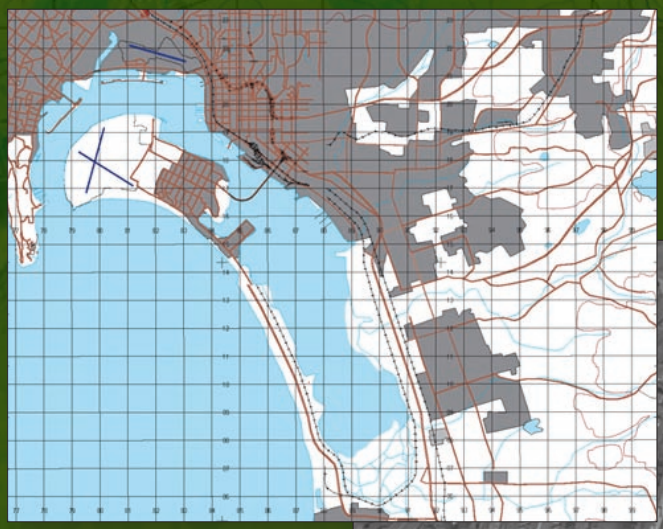
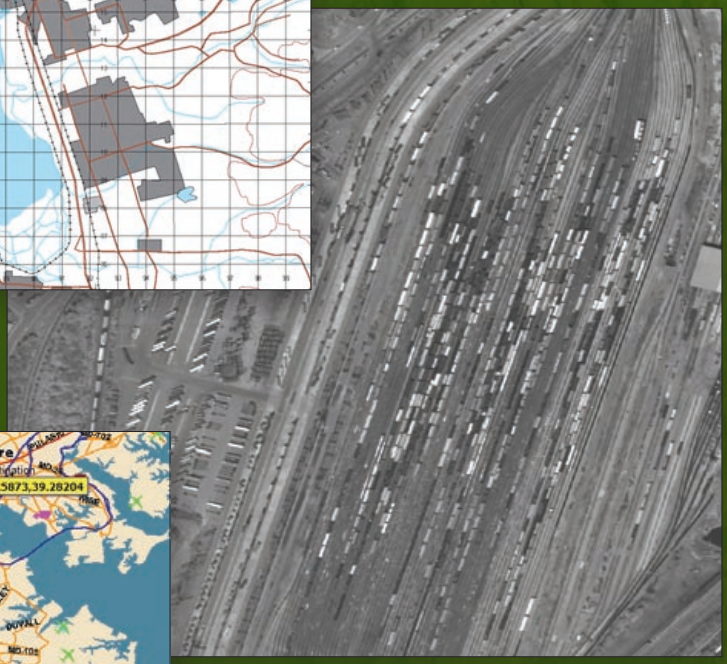
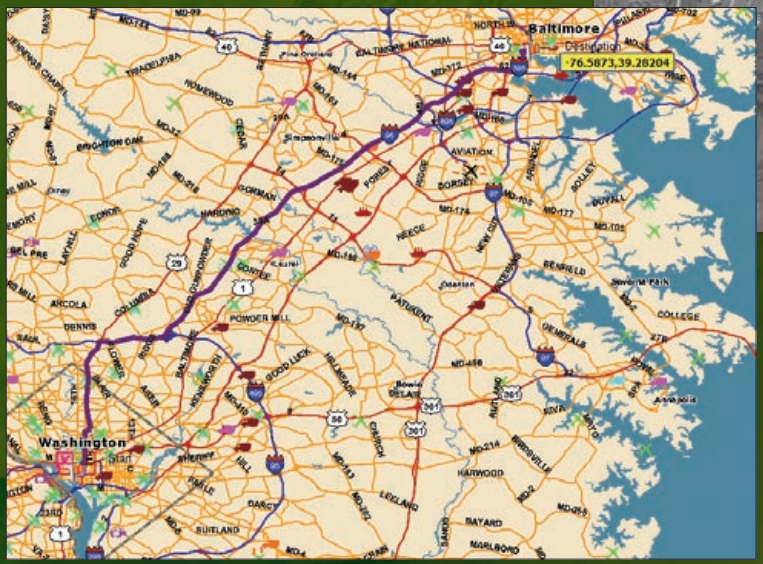
Mil Intel Muster

The Magazine for ESRI's Defense and Intelligence Communities







In This Issue

USTRANSCOM Relies on GIS and NAVTEQ Map Data

The NITF for ArcGIS Extension

ESRI on the Road

ESRI Defense Mapping

USTRANSCOM Relies on GIS and NAVTEQ Map Data

In a Web-Based Portal, the Data Helps Users Track and Manage Military Assets

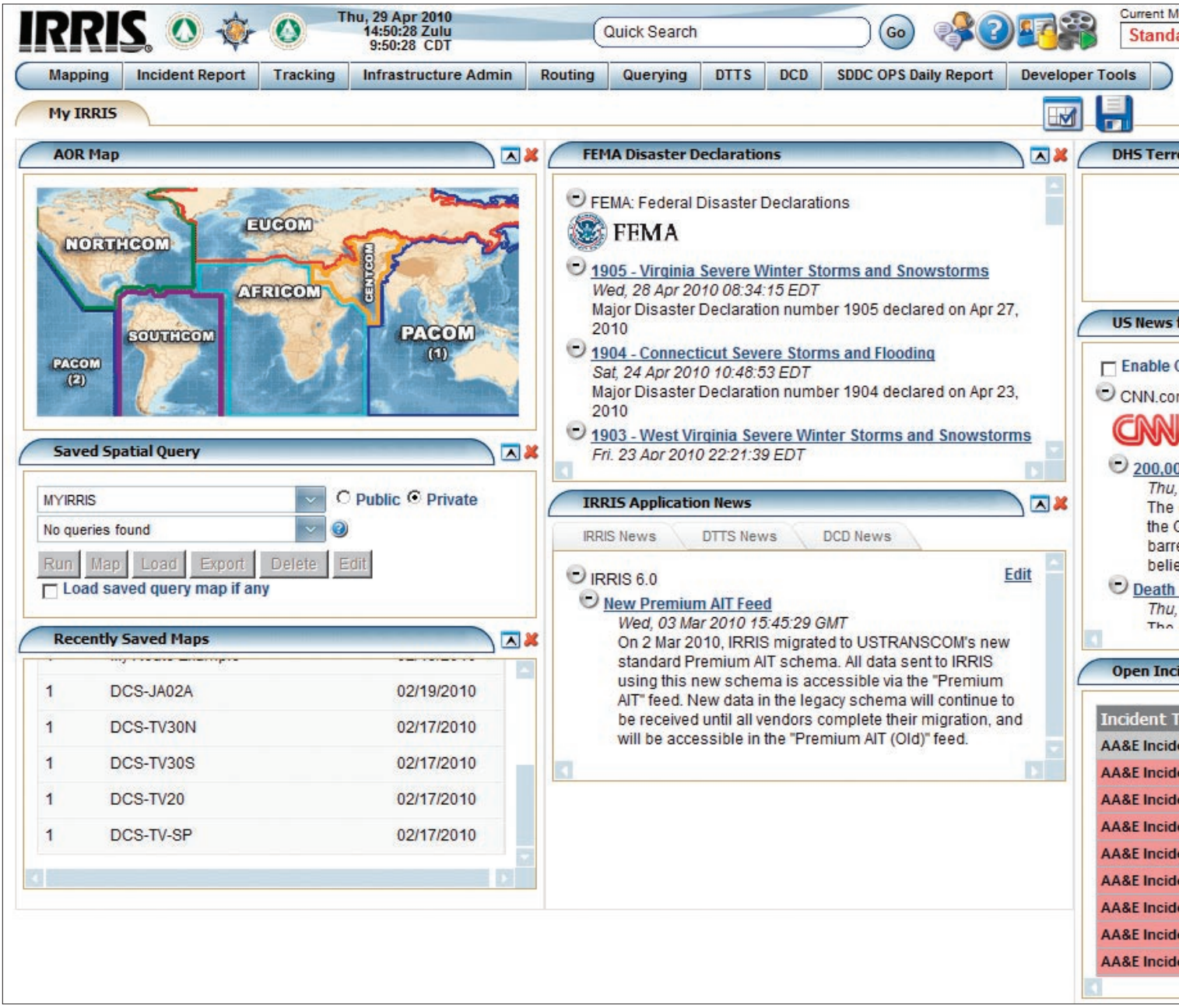
A large-scale organization can succeed or fail based on its ability to effectively manage a global supply chain. As the renowned quotes in the callouts throughout attest, and as the U.S. Department of Defense (DoD) understands, this can mean the difference between life and death, victory and defeat.

