

NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

PATHFINDER

The Geospatial Intelligence Magazine

GEOSPATIAL-INTELLIGENCE AGENCY

▶▶ PARTNERSHIPS & INTEGRATION

▶▶ From the Director: A Sense of Urgency

Industry Joins NGA in Cooperative R&D

Technology Alliance pursues common goals

SPECIAL EDITION
GEOINT 2004 SYMPOSIUM
NEW ORLEANS

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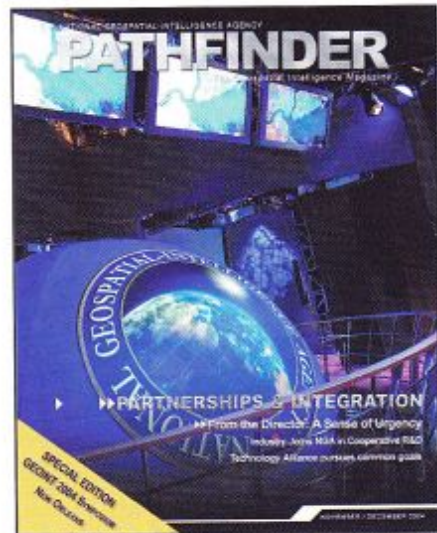
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On the Cover

"Partnerships and Integration"—the theme of this issue—is also the theme of the GEOINT Symposium in New Orleans Oct. 12-14. Since this special edition of the magazine will be distributed at the symposium, it seemed fitting to feature NGA's exhibit on the magazine's cover. You can read about the exhibit on page 6. Rob Cox took the photo. Jason Collins designed the cover.

Getting Published

All members of the geospatial intelligence community are welcome to submit articles of community-wide interest. Articles are edited for style, content and length. The copy deadline is the last Friday of the second month before publication. For details on submitting articles, e-mail the Pathfinder. Our address is pathfinder@nga.mil.

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NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

Dear Readers,

In our last issue, the Pathfinder focused on the process of how NGA develops and produces GEOINT today. This Special Edition continues the story.... it focuses on "Partnerships and Integration"—the theme of the GEOINT Symposium in New Orleans Oct. 12-14. NGA's ability to build and sustain a high quality, responsive National System for Geospatial-Intelligence (NSG) depends on effective cooperation and collaboration across traditional organizational boundaries. Effective information sharing and immediate information understanding for rapid decision making are not options; in this post 9/11 environment, they are necessities. GEOINT and the NSG hold the promise to enable both.

NGA Director retired Air Force Lt. Gen. James R. Clapper Jr. makes the case regarding the role of industry in our lead article—"A Sense of Urgency." He then outlines specific areas where the Agency needs help and provides a point of contact for unsolicited contract proposals.

Nontraditional ways for industry to work with NGA are also presented in two articles that highlight the National Technology Alliance and Cooperative Research and Development Agreements. Both articles contain striking examples of how NGA and industry are working together, not only for their mutual benefit, but for no less than our nation's security in challenging times indeed.

You'll also want to read about NGA's exhibit at the GEOINT Symposium, which shows how the Agency has transformed and is transforming. We use the example of Non-combatant Evacuation Operations to highlight our work. Some of the important points we illustrate center on collections of commercial imagery, collaborative analysis and forward deployments.

With industry support, we've also opened a new facility that uses high-tech methods to produce a more refined traditional product—three-dimensional models to aid analysts and other customers with visualization. A short discussion about the value and importance of 3-D models is the concluding article.

Finally, feedback is important, and I value your input. Currently over 7,400 government and industry professionals read the Pathfinder. You are a stakeholder in how NGA, government and industry partners conduct GEOINT. Please tell us what we can do to improve the Pathfinder. If there are issues that the Pathfinder can showcase, please let us know. If issues are discussed that are not relevant to the art and science of GEOINT, please let us know that as well.

The articles that follow demonstrate how NGA is partnering with government and industry to use GEOINT to protect national security today and vision into the future to solve problems together. Our national security depends on it.


Mark Schultz
Director, Office of Corporate Relations

A Sense of Urgency

By Lt. Gen. James R. Clapper Jr., USAF (Ret.)
Director, National Geospatial-Intelligence Agency

This country is facing a threat unlike any other in our nation's history. In the past our enemies massed military forces, and there were very obvious things we could "see" and targets we could strike. Now our enemies are stealthy. They remain hidden. They move constantly to avoid detection. There they wait until they have an opportunity to strike again.

