's Office for the Coordination of Humanitarian Affairs (OCHA) activated the Standby Task Force to assist with the upheaval in Libya. The task force responded by developing the *LibyaCrisisMap.net* within 48 hours. As more data streamed in from social media, aerial photographs, video, and other sources, layered maps revealed an unfolding civil war and a population fleeing to get out of the way.

The crisis maps offered the United Nations a look at what was going on inside of Libya. But the same information was also available to Gadhafi's regime, and that diluted some of the data gatherers' naiveté by injecting ethical issues into the process.

After learning of the problem, OCHA ran two websites: one with data accessible only to limited and approved parties; the other open, but with no information that could endanger a source, and with a 24-hour delay on data.

"We're operating at that strange nexus between, on the one hand, philosophically and fundamentally believing in open data and openness in general—open software and open systems," said Ziemke. "On the other hand, we also operate in the real world where security trackers can track where people are tweeting, 'My brother was killed at a prison where he was tortured.' These tools can be used by people any way they want."

40,000  
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**“The government had conventional weapons, and the people had tweets. There was a cartoon in which there was a gun, and a kid said, ‘Stop, or I’ll tweet.’”**

— Anthony Stefanidis, director of the Center for Geospatial Intelligence at George Mason University

## VERIFICATION OF DATA

The use of social media for intelligence purposes is often unwieldy, and draws skepticism from those who are concerned with the verification of such information.

Those concerns begin with taking social media seriously, a never-ending challenge. For example, in early July, the Army posted Techniques Publication 2.22.9, Open Source Intelligence, establishing doctrine that “highlights the characterization of OSINT as an intelligence discipline, its interrelationship with other intelligence disciplines and its applicability to unified land operations,” according to the service’s Intelligence Center of Excellence. However, an Army source said the classified publication “does not address social media.”

Verification of social media data can be especially trying when compared to traditional OSINT resources like broadcasts, newspapers, and miscellaneous documents. Add geospatial information to this social media, like user-selected check-ins and GPS-enabled applications, and you’ve injected another variable that

can be difficult to substantiate before that data can be massaged into actual, actionable intelligence.

Verification techniques run the gamut from relying more heavily on proven OSINT contributors, to getting often-used sources to support information offered by new people, to challenging sources to provide their own corroboration, including pictures or video to support texted or tweeted claims. When the latter technique is used, often one social medium is applied to verify another.

In essence, verification involves techniques of journalism and law enforcement, but uses new tools in newer ways.

“My father was a police officer, a detective with almost 30 years of service, and these are the things he does,” Roberts said. “Journalism, anthropology, detective work. You use all of these things.”

Stefanidis is a preponderance-of-evidence advocate.

“You cannot cry wolf in social media,” he said. “If you tweet about something and other people aren’t tweeting about

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**“At the end of the day, this isn’t magic. It’s not a black box. We just need to do it...We just need to change the culture a little bit.”**

—Shadrock Roberts, senior GIS analyst at USAID

it, it’s worthless. I cannot start a revolution by myself.”

Experts estimate more than 100 companies and other organizations are working on technology to help gather, verify, sort, and analyze data in what is largely a labor-intensive field. Ushahidi is chief among them, with SwiftRiver, a platform to process and integrate large amounts of seemingly disparate data in short amounts of time. This capability is particularly valuable during the social media torrents within the first 24 hours of a disaster.

Perhaps more problematic than developing tools is herding the more than 2,000 members of the International Network for Crisis Mappers, each with ideas of how the process should work.

“There are a lot of people with questionable qualifications doing work because it’s an open field,” Naquin said. “It’s like a land rush, like Oklahoma. Everybody is trying to stake a claim before they know what they are doing.”

While organizations such as the crisis mappers and Standby Task Force work on best practices, others, such as the Woodrow Wilson International Center for Scholars, seek to develop ethical standards and policies for the use of social media in generating OSINT, especially for governmental use.

“We’re lagging behind very seriously in a policy framework for using this data,” said Roberts, who recently addressed the Wilson Center on a USAID exercise that used crowd sourcing to verify developmental data. That exercise incorporated many of the lessons learned from data gathering in Haiti, such as management, communication, practice runs, and accuracy assessment.

“It’s not that we can’t catch up with what’s happening,” Roberts said. “At the end of the day, this isn’t magic. It’s not a black box. We just need to do it. That’s the problem with all geospatial data. People should create metadata for all of their geospatial files. Generally they don’t. We just need to change the culture a little bit.”

#### **CULTURAL CHASM**

Metadata or not, historically, the military hasn’t been a strong advocate of OSINT.

“There’s a huge amount of suspicion or lack of trust in outside information,” said a civilian who asked not to be identified because he works with special operations in Afghanistan. “People often don’t trust information when it doesn’t come from their own organization. And there’s not a lot of trust by the military in organizations like the Standby Task Force, which deals in the international community.”

The irony is that the military, with its thousands of young soldiers, sailors, airmen and marines, understands social media better than most. Harnessing OSINT derived from social media for its overall intelligence package would require a cultural shift at the command level, but that could be just around the corner.

Some say the trust issue is melting away, albeit slowly. Such a step is the product of a realization that OSINT has progressed well beyond reading the *International Herald Tribune* and *Stars and Stripes*. However, the recent Army publication covering OSINT still doesn’t mention social media.

But Roberts suggested that perhaps disaster response could be the catalyst for military intelligence to realize the power of geo-enabled social media. He said that USAID is often approached by intelligence members in the military, as disaster response is a growing U.S. military mission.

“In all of those cases, those individuals have been interested in supporting disaster response, in supporting development,” Roberts said.

Still, if the military becomes more invested in OSINT derived from social media, it would be one step closer to what many see as the future of the medium: helping to forecast conditions, perhaps even conflict.

#### **FORECASTING CONDITIONS**

After the office of the United Nations Secretary General was caught off guard by the worldwide financial crisis in 2008, it asked why the UN was dealing in data sets that were five to eight years old, when there was access to real-time data that could have drawn attention to the coming crisis, according to Ziemke. This led to the development of a program called UN Global Pulse.

Global Pulse seeks to forecast crises by fishing from an ocean of social media data, rather than waiting for economic indicators to offer situational awareness.

But forecasting conflict? It’s still early in the game for that, according to some in the space.

“To do that, you really have to have a good idea beforehand of the questions you need to address,” said Naquin. “And you have to have very smart people who are familiar with statistics and data analysis to establish indicators. What I’m seeing happening is that people were kind of hoping that technology would be able to take a bunch of data and, with the use of tools, press F9 and find out where the next revolution was going to happen. I found that to be a little bit overly hopeful.”

It’s still early in what could be a long trip on a fast-moving train, but there’s a rush to get on board, tempered by some restraints that most experts believe can be resolved through imagination, creativity, and innovation.

“It’s exciting,” Usher said. “It’s moving in the direction of pro-activity pretty quickly, but at this point it’s still more of an art than a science.”