In today's data-rich environment, it's important to find an automated, user-friendly information platform that can integrate available data and technical applications in a common operational picture (COP) to effectively manage logistics and transportation security.

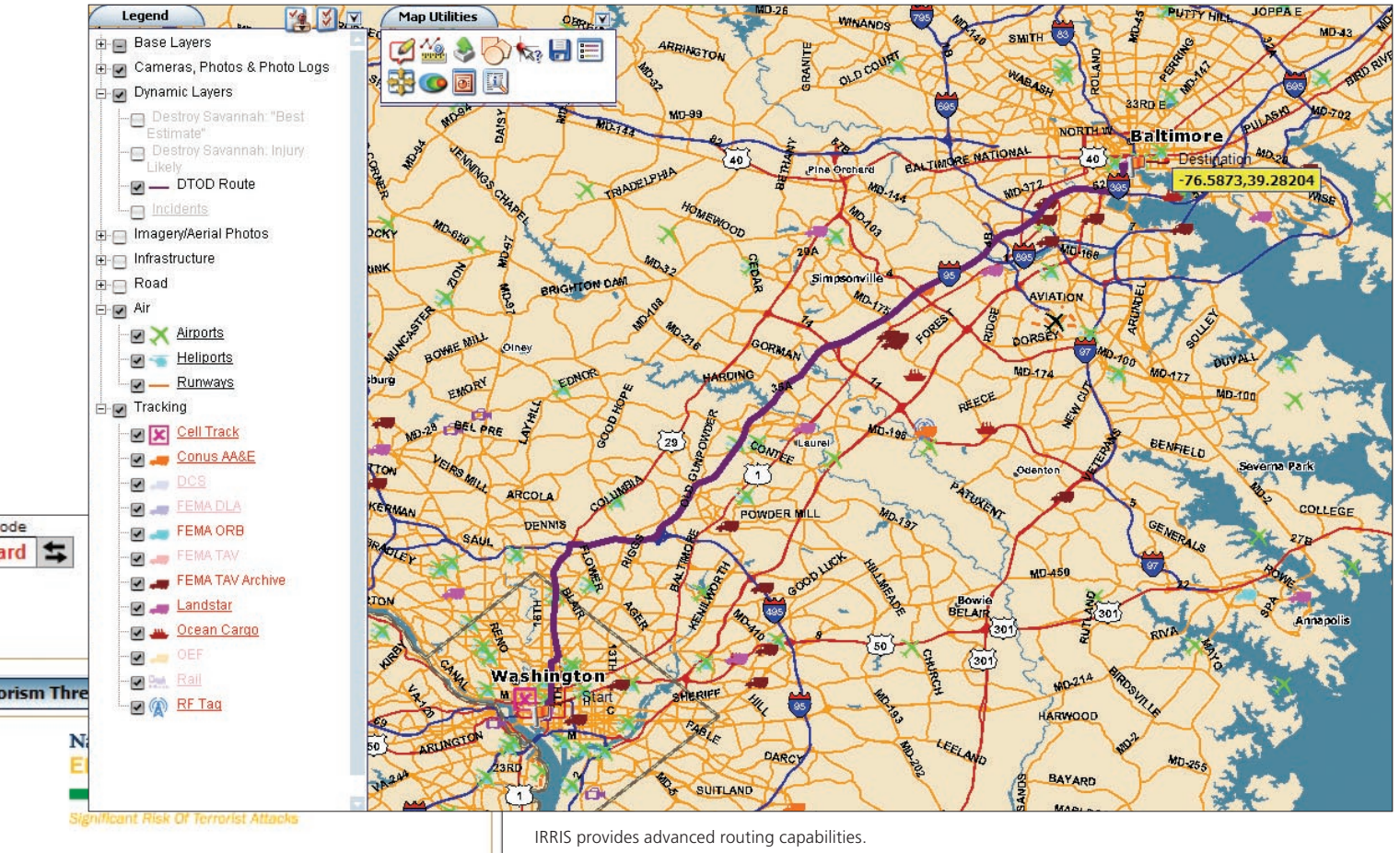
The United States Transportation Command (USTRANSCOM), a unified command of the DoD, has found and implemented such a platform: IRRIS from GeoDecisions. IRRIS is an innovative Web-based portal to worldwide infrastructure and near real-time transportation logistics data.

Headquartered at Scott Air Force Base in Illinois, USTRANSCOM and its components provide air, land, and sea transportation for the DoD. USTRANSCOM's command center, the Deployment and Distribution Operations Center (DDOC), uses IRRIS to support enhanced situational awareness for effective decision making.

The portal incorporates the latest advances in information technology (IT), geographic



An IRRIS Customized Dashboard



IRRIS provides advanced routing capabilities.

information systems (GIS), and location-based services (LBS) to help users manage assets and track equipment. The Web-based portal incorporates and displays worldwide infrastructure data, live vehicle tracking, near real-time weather, and the latest route conditions in a map format. IRRIS uses ESRI ArcGIS software, as well as NAVTEQ map data, to provide enhanced Web-based mapping capabilities and interoperability with military data sources.

