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2014 ISSUE 1

trajectory

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THE DEFINING DECADE OF GEOINT

GEOINT

TRADECRAFT

COMMUNITY

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INNOVATION

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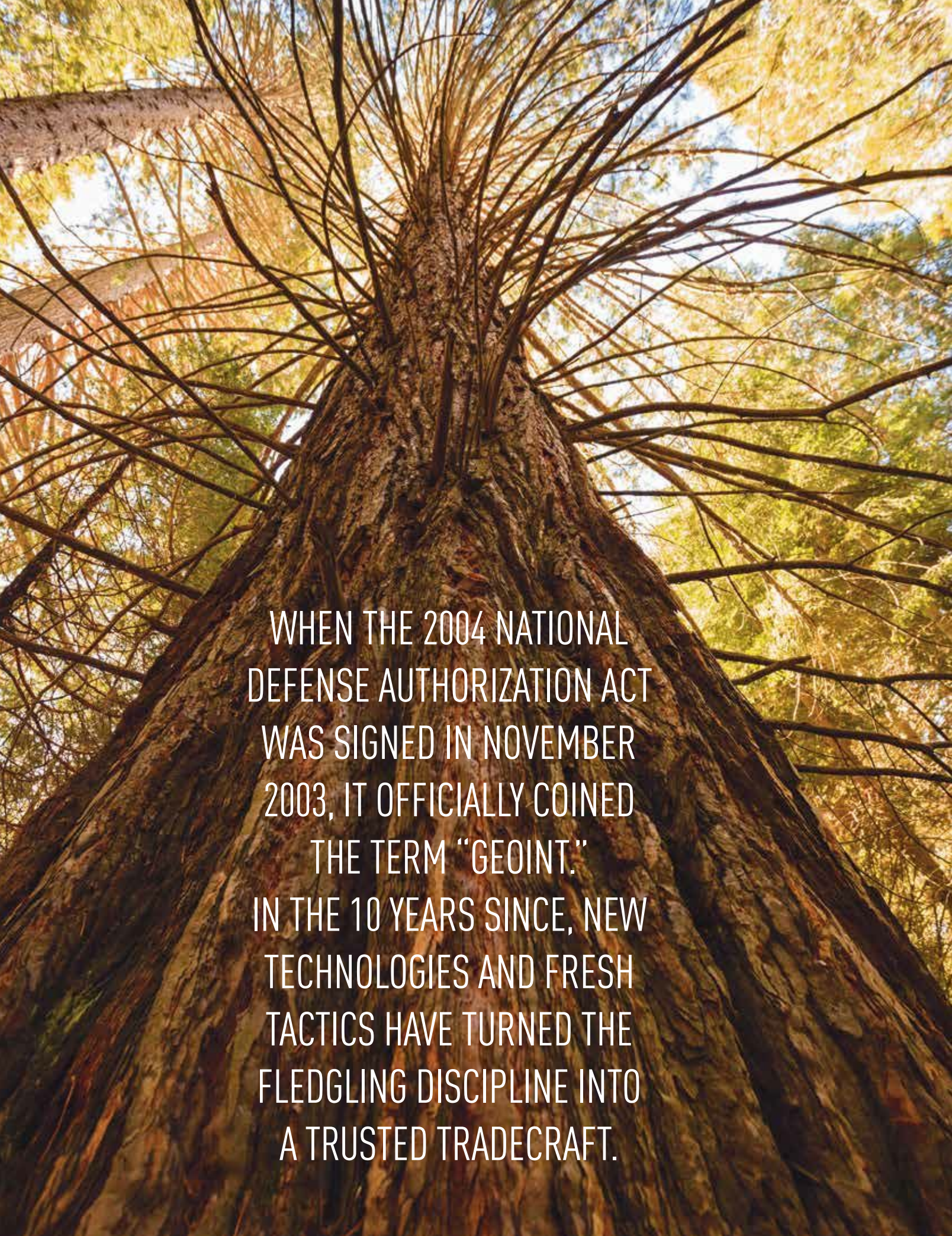
IMAGERY