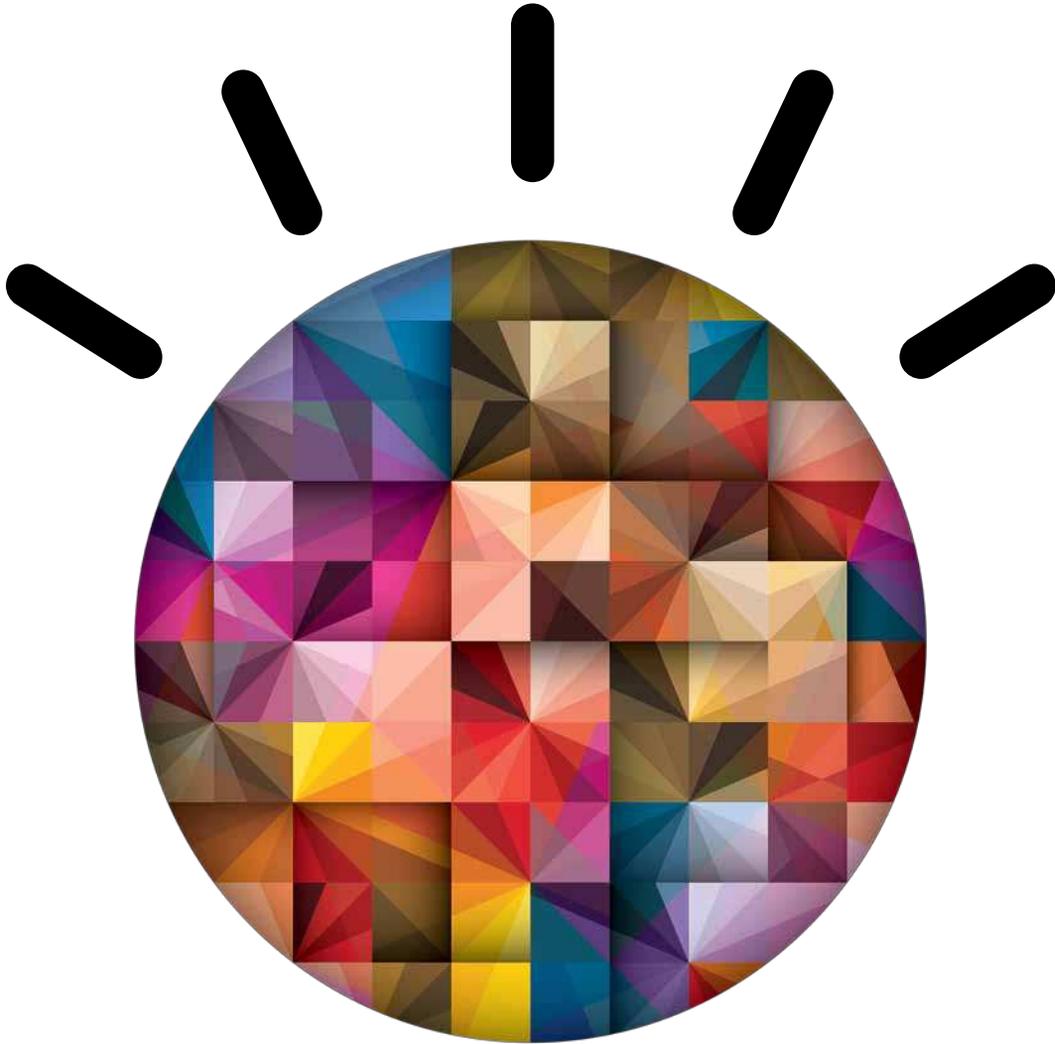
In many ways, the art was displayed in Haiti and Libya. The science will develop when time and location are routinely part of all open source data, and when geospatial applications are just as routinely the result. ■■



**EXPERTS ESTIMATE MORE THAN**

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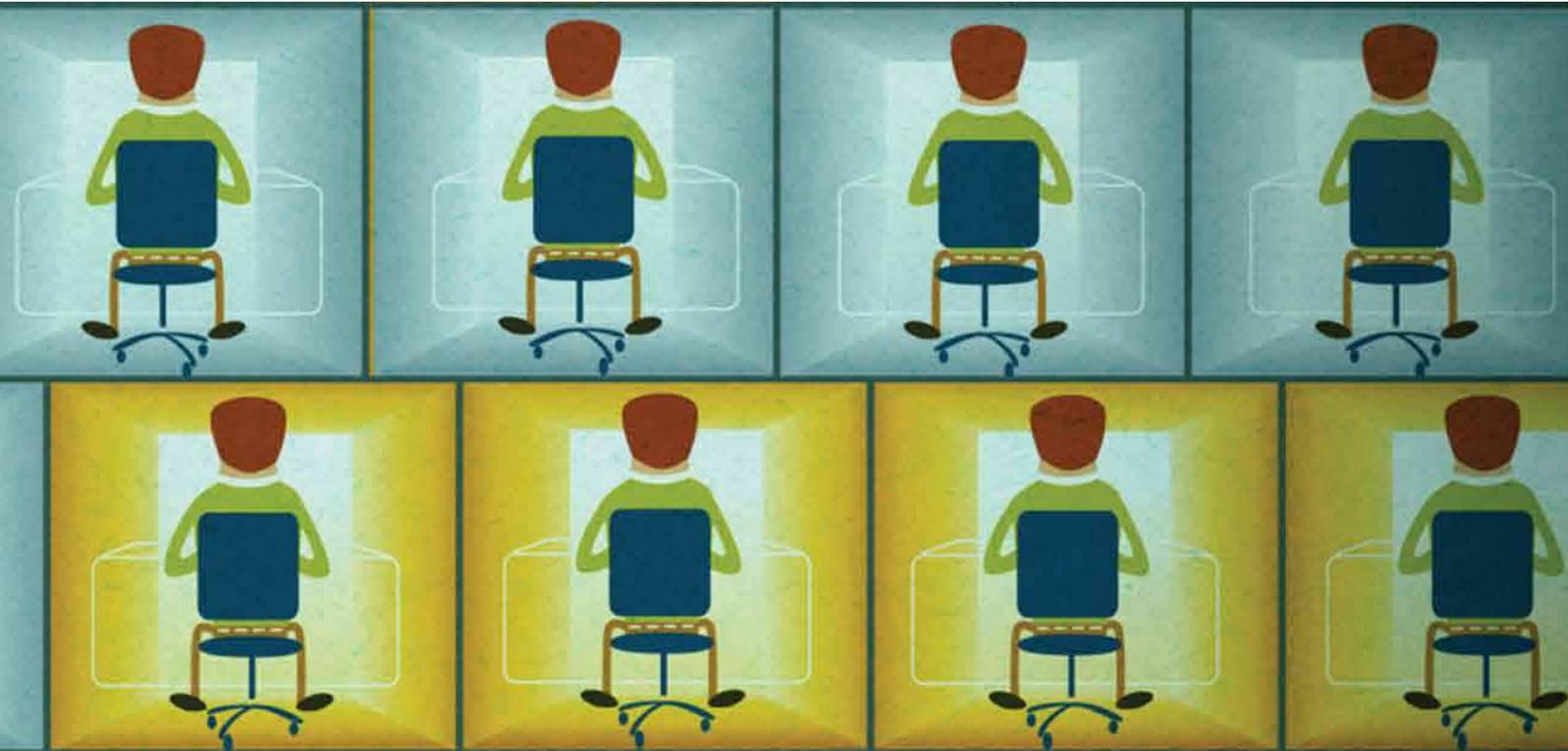
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COMMUNITY AS MUCH AS IT IS BY THE CODE]



*by Brad Causey*

# numbers



Software is the lifeblood of computer technology that makes it all possible. A smartphone is little more than a paperweight without the operating system that enables us to download and enjoy all of those wonderful apps.