> "Amateurs talk about tactics, but professionals study logistics."
>
> Gen. Robert H. Barrow, former commandant of the United States Marine Corps

GeoDecisions, an information technology company that specializes in geospatial solutions, developed and maintains IRRIS. Originally developed for the U.S. military Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA), IRRIS supports day-to-day operations and provides critical information to aid transportation logistics, incident management, information sharing, and collaboration.

The system has become a valuable tool for many other government agencies and organizations as a common operational picture (COP) to support effective decision making. For example, the Federal Emergency Management Agency (FEMA) uses IRRIS to track shipments of supplies bound for areas targeted for humanitarian assistance and disaster relief. The U.S. Navy also uses IRRIS to track critical logistics shipments.

Defense Transportation and Tracking Service

USTRANSCOM recently integrated the Defense Transportation and Tracking Service (DTTS) legacy system functionality into IRRIS. DTTS provides transportation security for more than 50,000 arms, ammunitions, and explosives (AA&E) shipments per year in the United States.

Retiring the legacy system and upgrading to IRRIS resulted in a significantly improved ability to identify, assess, monitor, and respond

continued on page 4

continued from page 3

USTRANSCOM Relies on GIS and NAVTEQ Map Data

to AA&E shipments. Before being integrated with IRRIS, DTTS did not have a geospatial component, making it difficult for users to visualize and analyze shipments. Now, with the DTTS functionality built into IRRIS, users can share a COP with command centers and service partners in a data-rich, geospatial environment.

The DTTS functionality in IRRIS improves the daily management of DoD shipments. For example, DTTS operators receive automated alerts when a shipment deviates from a specific route as a result of traffic incidents, weather issues, and/or emergencies. Operators also have the ability to immediately map an incident and calculate the nearest police and fire departments, military installations, emergency response locations, and other points of interest. Using NAVTEQ map data, the routing engine in IRRIS provides accurate turn-by-turn, address-to-address, or latitude-longitude driving directions with total drive time, mileage, and maps. For example, during recent shipments with national-level visibility in Afghanistan, DTTS operators used IRRIS's geofencing capabilities to provide an alert to the commanding general when supplies to warfighters on the front lines came within 100 miles of their destination.

> "My logisticians are a humorless lot . . . they know if my campaign fails, they are the first ones I will slay."
>
> Alexander the Great

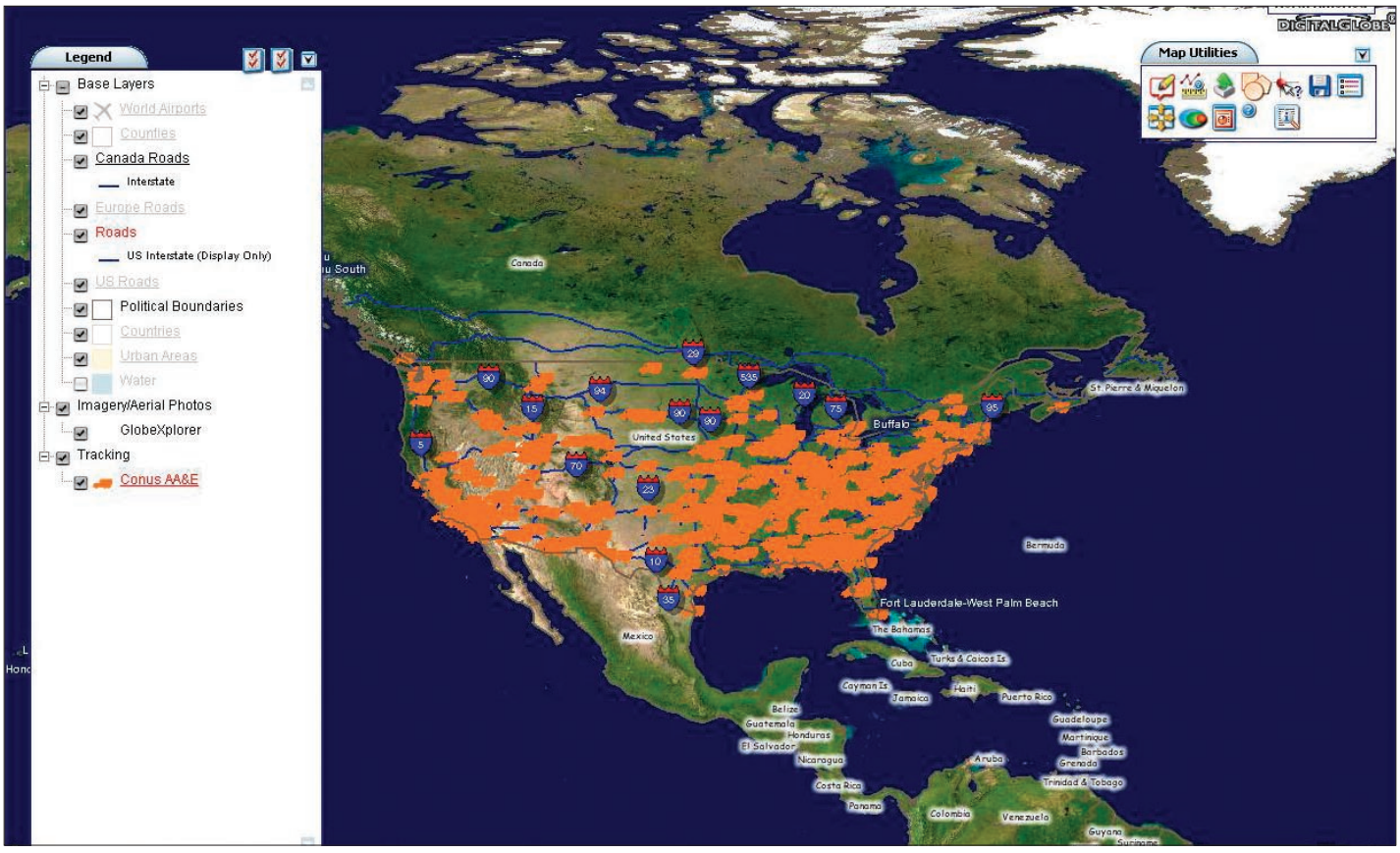
For system security, a Web-based system access tool and role-based user account component allows program managers to restrict data viewed by users to the individual data element level. IRRIS includes an online digital library of DTTS standard operating procedures, emergency response history, and other critical documents for minimizing data entry errors and significantly reducing overall processing time.

In addition to NAVTEQ's attribute-rich map data, IRRIS uses industry-standard ArcGIS software from ESRI and an Oracle database to provide analytic and visualization capabilities and ensure that future enhancements can be added seamlessly.

