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**Operational 3-D ★ Geospatial Collaboration
Persistent Change Monitoring ★ Army GEOINT Roundtable**

3-D Goes Operational



Three-dimensional technologies are advancing in the geospatial intelligence sphere, as organizations of all sizes develop applications and create content that allow users to create 3-D visualizations of ocean depths, atmospheric conditions and everything in between.

The potential is great. 3-D geospatial applications would allow warfighters, commanders and analysts a deeper understanding of environments such as urban areas and could help them execute their missions better and more efficiently.

But these new technologies and applications are not reaching the military fast enough, which is why the Army Geospatial Center (AGC) initiated a multi-agency project, the Op3-D Joint Capability Technology Demonstration (JCTD), to facilitate the validation and fielding of 3-D geospatial technologies and to promote standards that would allow for the more rapid development and acceptance of these systems.

“In the past, 3-D technology, products and capabilities were too slow to be used for mission planning and execution,” said Heidi Hainsey, the AGC’s Op3-D technical manager. “With the



Heidi Hainsey



Gabe Batstone

advent of faster processing, the ability to create 3-D mission data sets enabled creation of 3-D products, but not to produce 3-D capabilities to meet mission needs in an expedited fashion.

“3-D products must undergo a lengthy development process in order to be considered valid enhancements in the military decision making process,” Hainsey added. “Areas of improvement have been identified within the collection, processing, exploitation and dissemination process for 3-D production that limit the effectiveness of these products.”

“There are tons of geospatial information being collected, whether LiDAR or satellite imagery. Warfighters are overwhelmed with the amount of data,” said Gabe Batstone, chief executive officer of Ngrain, a provider of 3-D technologies. “Too much information can be an inhibitor. It slows them down. The problem that industry needs to solve is to create applications that turn information into knowledge.”

Three-dimensional visualizations of geospatial data can help by “consolidating and presenting information in a fashion that is easily usable

to adhere to the thought of breaking down stovepipes rather than creating new ones, Op3-D relies on and leverages core technologies,” said Hainsey, including those developed by AGC, NGA and USSOCOM. “The program will update and improve existing technologies across the entire pipeline that the warfighter already has available to enable faster generation and exploitation of 3-D mission planning products.”

Op3-D is also working with private sector companies to develop 3-D capabilities that can be pushed out to warfighters. The program is working with SAIC and TerraGo Technologies to create an uncomplicated 3-D GeoPDF composer tool that enables a user to create these easily readable products for warfighter usage in low bandwidth environments within Adobe Reader software. In addition, Op3-D is joining with Overwatch Textron Systems to improve the commercially available and readily used Feature Analyst and LiDAR Analyst software to enable faster production of databases to be used in 3-D mission rehearsal data sets.

Op3-D has worked with Intergraph Government Solutions, moreover, to improve the ERDAS Imagine software tool set and have completed the required tests to be certified by the Joint Interoperability Test Command (JITC). “This enables all geospatial intelligence analysts who use the software, the ability to create controlled image base imagery,” explained Hainsey. “These products can then be included in the NGA repository, enabling them to be used by the wider National System for Geospatial Intelligence community, and reducing the cost and increasing the coverage of controlled image base (CIB).”

CIB is unclassified digital imagery, produced to support mission planning and command, control, communications and intelligence systems.

WEB ACCESS

Skyline has worked with Op3-D to provide a product called Army Geospatial Enterprise (AGE) GeoGlobe. AGE GeoGlobe is based on Skyline Software’s SkylineGlobe suite of products. This software allows users to access AGC’s geospatial data archives and products over the internet.

“We provide a suite of software products that allow users to create 3-D visualizations, by infusing 3-D geospatial information into imagery, and to disseminate it,” said Collins.

AGE GeoGlobe provides users with a web interface to find and view AGC products such as the Water Resources Database, Urban Tactical Planner and BuckEye imagery, as well as Theater Geospatial Database data. These products form part of the GeoGlobe’s data layers and can be viewed in any of the GeoGlobe’s three different globe views, world map, NGA map and imagery.

“AGE GeoGlobe has created a huge collection of city data in Afghanistan, Iraq and elsewhere,” said Collins. “What we have been able to do is take all that and allow users not trained in geographic information systems to look at data and click on and click off information depending upon what is relevant to their mission.”



Rick Black

The system has been used for several types of applications in theater, such as convoy route planning and air operations planning. It is particularly useful in urban operations, according to Collins. “It’s one thing to look at a two-dimensional map or image,” he said. “It’s much more relevant to have a complete sense of what structures look like, what the road networks are, and to overlay all that with the human terrain to have a better understanding of the political background of a particular neighborhood.”

One challenge that Op3-D is tackling is the cumbersome volumes of data required for 3-D representations. Ngrain has developed and patented a technology that compresses the data and allows it to be deployed to a variety of platforms. “What we do is license a core technology that allows customers to get at the heart of Ngrain technology and develop tools themselves,” said Batstone. “We have a tool kit called Constructor that allows our partners to develop applications to solve specific problems.”

The Canadian Department of National Defense has used Ngrain technology to create a 3-D simulation that allows it to model the effect of weapons on particular geographic locations. In the U.S., Lockheed Martin has deployed Ngrain tools in a similar fashion as part of project conducted by the Defense Advanced Research Project Agency. Another U.S. company, Quantapoint, uses the Ngrain technology to generate 3-D representations of urban areas. It has also been used by United Kingdom forces to study terrain to determine the proper location of deployable medium girder bridges.

3-D AND BEYOND

Zebra Imaging Inc. takes 3-D to another level by producing holograms of terrain, particularly urban terrain, of interest. A hologram is a 3-D, 360-degree representation of an object or area that projects an image above the film, thus creating a 3-D effect that can be observed from all sides. The hologram is projected by illuminating Zebra’s proprietary film.

“A hologram is virtually solid but not physically solid,” explained Rick Black, Zebra’s director for defense and intelligence programs.

Zebra’s holograms can be created from a variety of data. They have utilized LiDAR data from AGC’s BuckEye program, as well as commercial satellite imagery and airborne imagery.

“The holograms have been used to plan line-of-sight communications in urban areas,” said Black. “A line of sight is not easily discernible from a flat representation. They have also been used for route planning, for mission pre-brief and debriefs, for flight rehearsals, and for virtual reconnaissance.” Unlike photographs or maps, hologram users don’t need any special training to understand the terrain being represented, according to Black.

“We have placed thousands of these products into the Afghanistan and Iraq theaters since 2005,” said Black. “In response to customers’ requirements, we have sped up production of the holograms from three and half hours down to 93 minutes.