INTELLIGENCE

MAPPING

CARTOGRAPHY

USGIF homeland security defense Intelligence Community
 The GEOINT Symposium ABI integration collaboration
 standards Hurricane Katrina Abbottabad predictive analytics
 commercial imagery UAVs Multi-INT ISR persistence
 9/11 Commission ODNI NGA NRO NSA CIA DIA NPIC
 NIMA variability COMCOMs precision engagement Operation
 Enduring Freedom human geography MASINT GEOCELL LBS
 GPS disaster response humanitarian relief accreditation
 NSG certification training education culture EnhancedView
 WorldView LiDAR SAR airborne ISR augmented reality PED
 Big Data cybersecurity crowdsourcing OSINT social media
 geo-location people ASG geospatial intelligence DMA



WHEN THE 2004 NATIONAL
DEFENSE AUTHORIZATION ACT
WAS SIGNED IN NOVEMBER
2003, IT OFFICIALLY COINED
THE TERM "GEOINT."
IN THE 10 YEARS SINCE, NEW
TECHNOLOGIES AND FRESH
TACTICS HAVE TURNED THE
FLEDGLING DISCIPLINE INTO
A TRUSTED TRADECRAFT.

THE DEFINING DECADE *of* GEONIT

BY MATT ALDERTON

The world's tallest living tree is 379.3 feet tall, 74 feet taller than the Statue of Liberty. The location of this impressive, 700-year-old redwood—named after the Titan god of light, Hyperion—is top-secret. Were you to locate and stand beside Hyperion, however, you'd almost certainly feel dwarfed by its towering trunk. In that moment, neck craned skyward, it would be easy to forget that even the tallest timbers were once saplings.

“Developing and organizing a critical mass of geospatial and imagery professionals so they worked effectively under the same agency umbrella was a major achievement that took years and years to accomplish.”

— Letitia Long, Director, National Geospatial-Intelligence Agency

kick-started the creation of the GEOINT Community,” said NGA Director Letitia Long, a former naval engineer who at that time had just joined the Defense Intelligence Agency (DIA) as deputy director for information systems and services.

“Developing and organizing a critical mass of geospatial and imagery professionals so they worked effectively under the same agency umbrella was a major achievement that took years and years to accomplish.”

Although it didn’t yet have a name, GEOINT had been born.

TWO DISCIPLINES, ONE FUTURE

When NIMA was established on Oct. 1, 1996, it combined DMA and NPIC, DoD’s Central Imagery Office and Defense Dissemination Program Office, and parts of several other federal agencies. It seemed a logical fusion. Logical, however, didn’t mean easy.

“Having the mapping and imagery intelligence people working together was kind of a cultural revolution,” said Don Vance, director of geospatial intelligence programs within Boeing’s Intelligence Systems Group. “There were some rough spots on that road.”

Resentment and turf wars between mapping and imagery experts fueled opponents of the integration, who rallied around the idea of a “NIMA Commission” to review the new agency and, by exposing its dysfunctions, disband it. At the request of Congress, the commission formed in late 1999. The findings it published that December confirmed reports of infighting, but also doubled down on NIMA’s vision.

“The Commission concludes that ... the promise of converging mapping with imagery exploitation into a unified

geospatial information service is yet to be realized, and NIMA continues to experience ‘legacy’ problems,” read the report. “Notwithstanding, the Commission believes that timely development of a robust geospatial information system is critical to achieving national security objectives in the 21st century.”

NIMA didn’t need to be disbanded, the Commission concluded. It needed to be rebooted.

“The NIMA Commission report ... made a very articulate, eloquent case for what came to be called GEOINT, and I was asked to try to bring that to life,” said then Lt. Gen. James Clapper, who became NIMA’s third director on Sept. 13, 2001. “I started two days after 9/11, and it was soon clear that there was actually great functional merit to the notion of marrying up those previously disparate skill sets.”