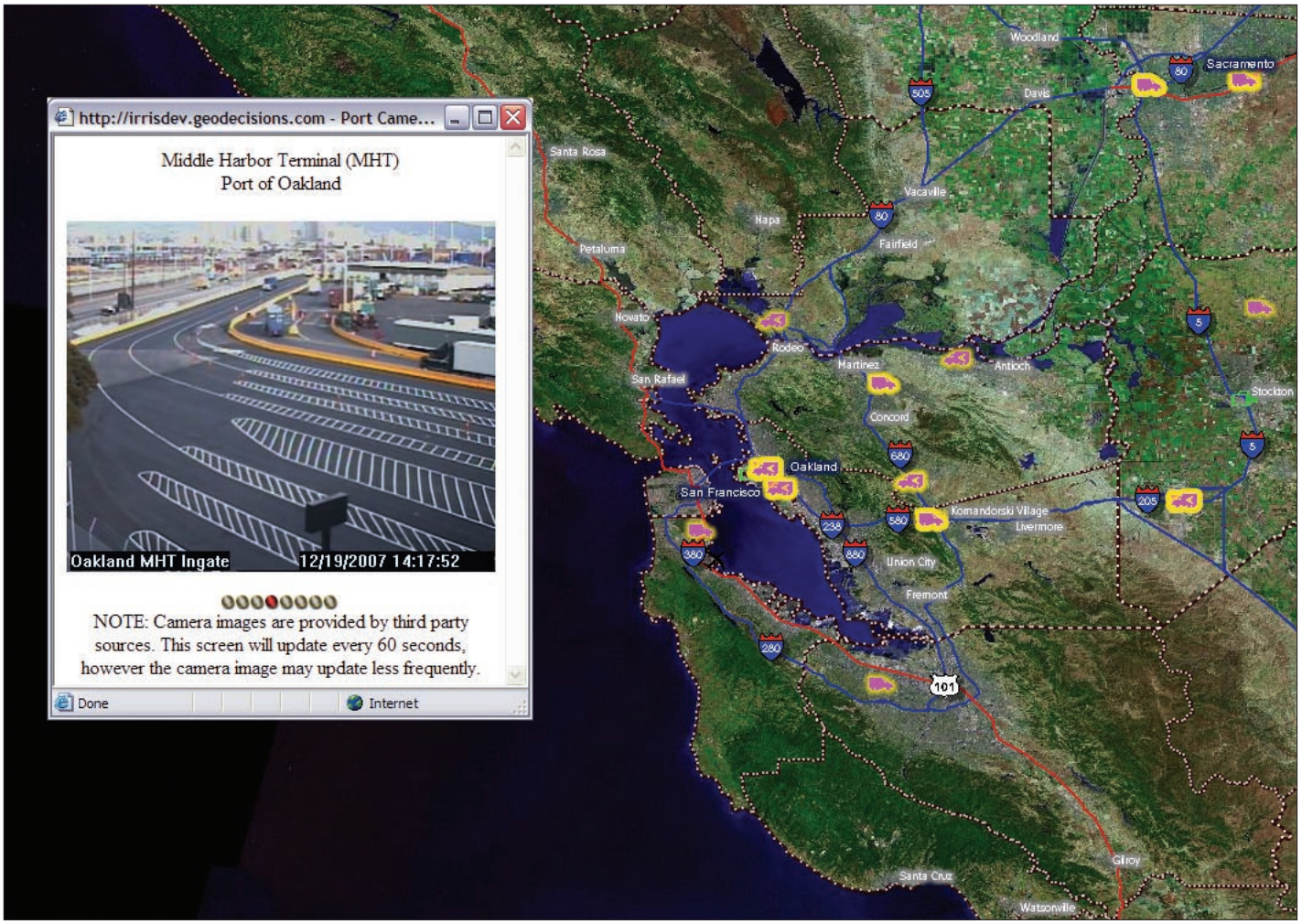
By investing in IRRIS and retiring a legacy system, USTRANSCOM improved its operations in this area at a cost avoidance projected to be $6 million, including $1.5 million in system upgrade costs and more than $500,000 of annual maintenance costs for DTTS.

Defense Courier Division

Similarly, USTRANSCOM's Defense Courier Division (DCD) also uses the capabilities in IRRIS to improve its ability to securely and cost-effectively distribute highly classified and sensitive material to worldwide defense couri-



Tracking Wall Map Showing AA&E Shipments



Integrated Port Camera Feed and Tracking Functionality in IRRIS

er stations. The DCD provides secure, timely, and efficient end-to-end global distribution of classified and sensitive material. Responsible for secret-level shipments and small packages, DCD manages and routes these shipments and drivers as well as tracks vehicles.

Before implementing IRRIS, DCD lacked an information technology component or any visibility for its shipments. Once a package was delivered, it was confirmed by a phone call to its shipping origin. Now, when a shipment is entered into IRRIS, an e-mail notification is sent to the receiver 24 hours prior to delivery. The tracking capabilities in IRRIS offer DCD In-Transit Visibility (ITV) to track and identify vehicles and shipments.

IRRIS enables DCD to monitor, track, and pinpoint the location of shipments moving through various worldwide transportation networks in near real time. The system's carrier performance capabilities let users quickly generate reports for specified shipments. For example, DCD may need to determine why a shipment did not reach its destination in the proper time frame. IRRIS allows DCD to proactively address issues related to tracking shipments and other materials.

USTRANSCOM's previous investment in IRRIS enabled the organization to upgrade its DCD capability to track sensitive material for a fraction of the cost of any similar capability. Furthermore, secure transport, tracking, and response infrastructure has been greatly enhanced.

Benefits of IRRIS

With IRRIS, USTRANSCOM can manage and track sensitive cargo and respond to specific situations using an intuitive Web-based interface. The GIS, Web, and service-oriented architecture capabilities in IRRIS provide USTRANSCOM with the ability to receive, process, and display satellite tracking and messaging data from conveyance transponders. These efficiencies have resulted in a projected $6 million cost avoidance for USTRANSCOM and, ultimately, taxpayers.

For more information, contact Brendan Wesdock, vice president, GeoDecisions, at bwesdock@geodecisions.com or visit www.irris.com and www.geodecisions.com. You also may contact Michael Buckley, NAVTEQ Enterprise Americas, at michael.buckley@navteq.com or visit www.navteq.com/enterpriseamericas.

NAVTEQ MAPS™

The NITF for ArcGIS Extension

ITT Visual Information Solutions and ESRI Offer National Imagery Transmission Format Support for GIS Applications

Geospatial analysts increasingly use current satellite and other imagery to provide up-to-date intelligence products for making informed decisions. The defense and intelligence communities use the National Imagery Transmission Format (NITF) for storing imagery and related data.

To help geospatial analysts who work with ESRI's ArcGIS Desktop platform easily create and access NITF data, ITT Visual Information Solutions—collaborating with ESRI—developed the new software extension NITF for ArcGIS.