As the demand for software has become universal, the natural evolution of technological progress is to standardize and commoditize basic needs, in order to provide everyone with a solid foundation (of source code) upon which to build new capabilities to solve new problems.

Open source software is the present stage of that evolutionary process.

### OPEN SOURCE SEMANTICS

In 2009, the Office of the DOD CIO released a memorandum titled, Clarifying Guidance Regarding Open Source Software (OSS), in which it defined OSS as “software for which the human-readable source code is available for use, study, reuse, modification, enhancement, and redistribution by the users of that software.” It continues, “In other words, OSS is software for which the source code is ‘open.’”

What does that mean, exactly? It means every line of code is available for anyone to read, study, learn, and ideally, to improve. The philosophy is simple: all of us are smarter than any one of us. OSS is built and developed by a community. It is an example of network-mediated peer collaboration where people all over the world can work together without the coordination of any central hierarchy.

Take Wikipedia, for example. The principle is the same—just swap encyclopedic knowledge for software code. People across the globe contribute a piece of information, based upon their area of expertise, which is then reviewed by peers. If someone disputes the veracity of that information, they may voice their concern to the community and by majority consensus the facts will aggregate until the truth eventually emerges.

When it comes to software development, OSS represents a shift away from out-and-out competition between commercial entities, to a more collaborative approach to solving common problems and then innovating on top of those shared solutions.

“It’s a cool shift that you see in society as a whole,” said Chris Holmes, chairman and founder of OpenGeo, a proprietor of open source geospatial software. “Look at social media and the way people now collaborate on the Internet.”

OSS development was the first collaborative effort to leverage the power of the Internet to do more than individuals could do alone, he explained. Because software developers were the closest to the Internet, they were easily able to communicate and work together in this way. OSS is the result of connecting the world so that people can communicate and evolve through collaboration to develop better tools and solve each other’s problems.

### WRITE AS YOU FIGHT

There are many advantages gained from using OSS. It is traditional military doctrine that the ability to maneuver and adapt more rapidly than your adversaries creates a strategic advantage.

“Open source software is important because it gives us the strategic advantage to be more agile in the delivery of IT systems,” said Dan Risacher, associate director for strategy and policy within the Office of the DOD CIO, and author of the 2009 memorandum on OSS.

With OSS, you have access to a huge library of components that you don’t have to go develop or even pay for, he said. You have to figure out how

## COMMON MISCONCEPTIONS ABOUT OPEN SOURCE SOFTWARE

**Open source software is not secure.** Security is a concern wherever software is installed, whether it’s open or closed source; the difference with open source software is the transparency of the source code. That transparency brings a level of assurance, said John Scott of RadiantBlue Technologies. “You really shouldn’t trust any software you bring through the front door,” he said. “With open source, at least you can see what’s in there.” Once that software is through the door, it will be modified and adapted for classified use. “Those changes are easier to make and more cost effective with open source software,” he said.

**Open source software is not mature.** Open source software is developed through a community of thousands, but a much smaller steering committee vets all suggested improvements. They screen, review, build, and test rigorously before anything goes into the next version. The reason open source software is so popular is because it’s really good code, said Chris Holmes of OpenGeo. Because so many people are working on it, and the social pressure of being looked upon, he explained, “You need to be damn sure that it’s going to work and work well and stand up to any criticism.”

**Open source software is free.** Yes and no—it depends how the word “free” is defined. While OSS may be free to use, it requires installation, maintenance, and service, all of which will incur some level of cost. There are many companies now that provide OSS support, as well as those that have developed customized software solutions on top of OSS platforms, or hybrid products that combine OSS and proprietary software. These products and solutions are not free, so how is OSS considered free then? By definition, open source software is free to use, distribute, and modify. The popular phrase in the open source community is, “Free like freedom of speech, not a free lunch.”

to support and integrate them, but you can adapt and build software more rapidly.

“If you really want to build technology faster, you have to have access to it, all the way down to the source code,” said John Scott, a senior systems engineer with RadiantBlue Technologies.

Our adversaries plan around our strengths now, he added. We’ve got to be able to create new strengths in the field—this is the battle of the future.

“You see it in cyberspace,” Scott continued. “Things are happening instantaneously and you have to be able to modify your source code and change things on the fly, in the fight.”

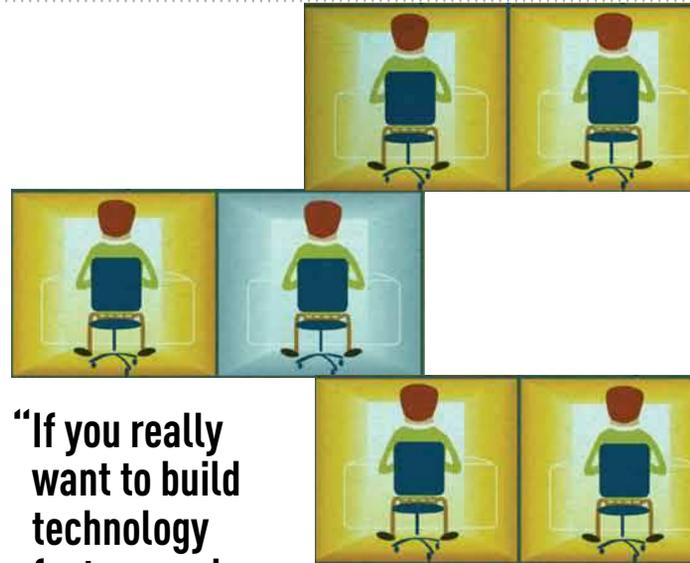
The rapid deployment of IT systems and on-the-fly software modifications for traditional warfighters and cyber-warfighters alike are very real capabilities provided by OSS that serve an ever-increasing need for speed in the battles of today and tomorrow.

### THE ACQUISITION CHALLENGE

One of the biggest challenges to quick implementation of new technology is the historically cumbersome traditional acquisition process. A significant culture change would be required to expedite this process, but there is an increasing recognition of the need for change.

“If we create policies that prevent us from effectively using open source software,” Risacher said, “potentially we are shooting ourselves in the foot, because Al-Qaeda and the Taliban and insurgents do not have such policies. They will use the tools that best meet their mission needs.”

The deeper problem, according to Scott, is that the DOD acquisition process is set up to build and acquire large chunks of expensive hardware—a tank, for example. But software is never done; it’s never complete. The hardware changes, languages change, communications change. Once a tank is built, it’s basically done, unless you upgrade it.



**“If you really want to build technology faster, you have to have access to it, all the way down to the source code.”**

—John Scott, a senior systems engineer with RadiantBlue Technologies

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## GEOINT OSS



*FalconView is a mapping application widely used by the DOD. A free and open source version of FalconView is being released under the terms of the GNU LGPL license.*



*OMAR is a web-based system used to archive, process, and distribute geospatial assets. Searching can be performed on the basis of location, time, or any combination of the stored metadata.*



*OpenGeo Suite is an open source geospatial platform for serving maps and data through web applications, mobile devices, and desktop clients. Because there are no license fees, the OpenGeo Suite is ideal for cloud and clustered deployments.*

“The mindset has to change,” Scott said. “It’s an ongoing process where you’re always going to be building new stuff, new capabilities.”