What We Must Do

In the past, when we were facing down an adversary's military forces, we had time to ponder their moves, almost like a chess match. Our military and policy-makers' moves were deliberate and calculated. Our work force's production efforts aligned with our customers' needs: we built a systematic process that gathered information, stored it, analyzed it and distributed it on timelines sufficient for the day. Now our customers' environment has changed. We are changing along with them. But are we changing fast enough?

To meet the challenge of today's threat, our policy-makers and military commanders demand even more accurate information on even shorter timelines. Our customers' needs dictate we build an intelligence architecture that can reveal enemies and their secret plans. Our country's leaders and our citizens expect the Intelligence Community (IC) to be able to predict, prevent and disrupt their activities, and when necessary, support preemptive strikes. Some would say we must provide an "unblinking eye." We'll never have a perfect system. But there are clearly things we *can* and *must* do better—and NGA is striving to do so.

NGA is working hand-in-glove

with the Department of Defense, the services, and our sister intelligence agencies. We have put into motion the actions required to achieve full spectrum persistent surveillance on a regional, then global, scale. We are moving ahead with the necessary automation and full-stream processing required to focus our analysts' efforts better. We have championed the notion of a single, integrated ground architecture—some call it "plug and play TPED" (tasking, processing, exploitation and dissemination) that will lead to true vertical and horizontal integration.

Our goal at NGA is to build a National System for Geospatial-Intelligence (NSG) that will provide self-service, tailored on-time solutions, and analysis that is insightful, actionable and accurate for all consumers of geospatial intelligence (GEOINT).

Make no mistake: What we are attempting is more than incremental improvements. Modest changes won't suffice. We face an extraordinary challenge: keeping today's systems up and running, while simultaneously moving to a more dynamic and net-centric system. Some ask, "Is this *revolutionary* change or *evolutionary* change?" We are putting into place a completely new way of doing business—without dropping the ball or missing any-



thing happening today—that is truly revolutionary. It is also essential that we succeed.

We Will Prevail... Together

I have no doubt that we will prevail, but neither NGA, nor even the IC as a whole, can do it on our own. Industry must help us to move quickly from our old ways, our old systems, our old processes. Our work force is now over 50 percent contractors; our industry team builds and maintains our systems. Now and in the future, we will look to the private sector to help provide us with the human talent, expertise and technology we need. We must move into the future together so we can better protect our citizenry.

Our acquisition strategy similarly depends on close work with industry. To help facilitate that cooperation, NGA has streamlined its acquisition process. Many of you are already familiar with—or perhaps even working with—NGA through one of our acquisition vehicles that will provide GEOINT to all of our customers:

- Enterprise Engineering (EE)—our enterprise architect and enterprise engineer
- GeoScout—our developer and systems integrator
- Information Technology/Information Services (IT/IS)—our systems operator and maintainer.

What Role Can Industry Play?

For those of you not already working with NGA through one of these large, multi-year, comprehensive contracting vehicles, it may seem as though you have been left out, or shut out, of any potential cooperation with our Agency. That is emphatically *not* the case. There is still considerable opportunity to get on board with NGA through one of these existing efforts or through the Industry Interaction Program (IIP). (More on the IIP later.) Specifically, some of our biggest priorities for which we are looking to industry are:

- **Full-stream processing.** We need automated or assisted means for processing the increasing volume of current and new sources so our

analysts can perform their work more efficiently.

- **Interoperability.** We want open databases and an architecture that embraces commercial standards wherever possible. We want to move to easily integratable content in a non-proprietary format that supports use by multiple vendors' tools.
- **Multi-level security.** All NGA employees must be able to access the entire IC and World Wide Web sites from a single desktop. This multi-level security environment might be managed via profile managers and would necessitate automatic metadata capturing and cataloging.
- **New ways of reporting GEOINT.** We want to capitalize on advances from the commercial sector (e.g., the gaming, financial and telecommunications industries), incorporating three dimensions as well as the temporal nature of the data. We need to fully exploit all dimensions of the data we hold across space and time.
- **Web-enabled tools and applications.** We must head in this direction for ease of access, installation, distribution and

consistency. These tools are critical to supporting collaboration and visualization, and giving our deployed analysts the ability to bring the full force of the virtual work force to bear on the issue at hand.