To maximize available intelligence and work in an interoperable environment, today's geospatial analysts need to integrate NITF imagery into their existing GIS workflow. Receiving imagery in NITF format is only the first step that connects the analyst with decision makers, warfighters, and field operatives that will use the products the analyst creates.

Adding NITF Imagery to the GIS Workflow

Previously, ArcGIS users had limited access to NITF imagery in their workflow. Now, geospatial analysts no longer need to depend on multiple software solutions to integrate NITF imagery into their GIS workflow. NITF for ArcGIS provides seamless access to NITF data within the ArcGIS environment, making geospatial analysis more efficient and timely. NITF for ArcGIS is certified by the Joint Interoperability Test Command (JITC) and allows users to create data products that comply with NITF specifications. This comprehensive solution also complements ESRI's interoperable, standards-driven platform.

NITF for ArcGIS is based on technology in ITT Visual Information Solutions' ENVI software, which is used for processing and analyzing geospatial imagery. Also JITC certified, ENVI is widely acknowledged within the U.S. defense and intelligence communities as being the best available NITF support product.

The NITF File Format

The NITF standard is a digital file format defined by the NITF Standards Technical Board. Defense and intelligence imagery consumers use NITF to store multiple data types in a single file. These data types include imagery, vectors, annotation, and detailed metadata.

NITF is a complex imagery and image exploitation format that contains a variety of image and nonimage information. Currently,

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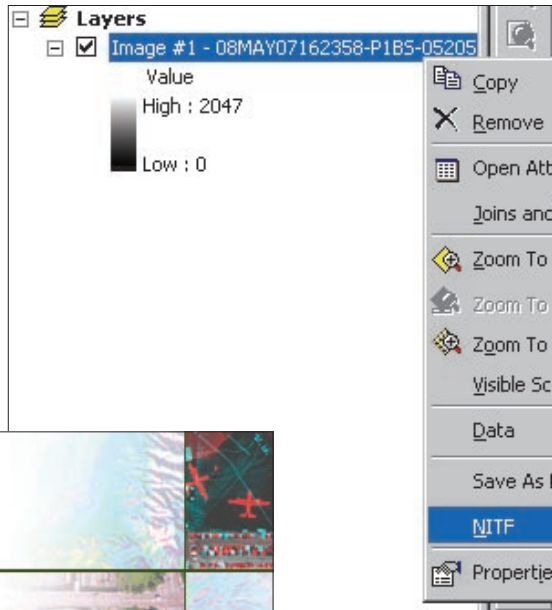
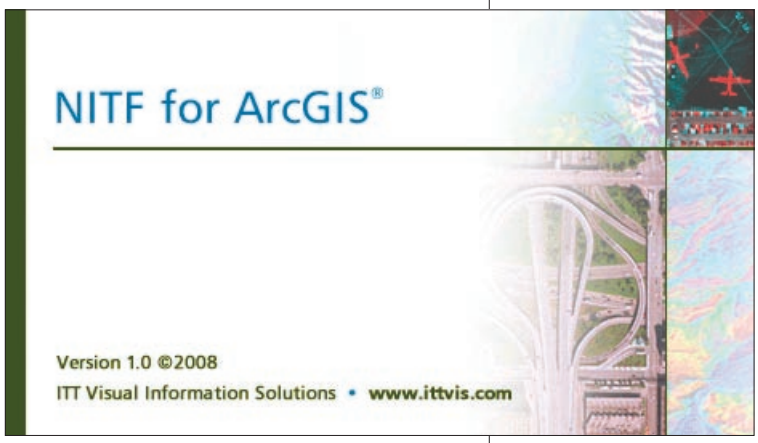
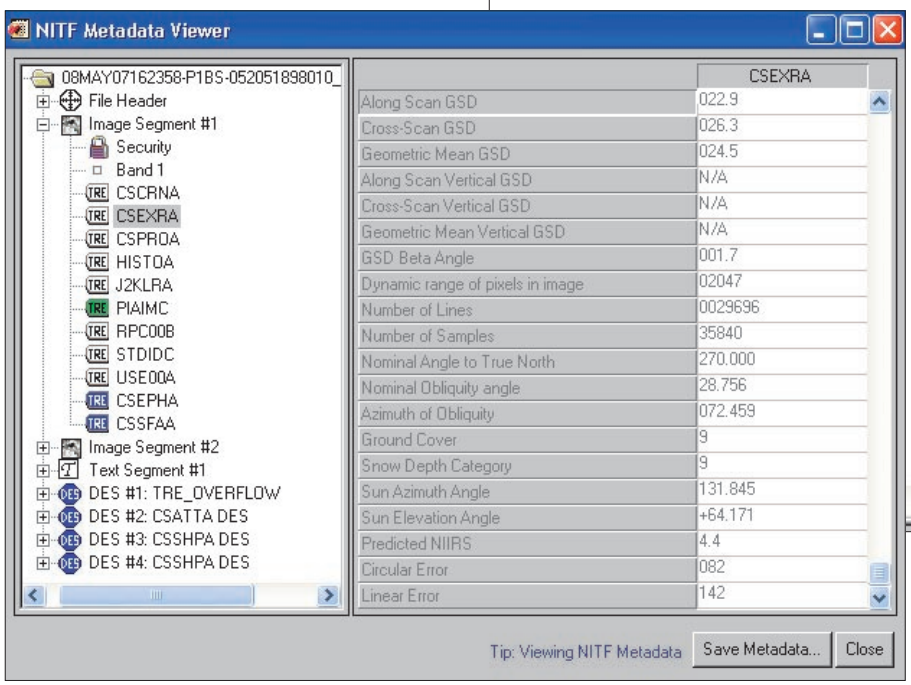




ITT Visual Information Solutions and ESRI offer ArcGIS users access to JITC-certified NITF support with the NITF for ArcGIS extension.



The NITF Metadata Viewer allows users to view all NITF metadata, including header information, Tagged Record Extensions (TRE), security levels, and any associated text segments.

From the ArcGIS display, users can view the NITF metadata or save the file to a new format using the tools in ArcGIS.

continued from page 6

The NITF for ArcGIS Extension

there are three different versions of the NITF specification: NITF 1.1, 2.0, and 2.1.

NITF for ArcGIS provides full read and write support for both NITF 2.0 and 2.1 as well as read-only support for NITF 1.1.

NITF is an evolving, dynamic standard. Each successive version adds features or components intended to satisfy emerging requirements of the national and international defense and intelligence communities. For example, NITF 2.1 was the first version to include support for the JPEG 2000 compression standard. Each version of NITF remains in use at U.S. agencies. However, many organizations are moving to NITF 2.1 and converting older data into the new format when possible.