The NIMA Commission’s recommendations included not only repairing the cultural rift, but also pushing past the individual activities of predecessor organizations, such as map production and imagery analysis, into a more truly integrated approach.

Under Clapper’s direction, NIMA’s senior leadership decided a name change would help it achieve those objectives. With that realization, “precision intelligence” became “geospatial intelligence” and the “National Imagery and Mapping Association” became the “National Geospatial-Intelligence Agency (NGA).”

Said Clapper, who now serves as Director of National Intelligence (DNI), “I sort of posed a question rhetorically: ‘Don’t you think we’ve been singing ‘Amazing Grace’ at the wake of DMA

and NPIC long enough? If we have, and if people see the merit—which was battle-tested in the immediate aftermath of 9/11—then we ought to embrace the concept of geospatial intelligence.”

The name change became official in 2003, when Congress passed the National Defense Authorization Act for fiscal year 2004, coining the term “geospatial intelligence” as “the exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the earth.”

“NIMA’s rebranding as the National Geospatial-Intelligence Agency and creating the concept of GEOINT helped instantiate two essential missing elements: unity of effort and unity of effect,” Long explained. “Although we had brought people together physically, Director Clapper unified our efforts toward a single goal—GEOINT and the positive effects that the integration of geospatial data and imagery could have on warfighting and policymaking.”

Indeed, because the nomenclature included neither the words “mapping” nor “imagery,” it galvanized both disciplines into forming a successful union.

“We were all very proud of our history,” said former NIMA imagery analyst Robert Cardillo, now ODNI’s deputy director for intelligence integration. “If you were an imagery guy, you kind of resented and competed unhealthily with the other camp. By renaming us, we had something to join up with ... and that really was needed because the labels were so powerful.”

Surprisingly, one of the most important elements of the new name was the hyphen in “geospatial-intelligence,” making NGA

a three-letter agency. As NIMA, many felt the four-letter agency was relegated to a supporting role. As NGA, however, it was poised to play a lead.

THE FOG OF WAR

Lifting the “fog of war” was the impetus for creating NIMA, and subsequently NGA. However, in the wake of 9/11, Operations Enduring Freedom and Iraqi Freedom became critical proving grounds for GEOINT.

Because of the challenging operating environment, these were demanded GEOINT support in ways previous U.S. conflicts had not.

“We were more focused in urban and complex terrain, which drove us to demand higher-fidelity information,” explained retired Army Chief Warrant Officer Michael Harper, now chief of the Army Geospatial Center’s Tactical Source Directorate. “Because of the tribal nature [of Iraq and Afghanistan], human geography and human terrain also became important. That drove the development of software and systems that could catalog information and rapidly exploit it for commanders.”

Case in point: the GEOCELL. Created in 2004 by the National Security Agency (NSA), the program co-located NSA and NGA analysts at NSA head-

quarters for the purpose of finding and tracking enemy targets.

“The GEOCELL was the initial entrée into fusing GEOINT and SIGINT together as complementary forms of multi-INT,” explained Weise. “The work [GEOCELL] did in prosecuting the Iraq War was unimaginable. The effect they had on intelligence production ... made an immediate impact.”

The effects were such that NGA analysts were subsequently embedded with warfighters in theater and with other analysts at multi-INT fusion hubs such as the National Counterterrorism Center and the National Counterproliferation Center, established in 2003 and 2005, respectively.

“Military commanders would not go to war without [NGA analysts] after the 9/11 timeframe,” said NGA Director of Strategic Operations John Sherman. “[GEOINT] became literally indispensable.”

The advent of unmanned aerial vehicles and persistent full-motion video made NGA analysts even more valuable.

“When the Global Hawk and Predator were deployed to Iraq and Afghanistan, it was a big turning point for the military in terms of making imagery available on demand,” said David Messinger, Ph.D., director of the

Digital Imaging and Remote Sensing Laboratory at the Rochester Institute of Technology’s Chester F. Carlson Center for Imaging Science.