With how quickly those new capabilities are developed now, software really can go from the lab to the battlefield instantaneously, he added. The challenge is to streamline the acquisition process so that new software technology can be deployed at the rate it is developed.

### FREEDOM OF CHOICE

Another attractive advantage that OSS offers is cost savings.

“We use open source as much as we possibly can,” said Dr. Ann Carbonell, director of the Information Integration Office with the National Geospatial-Intelligence Agency. “It’s a wonderful way to reduce your total cost of ownership.”

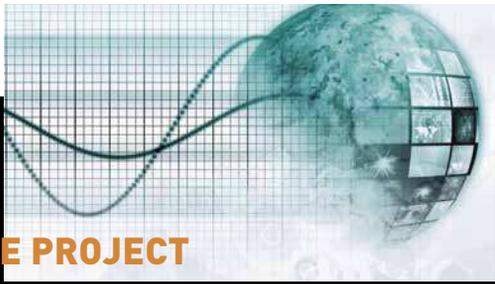
Carbonell explained that one of the challenges of selecting and securing a software contract in the past was for example trying to differentiate among five competing proprietary software vendors offering similar products.

“With OSS, you actually have a community out there that is really trying to reduce that redundancy and let you know what is unique versus common, and that takes a lot of the workload right off of our plates,” she said.

Licenses from proprietary vendors are also costly. Those applications that are no longer needed because of a viable OSS alternative allow government to divest from that ever-growing cost.

Fundamentally, OSS is the commoditization of technology so that we can invest in new problems and harder problems, not old problems, explained Scott. By lowering the barrier to use and development, things get cheaper and competition increases. Technologies that everyone uses get commoditized so costs come down, creating a virtuous cycle or feedback loop that sustains itself.

The cost is never zero though. It may be free to download, but OSS will require service and support commensurate to customer needs. The good news is that there are many companies who provide OSS service and support. Customers can choose new service providers without the need to reinvent the wheel, or rebuild any system from scratch, since



## THE ROGUE PROJECT

The Army Engineer Research and Development Center, in partnership with the Army Geospatial Center, LMN Solutions, and OpenGeo, is currently developing ROGUE—Rapid Open Geospatial User Environment. A Joint Capabilities Technology Demonstration, ROGUE is a good example of the potential for open source in the geospatial community. ERDC’s goal for the ROGUE project is to improve the humanitarian and disaster relief efforts of the DOD and SOUTHCOM through multidimensional collaboration via open source software.

Individual players on the ground—from governments, militaries, NGOs, and the community at large—will act as sensors and collectors of information, supplying the data they aggregate to the ROGUE project. In turn, everyone will have access to the unclassified geospatial information, which will prove advantageous during relief efforts when traversing unfamiliar terrain. This data is referred to as ‘volunteer geospatial information.’

ROGUE will fulfill the practical need of being able to share geospatial data with every entity involved in relief efforts, which will lead to more efficient, effective decision-making in humanitarian and disaster relief situations.

ROGUE is being constructed atop an existing portal that allows for the displaying and sharing of geospatial and hazard information. “We will be augmenting and building into it,” said Scott Clark, Director of Geospatial Programs, LMN Solutions. “We’re trying to enable the ability for providing geospatial analytic capabilities to support the needs of the people that are out in the field...and also enable the ability to collaboratively share information about the environment.”

those companies are familiar with the OSS upon which their systems and capabilities have been built.

This is a significant difference from the proprietary business model where, once a customer is locked in, they are bound to a single company for support on that proprietary software or system. The difference is freedom of choice, with negligible entry and exit costs. End users have the power and control over the software, rather than the vendor.

### A RISING TIDE

There are many proprietary software vendors that provide essential capabilities to the government and military. Hybrid systems or stacks that have OSS components bundled with proprietary software are becoming more common. One of the great advantages to using

OSS as a platform to build upon is the widespread support of a community. Maintenance is a major expense that is not always accounted for. When there is an entire community working on OSS, maintaining it, building it, and relying on it, that maintenance cost is spread across a much larger group.

Many companies and organizations have taken advantage of this collaborative approach to problem-solving. The open source community solves common problems, allowing resources to be dedicated for work on unique or more difficult ones specific to mission needs or organizational requirements.

Linus Torvalds, the father of Linux, famously said, “Given enough eyeballs, all bugs are shallow.”

Or in the words of JFK, “A rising tide raises all boats.” ■

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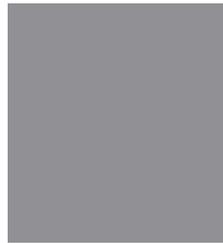
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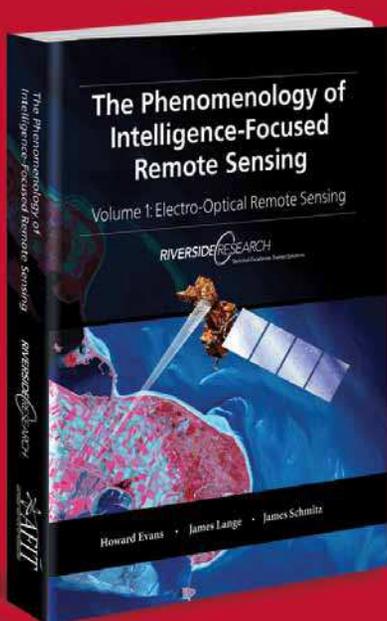
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# GEOINT 2012 SYMPOSIUM PREVIEW

# CREATING THE INNOVA

The Defense, Intelligence and Homeland Security Communities to Convene

## The annual GEOINT Symposium,

hosted by the United States Geospatial Intelligence Foundation (USGIF), is the nation's largest intelligence event of the year, bringing together the defense, intelligence, and homeland security communities all in one place.

The GEOINT 2012 Symposium, held October 8-11 at the Gaylord Palms in Orlando, Fla., promises another agenda packed with high-profile keynote speakers, insightful panel discussions, and interesting breakout sessions focused on this year's theme of "Creating the Innovation Advantage."

"Our theme is indicative of the idea that innovation has always been at the heart of what it means to be American," said Keith Masback, USGIF president. "When times have been tough, we've proved to be resilient. We've proven our ability to develop bold new approaches to our challenges. Thus, we at USGIF feel that it's time to recapture that history and spark the very same innovative spirit in our Community that indeed defines us as a nation."

The GEOINT Symposium provides attendees the unique opportunity to learn from leading experts, share best practices, and uncover the latest developments from government, military, and private-sector leaders. This mix of community leaders, combined with an ever-growing exhibit hall featuring the industry's top solutions and capabilities, brings attendees and exhibitors back year after year.

In recognition of a changing fiscal climate, this year USGIF reduced its government/military registration fee by more than 30 percent—in line with the Office of Management and Budget memo requiring agencies to reduce travel expenses by 30 percent.

The symposium also includes rich networking opportunities with immeasurable returns on investment. This year will feature the annual Allder Golf Classic, a Havana, Cuba-themed welcome reception with a nod to the 50th anniversary of the Cuban Missile Crisis, exhibit hall networking receptions, and a closing networking evening at the Gaylord for a final opportunity to connect with colleagues before returning to work.