- **Universal future exploitation platforms.** We require a single, non-hardware specific, analytical platform that supports high-resolution black-and-white and color monitors. An enhanced video card that meets performance standards for stereo viewing and rapid roam must support the platform.
- **"Plug-and-play TPED."** We want to enable a unified TPED infrastructure for the NSG that accepts data from all current and future sensors—satellite and airborne, both national and commercial—across the electromagnetic spectrum.
- **New types of Global Positioning System (GPS) receivers.** There will be opportunities soon for industry to design and build GPS receivers capable of transmitting more powerful signals known as "M-Code."

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Industry Point of Contact



Photo by Rob Cox

Brian Whitt is NGA's point of contact for industry. He can be reached at industry@nga.mil. NGA Director retired Air Force Lt. Gen. James R. Clapper Jr. has established the Industry Interaction Program to serve as the central point of contact for industry to interact with the Agency. The IIP ties together in one office all industry-wide activities not otherwise solicited through the normal procurement process. Whitt can provide more information about the program.

NGA Demonstrates Capabilities at GEOINT Symposium

While fall in the Washington, D.C. area often conjures up images of leaves changing colors, football games, and cooler weather; many NGA personnel now have the Big Easy on their minds as they prepare to travel to New Orleans for the GEOINT 2004 Symposium from Oct. 12-14. NGA and the U.S. Geospatial Intelligence Foundation (USGIF) are co-sponsoring this event, which features many distinguished speakers, panel discussions and exhibits from over 80 different companies and government agencies, including NGA.

As part of the NGA "Now, Next, and After Next" interoperability technology demonstration, representatives from the Acquisition, Production, Source, Innovation and Enterprise Operations directorates and the Office of Global Support will demonstrate existing and future technologies against the backdrop of a fictional Noncombatant Evacuation Operation (NEO). A NEO takes place during events that would cause the need for U.S. citizens to be evacuated from a foreign country, such as an international terrorist attack, civil war or natural disaster. So just how would NGA handle a NEO now? How do these offices all play a role? Let's take a look.

The "Now" begins with Source. It is through a visualization tool called Battlespace Visualization Initiative that source management analysts can determine if a commercial satellite will have the opportunity to collect against a geospatial intelligence need. Since commercial imagery is unclassified, it plays an important role in the NEO since it can be shared



Non-combatant Evacuation Operations are the subject of the NGA exhibit at the GEOINT Symposium in New Orleans.

with coalition partners and foreign governments.

After the imagery has been collected, imagery analysts from Production monitor collateral and open sources and report their findings through NGA imagery intelligence briefs. Regional and geospatial analysts work with NGA Customer Teams to update traditional NGA mapping products and country databases to meet the needs of our military planners.

One of the hardcopy products that traditionally is used for NEO mission planning is a Noncombatant Evacuation Operations Package (NEOPack), which is a hardcopy collection of both NGA and native maps and charts that provide coverage over the evacuation areas.

While the NEOPack and analysis can deliver support to military planners, there is often a need for direct NGA support. It is then up to Global Support to train, support, and

equip analysts to deploy worldwide as far forward as possible, often alongside the war fighter. These men and women often use the durable Mobile Integrated GEOINT Systems (MIGS) to conduct analysis. These durable systems allow analysts to deliver valuable GEOINT to a myriad of customers—no matter what, when or where the mission.

The "Next" and "After Next" deal with an important ingredient to NGA's future success: technology. Acquisition continues to update current systems, such as the Integrated Exploitation Capability (IEC) used by analysts, while Innovation tests new products to understand their capabilities and how they can be used by NGA. It is through improved software and systems that NGA has become better and will continue as the lead provider of timely, accurate and relevant GEOINT to its customers.

Why Is NGA Interested in Mad Cow Disease?

By Larry Clarke

Since its establishment in 1987, the National Technology Alliance (NTA) has been working to foster relationships with critical commercial technology sectors. NGA is the Executive Agent for the NTA and is chartered to execute its program on behalf of the Intelligence Community, the Department of Defense and other government agencies.

More than 90 government and industry partners comprise the NTA.

The work of the NTA is focused on research and development leading to prototype deliveries in four technology areas: geospatial intelligence, information processing, analysis and management, digital technology infrastructure, and chemical, biological and radiological defense.

Through the Chemical, Biological and Radiological Technology



Alliance (CBRTA), the NTA is attempting to define the geospatial component of chemical, biological, radiological and nuclear threats.