“During the Cold War it was sufficient to do reconnaissance,” added senior NGA official Thomas McCormick, Ph.D., deputy director of the NRO Mission Support Directorate. “In this global war on terror, that’s largely insufficient. We have to do more of a surveillance mission ... because we’re not able to answer the intelligence mail with just a periodic look at a particular target.”

In fact, NGA analysis of surveillance video led to one of the decade’s most significant milestones: the May 2011 takedown of Osama bin Laden.

“I see what happened in Abbottabad as a culminating moment,” Sherman said. “The things that went into that were honed over a number of years in a number of places ... [by] calibrating things that had been great ideas before, but were actually put into practice in places like Iraq and Afghanistan.”

After a decade at war, GEOINT no longer had to fight for a seat at the proverbial table. It had unquestionably earned one.

A TREMENDOUS REVOLUTION

Although GEOINT originated with the formation of NGA, and subsequently matured at war in Iraq and Afghanistan, the discipline was also influenced by significant advances in commercial technologies such as more sophisticated versions of Esri and Intergraph’s GIS software, GPS, location-based services, and of course, commercial imagery.

“There were several big milestones in the civilian community that pushed [GEOINT] forward,” Messinger said.

When President George H.W. Bush signed the Land Remote Sensing Policy Act of 1992, private companies were allowed to enter the satellite imagery business for the first time. Two of those companies, Space Imaging and DigitalGlobe, launched their principal commercial satellites—IKONOS and QuickBird—in 1999 and 2001, respectively. DigitalGlobe now owns both.

“Companies like DigitalGlobe ... for the first time produced satellite-based imagery of every spot on the world that everybody could see—not just govern-

A DIGITALGLOBE satellite collected this view of the Osama bin Laden compound in Abbottabad Jan. 15, 2011—less than four months before the historic raid.



IMAGE COURTESY OF DIGITALGLOBE

ment people,” Messinger said. “That was a game changer.”

In 2000, around the same time IKONOS and QuickBird launched, President Bill Clinton ordered the U.S. military to turn off “selective availability,” which until that point had intentionally degraded the GPS signal available for commercial use. The combination of commercially available satellite imagery and high-fidelity GPS signals created a critical mass for location-based services, including navigation systems.

In 2001, NIMA’s InnoVision directorate collaborated with In-Q-Tel, the CIA’s private nonprofit venture, to fund a start-up called Keyhole, a software development company whose signature application, Earth Viewer, superimposed maps onto satellite images. NIMA immediately employed Keyhole technology to support U.S. troops in Iraq. In 2004, Google acquired Keyhole, and in 2005 re-launched Earth Viewer as Google Earth, which has since been downloaded more than a billion times.

“Google buying Keyhole revolutionized the whole concept of online mapping and made geospatial data ubiquitous in the world,” Vance said.