To register for the  
**GEOINT 2012**  
Symposium, visit  
[www.geoint2012.com](http://www.geoint2012.com)

## GEOINT 2012 KEYNOTE ADDRESSES

(Confirmed as of press time)



### **General Keith B. Alexander**

Director, National Security Agency; Chief, Central Security Service and Commander, United States Cyber Command



### **The Honorable James R. Clapper Jr.**

Director of National Intelligence



### **Lieutenant General Michael Flynn**

Director, Defense Intelligence Agency



### **Letitia A. Long**

Director, National Geospatial-Intelligence Agency



### **Air Chief Marshal Sir Stuart Peach**

Commander, Joint Forces Command, U.K. Ministry of Defence



### **Rep. C.A. Dutch Ruppersberger**

MD-2nd, Ranking Member, House Permanent Select Committee on Intelligence

# TION ADVANTAGE

## for USGIF's GEOINT 2012 Symposium

### DYNAMIC BREAKOUT SESSIONS

#### TUESDAY 9 OCTOBER

##### **International Disasters: Lessons Learned from Around the Globe**

The purpose of this session is to discuss disaster response and bring together experts who have utilized geospatial systems during significant emergencies. They will share their best practices and focus on how to improve response time, deployment, and delivery of proper resources during a national disaster in order to provide the highest level of service and support to survivors.

##### **Geospatial Interoperability: The Basis for Shared Information and Investments**

What do the classified, sensitive, and public-facing geospatial communities have in common? The need to access the right data and services, at the right time, in a secure manner. This session will explore how these diverse communities are collaborating to resolve a common challenge by advancing geospatial interoperability. The vision is the Geospatial Interoperable Reference Architecture, a framework for developing new geospatial system investments and aligning existing geospatial capabilities.

#### WEDNESDAY 10 OCTOBER

##### **Activity-Based Intelligence: Delivering Contextualized GEOINT**

The ABL breakout session will explore issues associated with delivering time-critical and time-based GEOINT data for effective use and exploitation. Experts from various knowledge sectors will examine how different aspects of human existence and interactions might provide repeatable and verifiable signatures that could be integrated into an operating picture, thereby providing 'context' to the activity that originally raised the question. Senior-level experts from defense, national security, and law enforcement will discuss how one might add 'context' to activity-based intelligence.

##### **Threats in the GEOINT Industrial Security Enterprise**

The stakes are high in the battle against foreign collection efforts and espionage that target U.S. technology, intellectual property, trade secrets, and proprietary information. This discussion, led by Stan Sims, Director, Defense Security Service (DSS), will unite subject matter experts from DSS, NGA, NSA, and key GEOINT industry partners to discuss the management of risk as a function of threat, vulnerability, and consequence across the GEOINT-cleared industrial base.

#### THURSDAY 11 OCTOBER

##### **IC & DOD Professional Certification**

This breakout session focuses on the strategic rationale and broad vision for professional certification, featuring Reese Madsen, Chief Learning Officer for OUSD(I). There will also be a panel of experts present from government, industry, and academia to discuss credentialing, its international standards, and the value it will add across the GEOINT community.

##### **Interagency GEOINT Coordination**

The session will focus on established, budding, and nascent Geospatial Information Officers (GIO's), augmented by select key geospatial enterprise players within other organizations, to discuss the responsibilities surrounding their roles for coordination, assessment, and synchronization of their organizations' GEOINT policies and standardization requirements.

### YOUNG PROFESSIONALS AT GEOINT 2012

This year, USGIF will sponsor 25 young professional attendees under 35 years old who will receive free registration to the symposium and participate in a Young Professionals Program agenda. The USGIF Young Professionals Group (YPG) will also host its own YPG lounge throughout the week, featuring a Twitter heat map sponsored by Tomnod that will display live activity of tweets mentioning GEOINT 2012 exhibitors and trending topics from the show floor. Follow the YPG on Twitter @USGIFypg for special Tweet Up events and other YPG-related information.

This year's symposium will also feature a Young Innovators panel discussion on Wednesday, October 10. On the last day of the symposium, the YPG will host an outreach service project, through which students from area high schools will have the opportunity to visit and tour the show floor.

### EXHILARATING EXHIBITS

More than 250 exhibiting organizations will display the latest cutting-edge technologies in the more than 100,000 square-foot exhibit hall—sponsored by SAIC. There will be something for everyone in this year's exhibit hall. An Intelligence Community pavilion will feature agency, military, and government exhibits. A New Member Showcase will feature USGIF's newest members, and the Academic Pavilion will highlight universities, schools, and national labs.

This year the exhibit hall will include an Innovation Pavilion, renamed from what has been known as the Tech Talks Theater in previous years. The pavilion will offer technical presentations on a topic of interest related to innovative capabilities, and a focus on standards-based interoperability within the overall symposium agenda.

To see static displays of airframes from a variety of manufacturers, visit the UAV Pavilion. Or, soak up the sun while taking in our outdoor displays, featuring vehicles from first responders, military vehicles, and live satellite downlinks and demos. If you're looking to get off your feet or hold a quick business meeting, check out one of the multiple networking GEOLounges or Internet cafes.

## AGENDA AT A GLANCE (SUBJECT TO CHANGE)

### MONDAY 8 OCTOBER

- 0600-1400** Alder Golf Classic, Grand Cypress Golf Club
- GEOINT Foreword: Pre-Symposium S&T Sessions**
- 0800-0845** Keynote – Mr. Ted Cope, National Geospatial-Intelligence Agency
- 0900-1230** **Breakout Session 1** – Open Source Software  
**Breakout Session 2** – Human Geography
- 1230-1400** Lunch and Keynote – Mr. Jeff Jonas, Chief Scientist, IBM Entity Analytics group
- 1400-1530** **Breakout Session 1** – Gaming Technologies  
**Breakout Session 2** – Arab Spring Lessons Learned
- 1600-1700** S&T Lightning Talks
- 1900-2100** GEOINT 2012 Havana Nights Opening Reception: Remembering the Cuban Missile Crisis

### TUESDAY 9 OCTOBER

- 0800-0900** Welcome and Opening Ceremonies
- 0900-0945** Keynote – The Honorable James R. Clapper Jr., Director of National Intelligence
- 0945-1030** Panel – Defense, Intelligence and Homeland Security Information Innovation
- 1030-1100** Networking Break
- 1100-1145** Keynote – Rep. C.A. Dutch Ruppersberger, MD-2nd, Ranking Member, House Permanent Select Committee on Intelligence
- 1100-1800** Exhibit Hall Open
- 1145-1230** Keynote – Ms. Letitia A. Long, Director, National Geospatial-Intelligence Agency
- 1245-1430** Lunch and Exhibit Hall
- 1430-1600** **Breakout Session 1** – International Disasters: Lessons Learned from Around the Globe  
**Breakout Session 2** – Geospatial Interoperability: The Basis for Shared Information and Investments
- 1600-1800** Exhibit Hall Networking Reception

### WEDNESDAY 10 OCTOBER

- 0800-0815** USGIF Awards Program Presentations
- 0830-0915** Keynote – Air Chief Marshal Sir Stuart Peach, Commander, Joint Forces Command, U.K. Ministry of Defence
- 0915-1015** Panel – The Converged Future of Geospatial Intelligence: Young Innovators
- 1015-1100** Keynote – Lieutenant General Michael Flynn, Director, Defense Intelligence Agency
- 1100-1800** Exhibit Hall Open
- 1145-1430** Lunch and Exhibit Hall
- 1430-1600** **Breakout Session 1** – Activity-Based Intelligence: Delivering Contextualized GEOINT  
**Breakout Session 2** – Threats in the GEOINT Industrial Security Enterprise
- 1600-1800** Exhibit Hall Networking Reception