CBRTA is an alliance of 12 major corporations whose combined expenditures on internal research last year totaled \$13 billion. These companies do not traditionally bid on government research contracts. Most major "non-defense" companies choose not to participate in the Federal Acquisition Regulation (FAR) contracting process and therefore do not respond to Broad Agency Announcements. As a result, their technology is not exposed to the government until it is already a commercial product. Fortunately, the

CBRTA works with many agencies of the federal government, and through the NTA, the government has access to emerging technologies and can influence the development process to meet its needs long before the product reaches the commercial market.

When a cow was identified last year in Washington state with bovine spongiform encephalopathy (BSE), or mad cow disease, among the first questions were "Where did that cow come from?" and "What was its historical track to its detection location?" These are pointed geospatial questions to which existing technology and procedures could not provide full and satisfactory answers. The CBRTA is proposing a major study to resolve this crucial question.

CBRTA has a research project that uses geospatially unique pollens, clays and minerals to differentiate geospatial components for specific areas of the globe.

The geospatial component of any contagious disease impacts the distribution of vaccines and antibiotics to counter the disease. Many government agencies are interested in tracking and controlling various pests and diseases that occur in peacetime and from natural occurrences. Now add the terrorist threat: The need for fast, authoritative, geospatial information becomes paramount. Popular concern about the threat of terrorists introducing pathogens such as anthrax or smallpox into the United States is well founded. Hopefully, intelligence and police work can prevent such an incident. But there is

a huge difference between the impact of a quickly located and contained outbreak and one that spreads across our entire country. Making that difference, through rapid research and development of capable solutions, is a major part of the CBRTA mission.

The threat of terrorist actions inside the United States has added a new dimension to the geospatial component of any problem. Rapid detection, classification, characterization and geolocation of the problem may be the key to our survival. It is within this realm of threat possibilities that CBRTA conducts most of its business and constitutes a clear fit with its Executive Agent, NGA, as well as other government agencies.

In addition to the projects it sponsors, NTA seeks to acquire knowledge of government operational user needs through technology assessments and evaluations. By working closely with its government clients and industry partners, the NTA has the capability to effect rapid discovery, development and application of commercial technology solutions critical to government operational users.

To learn more about the NTA, visit our Web site at www.nta.org.



About the Author

Larry Clarke is the program manager for the Chemical, Biological and Radiological Technology Alliance.

Industry Joins NGA in Cooperative R&D Agreements

By Kathy Buono

A Cooperative Research and Development Agreement (CRADA) is a mechanism for technology transfer, allowing NGA and its commercial or academic partner to share research and development. Such agreements may involve the sharing of knowledge, facilities, resources and/or capabilities for mutual benefit.

NGA signed CRADAs in 2004 with Lockheed Martin Aeronautics Co. Inc., DVIP Multimedia and DAT/EM Systems International. All have the potential of advancing NGA's capabilities of meeting its mission.

The CRADA with Lockheed Martin Aeronautics deals with airborne Intelligence, Surveillance and Reconnaissance (ISR) collections. NGA has agreed to share its expertise in the development of future sensors, architectures and data exploitation. Lockheed Martin is sharing its expertise in ISR airborne and unmanned aerial vehicles (UAVs) and other areas.

"This is a tremendous opportunity," says the CRADA's principal investigator for NGA. Working together "to improve the ability of the user community to better identify targets and understand more accurately where they are located is critical in meeting current and future operational requirements."

Says Avrom Solomin of Lockheed Martin, "It is through cooperative agreements such as this that future technologies can be researched and brought affordably to bear to solve national needs."

A small company in Maryland, DVIP Multimedia is developing

imaging software for homeland security.

Through the CRADA, NGA is exploring the technical utility DVIP digital imaging technology. Unlike traditional imaging systems, which perform a host of mathematical functions on image data after it has been captured, DVIP's *in-situ* technology employs novel processing functions during image capture.

"This agreement is a significant milestone in DVIP's effort to heighten the information-gathering capabilities of systems where critical decisions are made from digital (video) images," says Dr. Damon Tull, DVIP's chief executive.

"NGA will continue to collaborate with the private sector and seek to make technology transfer an integral part of the planning process."