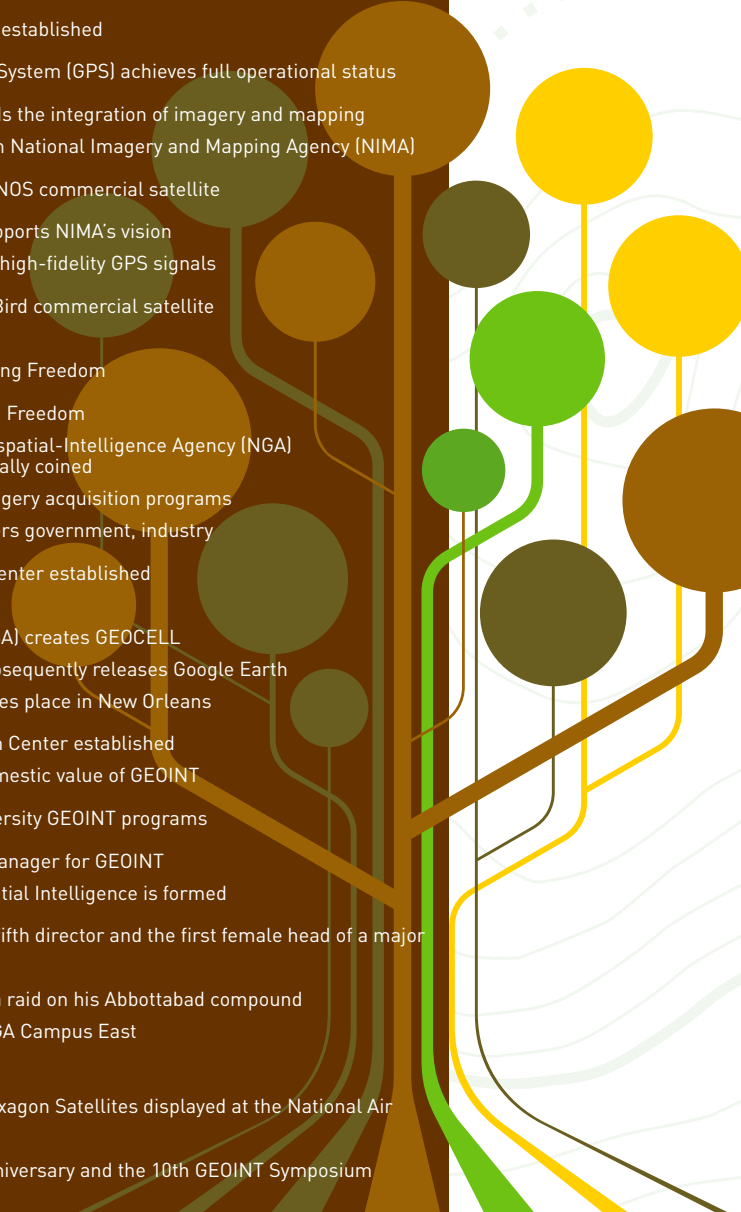
The Open Geospatial Consortium—established in 1994 to develop open standards for geospatial content and services—further enabled such ubiquity.

“The creation of open standards that allow systems to communicate and interoperate is one of the enabling developments that allowed commercial GEOINT and online mapping to prosper,” Vance continued.

That prosperity has helped GEOINT advance at breakneck speeds during its bedrock decade, further intensified by the rapid adoption of geospatially-enabled consumer products. The commercial revolution spread to NGA in 2003 with the creation of the ClearView and NextView commercial imagery acquisition programs. Key to expansion was the availability of unclassified, high-resolution imagery that could be shared for the first time across federal agencies.

“Civilian technology has caused an explosion in both GEOINT sources and GEOINT exploiters,” Long said. “In the past, only DoD and the IC had access to high-resolution imagery and other sources due to their classified nature. Now, anyone

THE GROWTH OF GEOINT

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- 1961** • CIA establishes the National Photographic Interpretation Center (NPIC)
 - 1972** • DoD creates the Defense Mapping Agency (DMA)
 - 1990** • Gulf War begins
 - 1992** • Land Remote Sensing Policy Act of 1992 legalizes commercial satellite imagery
 - 1994** • Open Geospatial Consortium established
 - 1995** • NAVSTAR Global Positioning System (GPS) achieves full operational status
 - 1996** • Joint Vision 2010 recommends the integration of imagery and mapping
• NPIC and DMA merge to form National Imagery and Mapping Agency (NIMA)
 - 1999** • Space Imaging launches IKONOS commercial satellite
 - 2000** • NIMA Commission report supports NIMA’s vision
• U.S. grants civilian access to high-fidelity GPS signals
 - 2001** • DigitalGlobe launches QuickBird commercial satellite
• Keyhole founded
• 9/11 incites Operation Enduring Freedom
 - 2003** • U.S. launches Operation Iraqi Freedom
• NIMA becomes National Geospatial-Intelligence Agency (NGA) and the term GEOINT is officially coined
• NGA creates commercial imagery acquisition programs
• GEO-INTEL conference gathers government, industry
 - 2004** • National Counterterrorism Center established
• USGIF founded
• National Security Agency (NSA) creates GEOCELL
• Google acquires Keyhole, subsequently releases Google Earth
• First GEOINT Symposium takes place in New Orleans
 - 2005** • National Counterproliferation Center established
• Hurricane Katrina proves domestic value of GEOINT
 - 2007** • USGIF accredits its first university GEOINT programs
 - 2009** • NGA named the functional manager for GEOINT
• The Allied System for Geospatial Intelligence is formed
 - 2010** • Letitia Long becomes NGA’s fifth director and the first female head of a major U.S. intelligence agency
 - 2011** • U.S. forces kill Bin Laden in a raid on his Abbottabad compound
• Construction complete on NGA Campus East
• NGA launches app store
 - 2012** • Declassified NRO Gambit-Hexagon Satellites displayed at the National Air Force Museum
 - 2014** • USGIF celebrates its 10th anniversary and the 10th GEOINT Symposium