### THURSDAY 11 OCTOBER

- 0815-0900** Keynote – The Honorable Michael Vickers, Undersecretary of Defense for Intelligence (invited)
- 0900-0930** USGIF Arthur C. Lundahl Lifetime Achievement Award Presentation
- 0930-1030** Panel – Service Intelligence Chiefs
- 1030-1100** Networking Break
- 1100-1145** Keynote – General Keith B. Alexander, U.S. Army, Director, National Security Agency; Chief, Central Security Service and Commander, United States Cyber Command
- 1100-1500** Exhibit Hall Open
- 1245-1430** Lunch and Exhibit Hall
- 1430-1600** **Breakout Session 1** – Interagency GEOINT Coordination  
**Breakout Session 2** – IC and DOD Professional Certification
- 1900-2200** GEOINT 2012 Sunshine State Closing Celebration

### FRIDAY 12 OCTOBER

- 0800-1600** Special classified session, by invitation, with keynote address by – Betty J. Sapp, Director, National Reconnaissance Office

## EXHIBITORS (AS OF PRESS TIME)

2d3 Sensing  
Accenture Federal Services  
Adobe Government at Carahsoft  
Advanced Technical Intelligence Center (ATIC)  
AEgis Technologies  
Agilex  
AirWatch  
Akamai Technologies Inc.  
American Military University  
Analytical Graphics Inc.  
Annapolis Micro Systems Inc.  
Applanix  
Apple  
Applied Imagery  
Aptima, Inc.  
Army GEOINT Battalion  
Astrium GEO-Information Services  
ATK  
BAE Systems  
Ball Aerospace & Technologies Corp.  
Belkin  
Berico Technologies  
Bloomberg Government Entity Solutions  
Blue Canopy  
Blue Coat Systems, Inc.  
Blue Marble Geographics  
BlueSpace  
The Boeing Co.  
Booz Allen Hamilton  
BOSH Global Services  
Brocade  
C4ISR Journal & Defense News  
CA Technologies  
CACI  
CALNET  
Carahsoft Innovative & Intelligence Solutions  
Carahsoft Open Source Solutions  
CARDIO  
Catapult Consultants  
CDW-G  
Center for Geospatial Information Technology, Virginia Tech  
Center for Geospatial Intelligence – University of Missouri  
Center for Technical Intelligence Studies and Research  
Chiliad  
Cisco Systems Inc. Civil Applications Committee  
Clearshark  
ClearTerra  
CommVault  
CompassData Inc.  
COMPUSULT  
Convey Computer Corp.  
Courage Services Inc.  
Cubic Cyber Solutions  
CyberMaryland  
Data Tactics Corp.  
DataDirect Networks  
DCGS-A TGS  
Defense Intelligence Agency (DIA)  
Defense Systems (1105 Government Information Group)  
Dell Inc.  
Dewberry  
DigitalGlobe  
DLT Solutions  
Dynamic Aviation  
East View  
e-GEOS  
Eizo  
EMC Isilon  
Endgame Systems  
Ergo  
Esri  
Eternix Ltd.  
Evertz  
exactEarth Ltd.  
F5 Networks  
FireEye Inc.  
Freedom Consulting Group  
Front Porch Digital  
Fugro  
Fulcrum IT Services  
Fusion-io  
GCS Research  
General Atomics Aeronautical Systems  
General Dynamics  
Geo Tactical Solutions  
Geodigital International  
GeoEye  
George Mason University  
Geospatial Intelligence Forum  
Geospatial Media and Communications  
Gigamon  
GISCafé.com  
Global Marketing Insights Inc. (GMI)  
Goodrich ISR Systems  
Google  
Haivision Network Video  
Harris Corp.  
Headwall Photonics  
The HumanGeo Group  
i3 ICS  
IBM  
IHS  
Image Matters LLC  
iMove Inc.  
Infoblox  
Informatica  
Intelligent Software Solutions  
Intergraph Government Solutions  
Invertix  
Iron Bow Technologies  
ITT Exelis  
Janya  
Juniper Networks  
KEYW  
Kitware  
L-3  
Layer 7  
LexisNexis OSINT  
LGS Innovations  
Link Information Systems Co. Ltd.  
LizardTech  
Lockheed Martin  
Los Alamos National Laboratory (LANL)  
MacAulay-Brown  
MarkLogic Corp.  
MaxVision LLC  
McAfee  
MDA  
Merrick and Company  
MicroLink, an HP Autonomy Co.  
Microsoft  
National Geospatial-Intelligence Agency (NGA)  
National Reconnaissance Office (NRO)  
Naval Postgraduate School, Remote Sensing Center  
NetApp  
NetScout Systems  
NJVC  
Nokia Location & Commerce (Formerly NAVTEQ)  
Northrop Grumman Corp.  
Novetta Solutions  
NuWave Solutions  
NW Systems Inc.  
Oak Ridge National Laboratory, GIST  
Observera Inc.  
Obsidian Strategics  
Océ North America  
Oceus Networks  
Octo Consulting Group Inc.  
OpenGEO  
Optech Inc.  
Oracle America Inc.  
Orbit Logic  
Overwatch  
Palantir Technologies  
Palo Alto Networks  
PAR Government Systems Corp. (PGSC)  
PASCO CORP.  
PCI Geomatics USA  
Penn State World Campus  
PIXIA Corp.  
Progressive Technology Federal Systems  
PV Labs  
Qbase  
Quantum  
R & K Solutions  
RadiantBlue Technologies  
RapidEye USA  
Raytheon Co.  
Recorded Future  
Red Hat Inc.  
Red Hen Systems Inc.  
RGS  
Riegl USA  
Riverside Research  
SAAB RAPID 3D MAPPING  
Safe Software  
Sandia National Laboratories  
SAP National Security Services (SAP NS2)  
SAS  
SceneSharp Technologies  
Science Applications International Corp. (SAIC)  
Semantic Research  
ServiceNow  
SGI  
The SI Organization  
Sierra Nevada Corp.  
Simulyze Inc.  
Skyline Software Systems Inc.  
SolarWinds  
Solers Inc.  
Solid Terrain Modeling Inc.  
Sotera Defense Solutions Inc.  
Space Dynamics Laboratory  
Spatial Networks Inc.  
Spectra Logic  
Splunk  
SRA International Inc.  
SRI International Sarnoff  
Surrey Satellite Technology US LLC  
Symantec  
TASC  
Technical Innovation Technology Management Associates  
TELLABS  
TeraLogics LLC  
TerraGo Technologies  
Texas Memory Systems  
Thermopylae Sciences + Technology  
Thetus  
thinklogical  
Third Dimension Technologies  
TIBCO Spotfire  
TomTom  
Topsy Labs  
TouchTable Inc.  
TransVoyant (formerly ObjectFX)  
Tresys Technology  
Trimble  
TVAR Solutions LLC  
U.S. Army Geospatial Center  
United Launch Alliance  
United States Geospatial Intelligence Foundation (USGIF)  
University of Denver  
University of Redlands – MS GIS Program  
USAA  
USAF Eagle Vision  
Verizon  
VideoBank  
ViON Corporation  
VMware Inc.  
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Washington College  
WESTPORT  
WISER  
Woolpert  
World Wide Technology  
Young Professionals Networking Lounge  
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# INNOVATING CULTURE

## HOW LOCKHEED MARTIN IS OVERHAULING ITS GEOINT BUSINESS

Lockheed Martin's Sharon Watts believes strongly in what she calls "the innovation shout-out."