NGA's principal investigator said, "The combination of the sensor with on-line real-time processing blurs the common distinction between collection and exploitation, creating opportunities for new capabilities that really might revolutionize the geospatial business model in ways we haven't imagined yet. This effort is exploring what some of these possibilities are."

The third CRADA is with DAT/EM Systems International, a small, digital photogrammetry software company based in Anchorage, Alaska. DAT/

EM Systems has developed a digital photogrammetric workstation that so far has only been used in the civilian applications. Establishment of the CRADA gives DAT/EM Systems the opportunity to expand the capabilities of its digital stereoplotter to perform photogrammetric tasks unique to the government.

"This CRADA offers a substantial advancement in the development and expansion of DAT/EM Systems digital photogrammetric tools," says Jeffrey Yates, DAT/EM Systems general manager. The benefit to NGA is a potentially additional source for digital stereo workstation software, which may be easier to use than current packages and may provide stronger performance in new emerging targeting requirements.

NGA will continue to collaborate with the private sector and seek to make technology transfer an integral part of the planning process.

NGA has published a CRADA Handbook that provides general information to potential commercial or academic partners pursuing a CRADA effort with NGA. The handbook and other information about the CRADA program are online at www.nga.mil. Search on "CRADA."



About the Author

Kathy Buono is the program manager for NGA's Cooperative Research and Development Agreements.

3-D Foam Models Aid GEOINT Visualization

NGA recently opened a new facility to produce equipment, facility and terrain models that are of national security interest.

Constructed from blocks of polyurethane foam, the three-dimensional scale models are designed to aid war fighters, policymakers, security planners, intelligence collectors and analysts with target familiarization, operational planning, training, rehearsals, negotiations, briefings and debriefings. They are well-suited to face-to-face collaborative efforts and large group presentations where computer monitors and software would be impractical or distracting.

NGA—through its predecessor organizations—has a distinguished model-making history that dates back to World War II. From 1961 to 1996, the National Photographic



NGA's 3-D model production facility produces models of military equipment such as this missile launcher. Models help intelligence analysts and other customers better understand foreign systems.

Interpretation Center (NPIC) hand-constructed over 400 models. Analysts and operational planners appreciated NPIC models for their realism and utility. NPIC transferred its model-making tools to the U.S. Special Operations Command in 1996. The National Imagery and Mapping Agency, established the same year, retained several experts who built a small number of models for CIA operations planners.

NGA's emphasis on geospatial intelligence visualization, in the context of current events, prompted the re-establishment of its model-making capability. NGA is using advances in rapid prototyping,

numerical machining and image printing to improve the accuracy, precision and speed of model production. At the same time, traditional finishing methods will continue to give NGA models the realism and utility of past products.

Model Categories

Equipment models help policymakers, collectors and analysts understand the details of foreign systems.

Models include scale replicas of vehicles, aircraft, ships, antennas, weapons, research and development platforms, and missile and space systems.

Facility models support weapons and intelligence targeting, military and clandestine operations, and security preparations at friendly installations. They show windows, doors, structural details, fences, walls, individual trees and utilities above ground. They also may include interior information.

Terrain models are operational planning tools that can also help senior officials understand the relationship between topography and national