JITC Certification

The JITC certifies that implementations of the software that works with the NITF format comply with defined standards to ensure consistency, accuracy, and compatibility with disparate governmental systems. JITC is a National Geospatial-Intelligence Agency (NGA)-sponsored test and evaluation facility. JITC's primary role is to provide testing services for organizations that develop or use NITF products. JITC evaluates an NITF product's ability to consistently create and output, accept and process, and recognize the different components of NITF files.

Before certifying a product, JITC conducts a series of tests to verify the software's ability to generate, interpret, display, and unpack imagery, graphics, text, and associated metadata to and from the NITF file format. Successful certification assures users that the digital imagery products they disseminate and exploit are fully interoperable with their systems.

NITF for ArcGIS Applications

Defense and intelligence agencies exploit imagery in the NITF format in many systems and applications. Four common applications include accurate display of imagery, comprehensive metadata access, file format conversion, and the ability to export map results to NITF. NITF for ArcGIS fully supports these functions.

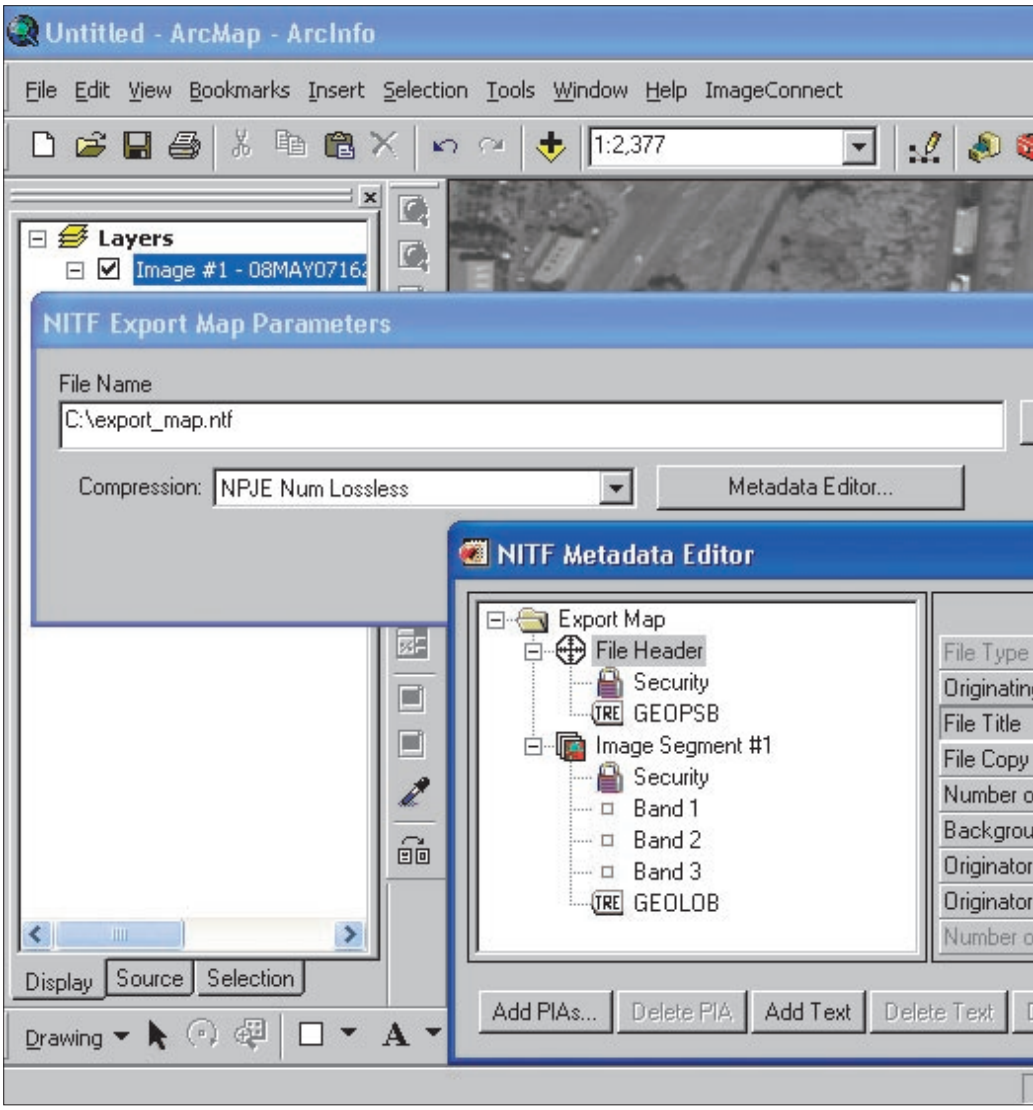
Accurate Display and Metadata Access

Two of the most basic NITF for ArcGIS features are perhaps the most important to the geospatial analysis of imagery: accurate display and georeferencing of the NITF contents and access to the full set of NITF metadata.

NITF stores a wide variety of imagery. The NITF file also contains instructions on how the image and nonimage information should be displayed with one another. For example, the NITF file may have a series of imagery segments that must be arranged in a particular spatial orientation, and each might contain specific text annotation that must be placed in the correct location. Any deviation in implementing these instructions would result in a noncompliant NITF display and could result in erroneous information being transmitted to analysts. The JITC certification ensures that NITF for ArcGIS will always display NITF contents according to the standards.

Access to the NITF metadata is important to the geospatial analyst. The ability to view the metadata fields, tagged record extensions, and text segments contained in the file helps the analyst assess the data's suitability for the intended geospatial analysis.

For example, it is important to know the time and date the imagery was collected, the sensor type, the coordinate system of geospa-



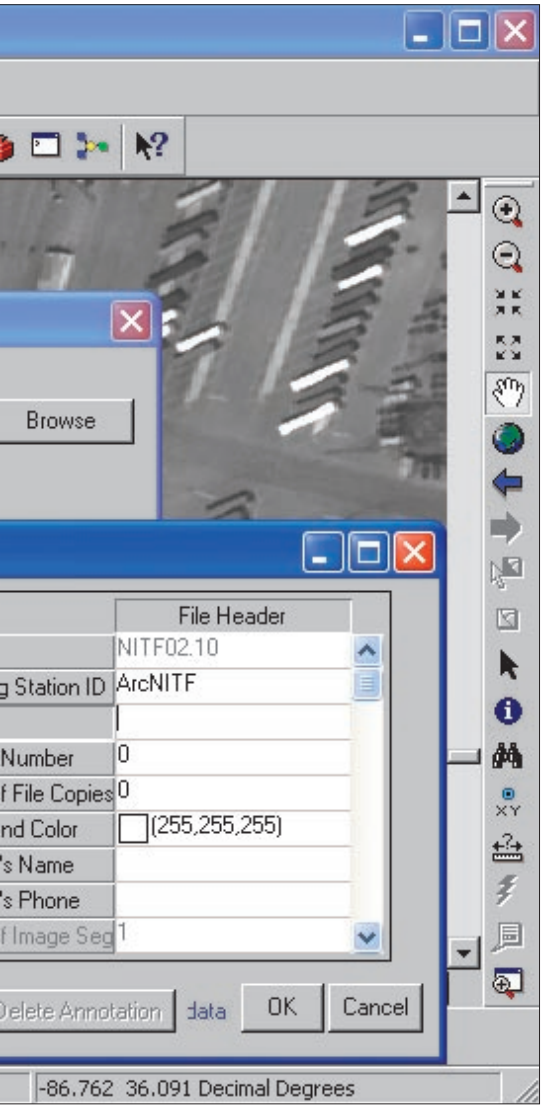
When saving an image or map to a new NITF file, users can edit the existing NITF metadata and add new information, such as mission-specific information.

tial data, and what type of processing has been applied to the imagery. Each of these attributes may influence decisions made through visual or analytic exploitation of the data. The JITC certifications of NITF for ArcGIS also guarantee that metadata is accurately presented.