"You don't just innovate on Tuesdays," Watts said. "Innovation just happens. You need to be in an environment where you can go run and tell somebody your idea."

This is exactly the type of culture Watts is striving to promote in her new role as vice president of Lockheed's GeoVision line of

business. GeoVision was created this year as part of an overall effort to re-organize and re-name Lockheed's Spatial Solutions line of business, in order to better reflect changing customer needs for more agile, affordable, and mobile technologies, according to Watts.

"We had been developing large scale products for the government," she said. "It was time that we took those large scale software development products and broke them

down to provide more innovative, mobile solutions to our customers."

Watts, who has been with Lockheed for more than 22 years, said the decision to transform the business unit reflects the ways in which the GEOINT Community has transformed over the past decade. She drew inspiration not only from the National Geospatial-Intelligence Agency (NGA) when determining how to restructure the business,



but she also looked at the goals of all of NGA's mission partners. She found agility, mobility, and the ability to get the data quickly to end users tasked with making decisions to be among the top priorities. GeoVision is in the process of aligning to meet these needs.

"The culture is the hardest and the most important thing to change," Watts said.

In addition to promoting an environment that supports the kind of collaboration and creative thinking that yields "innovation shout-outs," GeoVision is altering culture through initiatives such as town hall meetings, brown bag lunches, and voice of the employee 1-to-1 sessions. Watts said leadership also plays a key role in helping people feel like they can open up with their thoughts and ideas—an effort she and her peers are focused heavily on.

Changing the role of technology in the customer workplace is essential as well.

"At home, we get everything we want quickly," Watts said. "It's mobile, on-demand, speed, relevancy, and we want that at work. It's more of a challenge to get it at work, but it's critically important that we do that, and create an environment that also gets that technology to the end user."



**"It's amazing how quickly small business can turn around these innovative ideas and solutions that large companies frankly just can't."**

— Sharon Watts, vice president of GeoVision at Lockheed Martin

Watts said she believes working with small businesses is an essential element in achieving these goals.

"It's amazing how quickly small business can turn around these innovative ideas and solutions that large companies frankly just can't," she said. "We both provide an amazing service and we've got to make sure that we partner and bring the best to bear as teams."

Lockheed also engages in mentorship with small businesses in its global supply chain, by helping small companies better understand how to work with the government, win business, and grow.

In addition to partnering with small businesses, Watts is passionate about collaborating with other large defense contractors through working groups to bring better solutions and savings to the government.

"We get up every day because we believe in their mission, values, and vision," Watts said. "Together, we've got the depth and breadth that can provide

the government better ways of doing business."

Watts said Lockheed's membership in USGIF as a strategic partner has helped GeoVision reinvent itself through sharing knowledge and experiences. But most important, she said, is the network.

"That network is so critical that USGIF helps create," Watts said. "It's the most important thing because that helps you reach out to your industry partners."

GeoVision is about halfway through this evolutionary process of determining how to take the infrastructure it already has in place for customers, and break it down to become more portable and agile, according to Watts.

"A year from now, I'd like to be where all of that naturally comes to us, and the culture has completely caught on," she said. "I'm not foolish enough to think that culture turns overnight—that's what technology does."

■ BY KRISTIN QUINN



#### MEMBERSHIP INFO

For more information about USGIF membership, contact [membership@usgif.org](mailto:membership@usgif.org).



PHOTOS COURTESY OF KATIE CAMPANELLI

## FORWARD THINKING

Meet the new USGIF board member and co-chair of USGIF's Young Professionals Group

**WHEN MIKE CAMPANELLI ATTENDED** his first USGIF function, a speed networking event last summer, at the suggestion of a colleague, he won free admission to the GEOINT 2011 Symposium. Ever since, Campanelli, a senior systems engineer with RadiantBlue Technologies, has become increasingly more involved with USGIF, in particular the Young Professionals Group (YPG), which brings together GEOINT professionals under the age of 35 or with 5 or fewer years' experience in the Community.

Most recently, Campanelli, 31, was elected to one of two YPG-designated positions on the USGIF Board of Directors. Campanelli said his dedication to USGIF and the YPG stems from his strong alignment with the foundation's mission and goals, and he considers the board position to be an incredible opportunity.

"I think it's a testament to the foresight of the board to want to have the voices and opinions of the young professionals on it," Campanelli said. "I think it says a lot about their knowledge of the community."

Campanelli, originally from Rahway, N.J., began his career as a double major in aerospace and mechanical engineering at West Virginia University. While most students in these disciplines pursue jobs designing rockets, missiles, and airplanes, Campanelli said he graduated just as jobs with airlines were becoming scarcer. He interviewed for and accepted a position he didn't know much about, but that "sounded pretty cool," with Lockheed Martin, and was assigned to work in operations and mission planning at ADF-East.

"It was very dynamic, it was changing, it was challenging," Campanelli said. "I quickly realized that even though I wasn't designing rockets and airplanes,

my degree was very applicable, and that got me hooked. I didn't want to transfer and go do what I thought I was 'supposed' to be doing with a degree in aerospace engineering."

He credits his experience in mission planning for setting up the rest of his career thus far. After a couple years at ADF-East, Campanelli went to work for The SI Organization, which was then still part of Lockheed Martin, supporting the National Reconnaissance Office.

There, he worked exclusively in moving target intelligence (MTI), which is the study of analyzing imagery, radar, and video to derive intelligence from things that may or may not be moving.

Today, he works at RadiantBlue, a software company, but Campanelli doesn't write code. He bridges the gap between customers and developers of MTI software, or, he jokes, "between layman and geek."

USGIF HAS

SEATS DESIGNATED FOR YOUNG PROFESSIONALS ON ITS BOARD OF DIRECTORS

"I transform the needs and wants of the folks using our software into requirements that the developers can understand," he said.

When it comes to mentorship, Campanelli said he has gathered an "amalgamation" of knowledge from various mentors.

"It's important to know who to listen to, who to know, and who not to listen to," he offered as advice to other young professionals.

Campanelli is also in the process of completing post-graduate work in geospatial intelligence through Penn State University, to complement the M.S. in systems engineering he received from George Washington University while working at Lockheed. In his free time, Campanelli enjoys learning about photography with his wife, Katie, golfing, custom woodworking, and improvement projects at his home in Herndon, Va.