can purchase high-quality imagery and download limitless GPS-tagged photos and videos for free from the Internet. Anyone can now be a producer, a consumer, and an exploiter—all at the same time.”

The result is a democratization of remote sensing, precision location data, and geospatial information that will have

major implications for future iterations of GEOINT.

A DEFINING MOMENT

When Hurricane Katrina devastated New Orleans in 2005, the proliferation of commercial imagery in support of rescue, recovery, and relief efforts resulted

in immediate recognition of GEOINT's broader utility.

"The history of NGA shows that few approaches to intelligence offer the kind of universal and informed context that GEOINT can provide," Long said. "For example, in the often criticized federal response to the Hurricane Katrina disaster in 2005, NGA and GEOINT received singular praise in the final assessment for critical on-site support and a common operating picture necessary for sustenance and recovery."

In the wake of the storm, GEOINT yielded a visualization of the disaster that first responders used to assess damage and save lives. As a result, NGA was now focused on the homeland as much as the war zone.

"NGA has repeated these important disaster recovery efforts many times in the years since the New Orleans tragedy," Long said. "The natural disasters affecting Haiti and Fukushima in Japan offer just a couple of examples of the leading role GEOINT and NGA play in humanitarian response to physical and social disruption as well as nuclear contamination."

Other milestones were the Deepwater Horizon oil spill in 2010, during

which GEOINT helped the U.S. Coast Guard place oil booms; Superstorm Sandy in 2012, when GEOINT was leveraged to conduct predictive risk analyses; and the Philippines typhoon in 2013, when NGA maps assisted in the delivery of relief supplies to the most devastated areas. Even the Super Bowl has leveraged GEOINT.

FROM 'INT' TO 'INDUSTRY'

NGA's achievements at home and abroad constitute the sturdy skeleton around which GEOINT has built its muscle. The discipline's heart, however, is the larger community that has coalesced around it.

"NGA is a foundational member of the GEOINT Community, but for it to succeed ... there has to be a continued focus on driving and developing the tradecraft to support it," said Chris Bellios, vice president of operations for BAE Systems' Global Analysis & Operations group.

Because he understood this concept, Stu Shea—president and COO at Leidos—led the establishment of the United States Geospatial Intelligence Foundation (USGIF) in January 2004. An educational nonprofit that's

dedicated to advancing the industry's tradecraft, USGIF's history is an important thread in the GEOINT Community's fabric.

"USGIF ... has blossomed and matured into something quite effective," Clapper said. "It has done a lot to instantiate and royalize the discipline of GEOINT ... particularly as a tremendous forum for connecting government and industry, which in the rest of the Intelligence Community is a challenge."

The concept of USGIF was born during an industry-led gathering of GEOINT stakeholders in October 2003. Called GEO-INTEL, this initial event was planned by a group that would become the founding members and leadership of USGIF. GEO-INTEL became the precursor to USGIF's signature event, the GEOINT Symposium. However, the industry and government partners who came together in 2003 also knew an annual gathering would not be sufficient to build the community. So, shortly after GEO-INTEL, USGIF was incorporated, and the first official GEOINT Symposium took place in New Orleans in November 2004. In January 2014, USGIF celebrated its 10th

HURRICANE KATRINA damage estimates created by NGA gained widespread awareness for GEOINT among the general public for the first time.