NITF File Format Conversion

Many users, especially geospatial analysts working with open source data, receive imagery in a variety of file formats. However, their colleagues downstream in the analysis chain expect to receive products in the NITF format. The NITF for ArcGIS extension allows them to easily convert a non-NITF file, either a full image or spatial subset, into a new NITF file. During the conversion, mission-specific metadata and Tagged Record Extensions (TREs) can be added or updated.

TREs contain special metadata fields that are used to customize NITF implementations without changing the base NITF standard. The ability to edit and maintain the metadata ensures that future users of the product have the most up-to-date information about the file's origin, technical parameters, and georeferencing. NITF for ArcGIS accurately converts the following file types into NITF: JPEG, JPEG 2000, TIFF, DTED, and ENVI.



Export Map to NITF

ESRI's ArcGIS Desktop software offers a robust set of tools for creating maps and annotation. With NITF for ArcGIS, image and geospatial analysts can bring NITF imagery into the ArcMap window to take advantage of these tools. After completing the annotation, graphic markup, or full map layout production, the user can employ NITF for ArcGIS to export the results to a JITC-certified NITF output file. This is accomplished using the File > Export Map To NITF tool.

The Export Map To NITF tool works in much the same way as the ArcMap Export Map tool. The main difference: the Export Map To NITF tool gives the user the option of creating and editing metadata prior to export. Again, this is another way that geospatial analysts can ensure that their tradecraft and workflow with the NITF imagery is embedded in the NITF format without having to leave the ArcGIS environment.

ITT Visual Information Solutions developed NITF for ArcGIS for use with ESRI's ArcGIS software. The company provides workshops and outreach programs to help geospatial analysts use NITF imagery in their daily workflows.

To learn more, visit www.ittvis.com/NITFArcGIS, or call 303-786-9900 to speak with an ITT Visual Information Solutions representative.

ESRI on the Road

Environment, Energy, and Sustainability Symposium and Exhibition
June 14–17, 2010
Denver, Colorado, USA

Eurosatory 2010
June 14–18, 2010
Paris, France

Special Operations Forces Industry Conference
June 15–17, 2010
Tampa, Florida, USA

Network Centric Warfare Europe, IQPC
June 23–24, 2010
Brussels, Belgium

ESRI International User Conference
July 12–16, 2010
San Diego, California, USA

NGAUS
August 21–23, 2010
Austin, Texas, USA

INDESEC Expo 2010
September 6–8, 2010
New Delhi, India

GEOINT 2010
October 25–28, 2010
Nashville, Tennessee, USA

Technet Asia-Pacific
October 25–28, 2010
Honolulu, Hawaii, USA

NCO Asia Pacific
November 1, 2010
Singapore

Special Operations Forces Exposition
November 2–3, 2010
Ft. Bragg, North Carolina, USA

I/ITSEC 2010
November 29–December 2, 2010
Orlando, Florida, USA

ESRI Defense Mapping
Efficiently Manage Products with Military Specifications

ESRI Defense Mapping, an ArcGIS Desktop extension, lets you produce and maintain high-quality topographic databases and cartographic products. The extension helps military data producers and managers create, maintain, and leverage standards-based defense data across a services-wide environment.

Organizations in the defense mapping industry need efficient production workflows and tools to create and maintain quality spatial data for analysis, data integration, and map production that meet defense specifications. ESRI Defense Mapping provides tools for efficiently creating and maintaining data with military specifications and managing the production workflow. Defense organizations and their supporting contractor teams can use these commonly required tools to increase efficiency throughout all production stages.

With ESRI Defense Mapping, defense data producers can

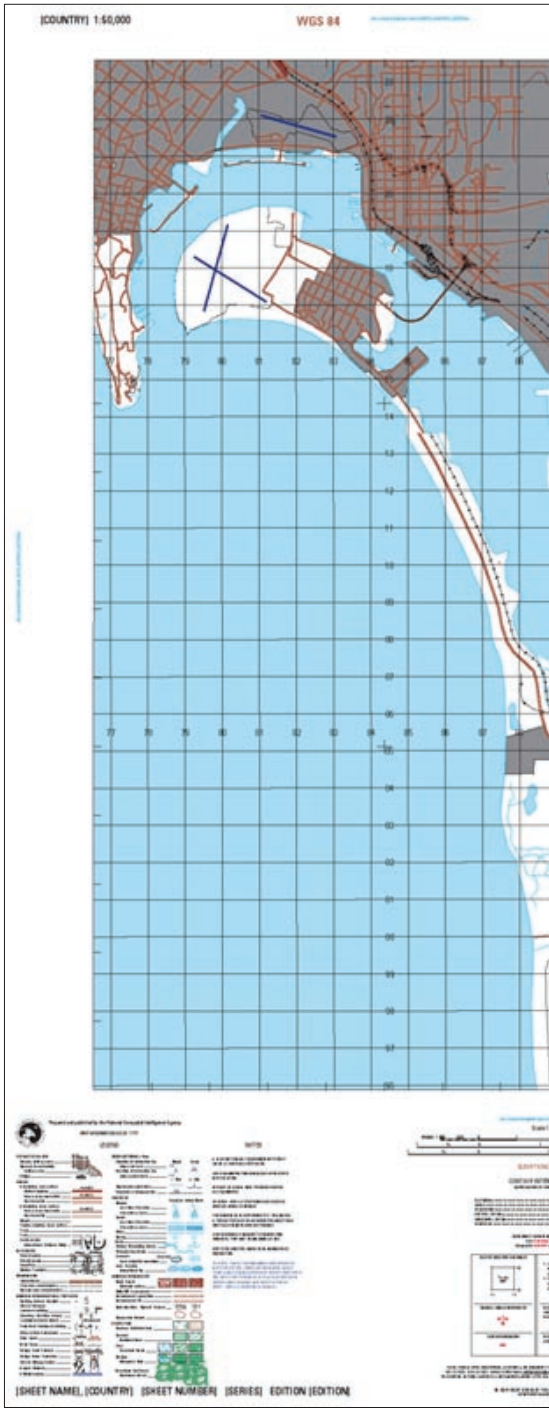
- Save time while performing ongoing maintenance of servicewide data repositories.
- Capture and distribute best management practices throughout the organization to ensure data consistency from site to site.
- Provide in-process quality assurance by leveraging relational geodatabase models, extended attribute validation rules, and automated feature attribution tools.
- Efficiently perform database maintenance, quality control, and high-quality cartographic output for services-specific products.
- Standardize cartographic production with efficiency-focused map series design and layout tools, rule-based symbology, and cartographic editing tools.