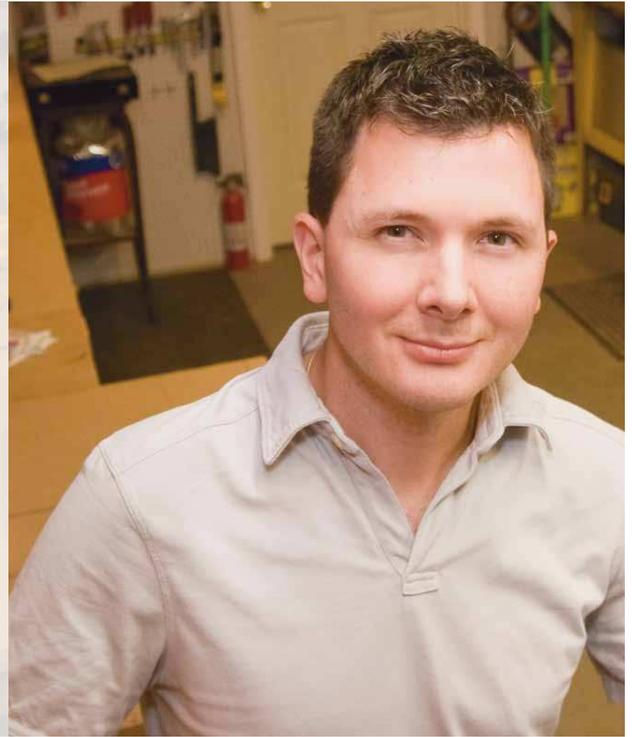
After two years with RadiantBlue, a seven-year-old company, Campanelli said he is enjoying working for a smaller company and is inspired by its entrepreneurial spirit.

"What's exciting to me is staying on for the foreseeable future, for as long as they'll have me, and seeing where this crazy ride takes us," he said. "It's fun to be part of something that you really feel that you own a part of."

■ BY KRISTIN QUINN

To learn more about the YPG, contact Carrie Drake at [carrie.drake@usgif.org](mailto:carrie.drake@usgif.org).

"It was very dynamic, it was changing, it was challenging. I quickly realized that even though I wasn't designing rockets and airplanes, my degree was very applicable, and that got me hooked."



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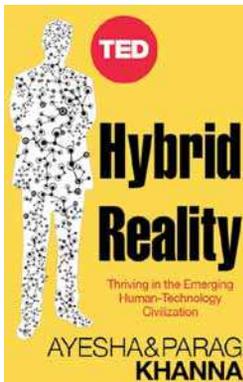
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READING LIST



**THE TECHNOLOGY QUOTIENT**

Futurist Parag Khanna spoke with *trajectory* about the new book he co-authored with his wife Ayesha, titled, *Hybrid Reality: Thriving in the Emerging Human Technology Civilization*.

The new e-book is published by TED, a nonprofit dedicated to sharing ideas related to technology, entertainment, and design.

“Since it’s a book about futurism, it seemed odd not to publish as an e-book,” Khanna said.

A self-described futurist and geo-strategist, Khanna is fascinated by the relationship between power and place. The book examines

shifting political geography in the decades ahead, particularly related to natural resource development, population size, manufacturing, and robotics.

*Hybrid Reality* outlines the importance of taking a geo-technological approach to understanding global change. While Parag Khanna’s area of focus is more on geography, Ayesha Khanna’s concentration is in technology. They posit that this intersection of disciplines represents the need to focus on developing one’s “technology quotient,” or “TQ,” as opposed to the historically coveted high IQ.

“TQ is shorthand for assessing one’s adaptability and preparedness for emerging technologies and integrating them into your skill set, professional life, etc.,” Khanna said.

Khanna also predicts that as more importance is placed on TQ, geo-political power will shift from governments toward more non-state actors.

“Even sovereignty is going to be gradually less significant than authority, and authority will derive increasingly from TQ,” he said.

**KHANNA ALSO PREDICTS THAT AS MORE IMPORTANCE IS PLACED ON TQ, GEO-POLITICAL POWER WILL SHIFT FROM GOVERNMENTS TOWARD MORE NON-STATE ACTORS.**



USGIF EVENTS CALENDAR

**SEPTEMBER**

10

Young Professional’s Group Networking Event  
Denver, Colo.

11-12

USGIF & ATIA Technical Workshop  
Denver, Colo.

11

GEOINteraction Tuesday  
Denver, Colo.

**OCTOBER**

8-11

GEOINT 2012 Symposium  
Gaylord Palms, Orlando, Fla.

**NOVEMBER**

13

GEOINteraction Tuesday  
Maggiano’s, Tysons Corner, Va.

*For the latest event listings visit [www.usgif.org/events](http://www.usgif.org/events)*

**PEER INTEL**

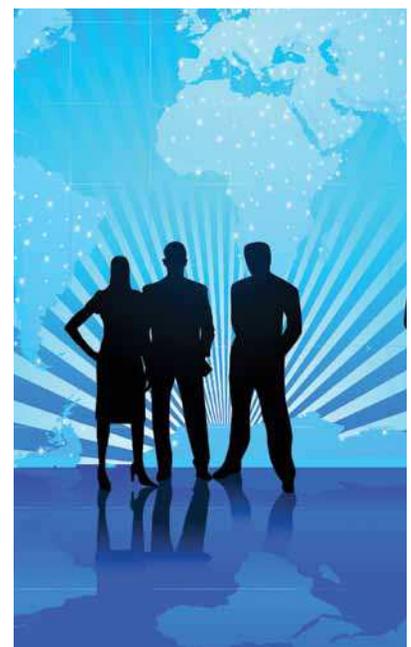
CAE appointed **Gene Colabatistto** as its new group president, military simulation products, training, and services. Colabatistto will be replacing **Martin Gagne** who, after 16 years of service with CAE, has decided to retire. Gagne has agreed to stay on as a consultant in order to ensure a smooth transition and support a number of key strategic initiatives.

L-3 Communications Corp. announced that **Steve Kantor**, senior vice president and president of L-3 Services Group, which includes its national security solutions business, has been appointed president of the company’s Electronic Systems Group. Kantor will succeed **James Dunn**, who will retire in December. In addition, Les Rose, currently president of L-3’s STRATIS division, has been named L-3 vice president and president of the company’s National Security Solutions Group.

Lockheed Martin announced that chairman and CEO **Bob Stevens** will retire as CEO effective Jan. 1, 2013. COO **Chris Kubasik** will take his place. Stevens has been with Lockheed for 25 years, and will remain as chairman through January 2014.

General Dynamics chairman and CEO **Jay Johnson** will retire Dec. 31. Current COO **Phebe Novakovic** will succeed him. Novakovic joined General Dynamics in 2001 following a long career with the DOD.

CACI has announced that president and CEO **Paul Cofoni** will retire Dec. 1, to be succeeded by **Daniel Allen**, the company’s current president of U.S. operations.





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# Aperture



PHOTO COURTESY OF EXPEDITION 29 CREW/ISS CREW EARTH OBSERVATIONS

## Earth Illuminated

This image represents one of hundreds used to compile NASA's latest time-lapse photography video: "Earth Illuminated." Photographs taken from the International Space Station (ISS) provide stunning views of the Earth, rivaling those imagined by historical astronomer Galileo, including city lights, aurora, lightning, comets, and other sights. Since last August, scientists in Crew Earth Observations at NASA's Johnson Space Center in Houston have been piecing together images taken from the ISS to create time-lapse videos—and a whole new vantage point through which to view the planet. Crew Earth Observations monitors about 300 sites around the world, and directs astronauts on board the ISS to take photos of those sites as the station passes by at more than 17,000 miles per hour. Each crew aboard the ISS takes tens of thousands of photos during their time in orbit, 500 of which are used, on average, to create each time-lapse video.

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