IMAGE COURTESY OF NGA

IMAGE COURTESY OF NGA



NGA PROVIDED before and after damage assessments following the 2013 Super Typhoon Haiyan in the Philippines.

anniversary, and April 2014 will mark the 10th GEOINT Symposium.

“There were men and women who risked their lives every day to protect our families, our communities, our nation, our values, and our way of life—and the underlying foundation for all of that security was geospatial intelligence,” Shea said. “GEOINT was where our national security began, and we realized whether we’re fighting the global war on terror, supporting coalition forces in theater, or reacting to worldwide natural disasters, there was always this growing need for actionable geospatial intelligence. That’s the reason we created USGIF, and that’s why we began to bring people together each year at the GEOINT Symposium.”

During this defining decade, USGIF reached throughout federal, state, and local government, as well as to industry and academia, to help the discipline flourish. The Foundation created on top of its three pillars—build the community, advance the tradecraft, and accelerate innovation—a true community. No other intelligence discipline has a dedicated foundation or association—perhaps because GEOINT has the distinction of being ubiquitous in everyday life.

“The unique thing about GEOINT is it exists as a vertical, taking its place alongside the longer-standing traditional

intelligence disciplines, but it also has this horizontal dimension in which it provides the underpinning for operations and intelligence integration,” said USGIF CEO Keith Masback. “Simply put, it brings ‘the where’ to the equation. There has also been a geospatial revolution in the last decade, where it’s exploded on the commercial side.”

GEOINT: 10 YEARS LATER

In the decade since USGIF’s formation, it’s quite possible more geospatial-intelligence type activity happened in those 10 years than in all preceding decades. The culmination of many conquered obstacles and hard-won achievements is a 10-year-old tradecraft that’s more efficient, effective, and engaged than its forebears could have ever predicted.

And also more global, according to Long, who cited the formation of the Allied System for Geospatial Intelligence (ASG) in 2009 as one of the most significant events in GEOINT’s history.

“Our relationship with the ASG, consisting of the U.S. and our four closest allies, continues to grow in importance as all of us face constrained budgets, increasing demands, and growing threats,” Long said. “Since the purpose of GEOINT is to locate anything and anyone on the globe, collecting and analyzing GEOINT

sources and producing timely, accurate, relevant, and actionable intelligence requires strong international partnerships. We are proving the value of our international partnerships in crises around the globe every day.”

As NGA’s fifth director, Long assumed leadership of the agency in 2010—a year after NGA was named the official functional manager of GEOINT. Her seminal speech at the GEOINT 2010 Symposium introduced a new strategy for NGA centered on two primary goals: creating online, on-demand access to GEOINT knowledge; and enhancing NGA’s analytic expertise. This vision was made official in 2012 when NGA issued “NGA Strategy 2013-2017.”

“Director Long’s vision of ‘putting the power of GEOINT in your hands’ is an acknowledgment that it’s now the users who are driving this community because they can leverage both government and commercial industry,” said former NGA CIO Keith Littlefield, Ph.D., now chief technology officer at TASC.

Although it carries a new set of challenges, Long’s vision presents an exciting turning point for GEOINT at the dawn of its second decade. More agencies throughout the Intelligence Community are beginning to expect GEOINT rather than ask for it as an add-on capability. Large, exquisite satellites continue to be built and launched, while SmallSats are being sent into orbit by innovators at nontraditional, start-up companies. Smartphones and the Wi-Fi-connected everyday devices that are becoming “the Internet of things” have made location so commonplace, we can be sure to see more groundbreaking applications for the power of GEOINT in the years ahead.

“The advances of the last decade are quite remarkable and that’s what makes looking forward to the next decade incredibly exciting,” Masback said. “It remains critically important that we focus on the training and the tradecraft of the people, because even as the technologies change, it’s people who have to operate with and within the technologies and the networks. USGIF will remain laser-focused on the people, because they’re at the center of making it all work. The most powerful, agile processor on the net is still the human brain.” ■