ESRI Defense Mapping includes many geodatabase models specific to the defense industry. Users have the option to use these models as they are or extend them. The models are

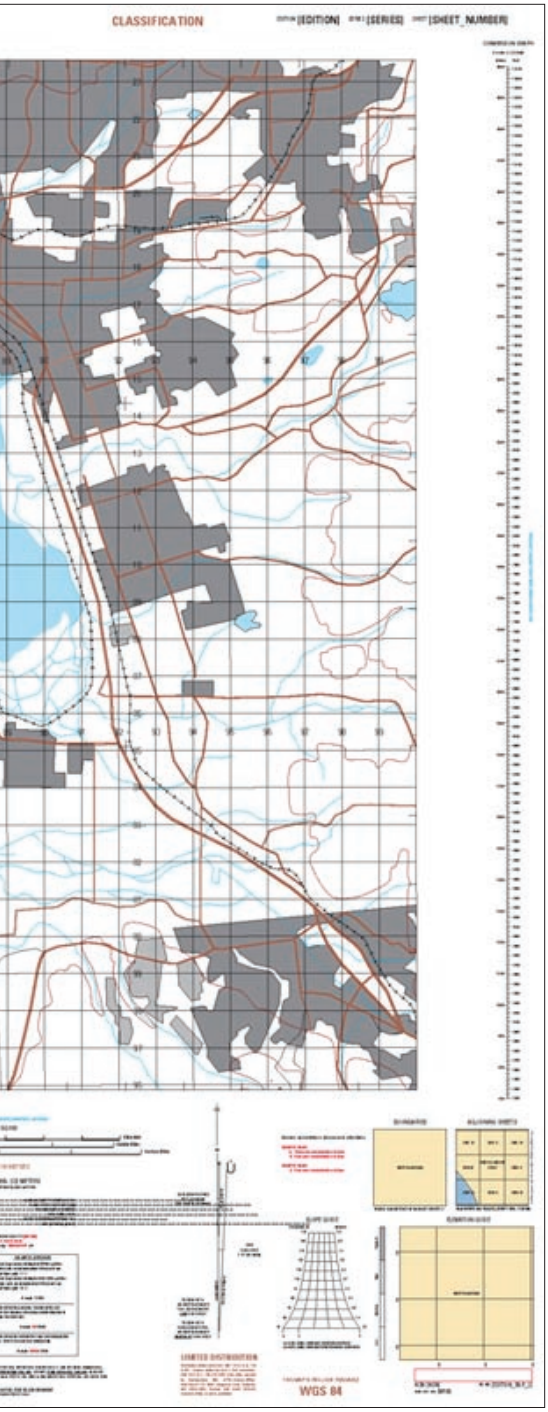
- Multinational Geospatial Co-Production Program (MGCP)
- Theater Geospatial Databases (TGD)
  - Strategic
  - Operational
  - Tactical
  - Urban
- Defense Installations and Environment
  - United States Air Force (USAF) GeoBase Common Installation Picture (CIP)
  - United States Marine Corps (USMC) GEO*Fidelis* CIP
- Geospatial Intelligence Feature Database (GIFD)
  - GIFD Delivery 4 (D4)
  - VMap 2 Topographic Line Map (TLM) (D4)
  - Digital Feature Extraction Guide (DFEG)
- Vector Map Series
  - Vector Map Level 0 (VMap 0)
  - Vector Map Level 1 (VMap 1)
  - Vector Map Level 2 (VMap 2)
  - Urban Vector Maps (UVMap)
- Vector Interim Terrain Data (VITD)
- Stereo Airfield Collection (SAC 2.1)
- Foundation Feature Data (FFD)

ESRI Defense Mapping provides the following cartographic standards:

- Image City Maps (ICM)
- Joint Operations Graphic-Air (JOG-A)
- TLM
  - 1:50k and 1:100k



Out-of-the-Box Support for Defense Cartographic Products



Key Features of ESRI Defense Mapping

Data Production

Schema creation and management are accomplished using automated tools such as Geodatabase Builder and associated defense data model templates. This gives defense data producers the ability to quickly create data repositories that support numerous data model specifications and model versions.

Legacy data loading and migration is supported via a suite of automated loading tools and associated cross-reference templates. This supports the planning, testing, and execution of data loading operations into and between various data model specifications. Templates for common data migrations are included for immediate use and can be easily modified using standard office productivity software to support unique data loading/migration requirements.

Feature extraction is supported through the use of specification-driven geometry and attribution tools. This enables in-process quality assurance, thereby rejecting creation of noncompliant data during the production process. Defense data specifications stored in a central repository give data producers the ability to perform in-process quality assurance as features are collected.

Cartographic finishing and product generation are managed through a suite of database-driven cartographic tools called Visual Specifications. These tools give users the ability to quickly and efficiently produce defense-specific map and data products. Defense cartographic specifications stored in a central repository enable production staff to efficiently produce data products in a consistent manner.

Data Management

Automated feature-level metadata collection tools enable defense data producers and managers to collect and manage the life cycle history of individual features in the database, thereby reducing the data maintenance staff's editing workload. Using these tools also reduces the likelihood of metadata attributes not being populated or being improperly assigned, since the attribute management task is now automated.

Streamlined data replication tools give managers the ability to work efficiently with distributed teams to automatically synchronize changes among sites, teams, or external data partners and cooperators.

Data quality and compliance testing tools enable defense data managers to quickly assess the quality and usability of data products. ESRI Defense Mapping (formerly PLTS for ArcGIS—Defense Solution) leverages both commercial off-the-shelf and government off-the-shelf Geospatial Analysis Integrity Tools to ensure compliance with published data model specifications.

Workflow Management

The workflow management component enables defense data producers and managers to automate workflows, distribute work evenly across the organization, and track data management activities. Using integrated reporting tools, managers can quickly obtain the status of data management activities, track the progress of tasks assigned to staff, and identify production constraints.

Integration of task-based management tools with ArcGIS Desktop enables data management staff to capture, distribute, and automate best management practices and procedures among the data production staff. This leads to greater production efficiencies across the organization.

For more information about ESRI Defense Mapping, visit www.esri.com/defensemapping or e-mail defensemapping@esri.com.

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