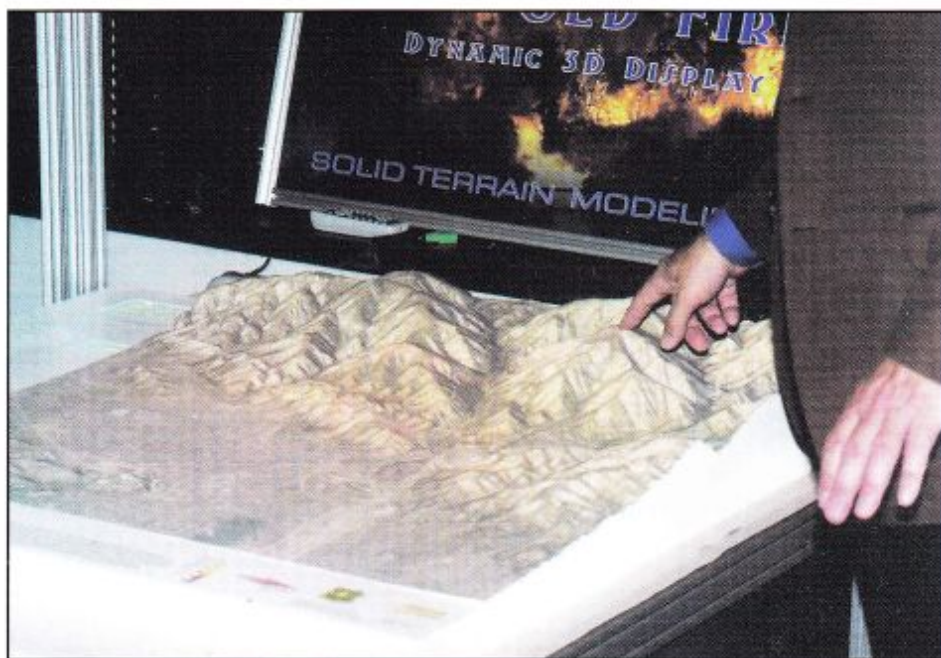


Photo by Alan King

A briefer displays a terrain model at the ribbon cutting for the new 3-D model production facility. Elevation data guides a power cutter to shape a block of high-density polyurethane foam.

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A Sense of Urgency

Continued from page 5

How Can Industry Get Involved?

For some firms, doing business with NGA is old hat; you know our Agency. For others, NGA may appear to be a more intimidating or daunting "nut to crack." I spent a few years as a contractor, so I know how challenging it can be to deal with government.

That is why two years ago I established the Industry Interaction Program to serve as the central point of contact for industry to interact with NGA. The IIP ties together in

one office all industry-wide activities not otherwise solicited through the normal procurement process (i.e., unsolicited proposals, white papers and industry visits). If you have an idea for a capability, service or product of potential interest to NGA, I urge you to contact the IIP. A cross-section of executives, representing every directorate within NGA, as well as our representative for Small and Disadvantaged Business Utilization will carefully assess your idea or concept. For more information on the IIP, please contact Brian Whitt at industry@nga.mil. Look on our Web

page, www.nga.mil, for information about submitting an unsolicited proposal or white paper. Click on "Business Opportunities" and the sub-link "Industry Correspondence NGA."



JAMES R. CLAPPER, JR.
Lieutenant General, USAF (Ret.)
Director

3-D Foam Models Aid GEOINT Visualization

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security issues. They show city-size to countrywide map information or images applied to a scale representation of mountains, hills, valleys and other elevation features.

Production

The models produced in the three-dimensional production facility reflect customer requirements and resource considerations. Finished products may not fit into a prescribed category. For example, scenarios might include three-dimensionally printed and hand-built structures and equipment placed on numerically machined terrain with details and paint applied by hand.

In most cases, customers provide the elevation data and map or imagery used to produce a model. A numerically controlled cutter/printer uses the elevation data to guide a power cutter as it shapes a block of high-density polyurethane foam into the three-dimensional model. The



The three-dimensional foam models of facilities can show both the exterior and interior of buildings.

system can then apply imagery or map information with inkjet printer heads. In addition, the printer can build up layers of resin to create items with moving parts and interior details, using a computer-assisted design file. Production specialists also use hand tools, conventional power tools, paint, decals and hob-

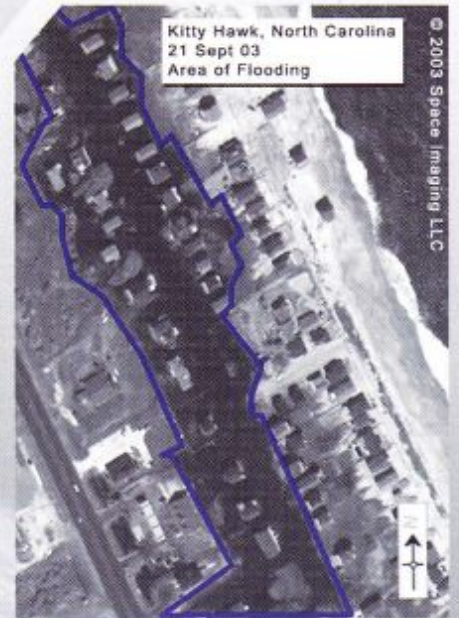
byist supplies to finish the models, or in some cases, build them from scratch. Production Facility staff can help customers obtain the source data and process it into the necessary input files.

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GEOINT

It Makes the Difference

Extent of Hurricane Isabel Damage
Kitty Hawk/Kill Devil Hills, Dare County, North Carolina



Hurricane Isabel September 2003

Damage assessments for response operations
made possible by geospatial intelligence

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