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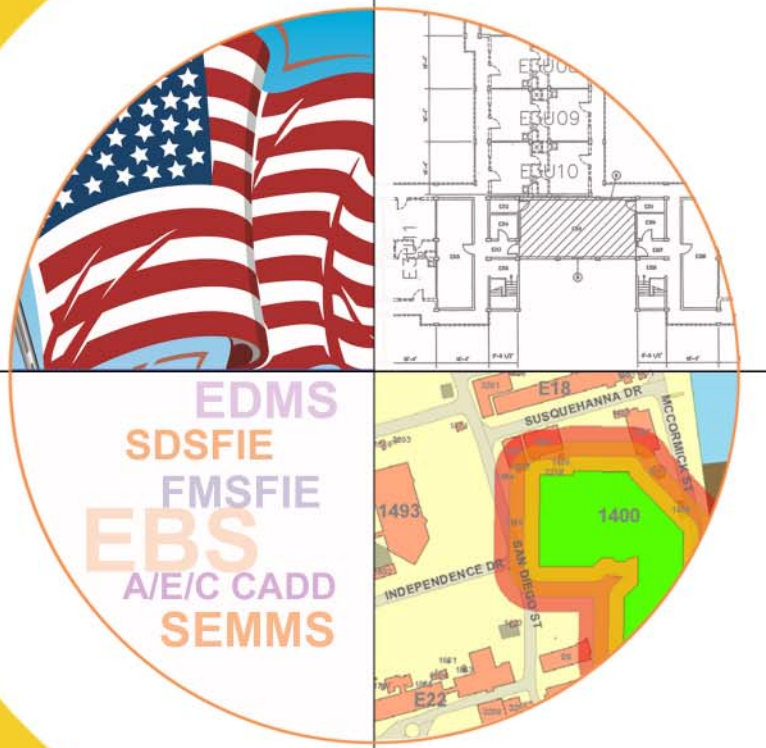

Published by the CADD/GIS Technology Center for Facilities, Infrastructure, and Environment
Fall 2003
Vol. 03-2

The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

Harold L. Smith, Center Chief
Laurel Gorman, Outreach Coordinator

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The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment is dedicated to fostering the application of computer-aided design and drafting (CADD) and geographic information system (GIS) technologies for facility life-cycle efforts throughout the DoD, other federal agencies, and private industry. The CADD/GIS Insights is published by the CADD/GIS Technology Center for Facilities, Infrastructure, and Environment of the Information Technology Laboratory, U.S. Army Engineer Research and Development Center, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180-6199.

Features

Departments

From the Chief

***Harold Smith**, Chief, CADD/GIS Technology Center for Facilities, Infrastructure, and Environment*

The Role of Data Standards in Homeland Security

In the aftermath of the September 11, 2001, attack, New York's search and rescue, emergency recovery, cleanup, and failure analysis teams were scrambling to integrate data sets from 23 city, state, and national sources. Converting and assembling the data became a 24-7 activity requiring support from 29 state, commercial, academic, and Federal organizations. Often, these data sets were found to be in dissimilar formats using different or no data standards. Many drawing files were not geo-referenced, a deficiency that made it even more difficult to combine the data sets into a common multi-functional GIS.

Most data managers agree that a national data content standard is essential in today's environment. A national standard will ensure that data sets/maps designed for national homeland security are able to share information across Federal, state, local, and commercial boundaries. The standard should be non-proprietary, multi-functional, acceptable by multiple agencies, and available immediately. The Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) can be that standard!

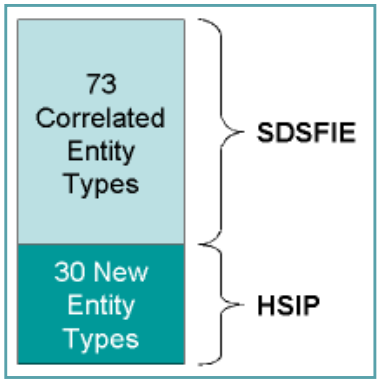
The National Imagery and Mapping Agency (NIMA) and the U.S. Geological Service (USGS) have partnered to develop the Homeland Security Infrastructure Program's (HSIP) Minimum Essential Data Sets (MEDS). The MEDS provide the geospatial foundation for tracking critical infrastructure, including those national assets that are characterized as having high national visibility. The HSIP identified five major categories for MEDS:

- Critical Infrastructure.
- Important Industry.
- High Value or Symbolic Targets.
- Miscellaneous.
- Base Map Information.

Figure 1. New York Emergency Data Processing Center on Sep 14, 2001

The CADD/GIS Technology Center has incorporated the MEDS into the latest release of the SDSFIE as a beginning for a Homeland Infrastructure filter. As such, the SDSFIE provides HSIP queries for the purposes of readiness, response and recovery planning, and actual emergencies. As the MEDS are expanded and refined, the SDSFIE can satisfy the evolving HSIP and MEDS needs. The HSIP report identified information requirements but did not define a data structure. As an established and widely implemented data content standard, the SDSFIE can easily provide the structure to implement the MEDS. A preliminary correlation of the Entity Types reveals that over 70% of the Sub-Layers presented in the HSIP Tiger Team Report already exist in the SDSFIE.

The SDSFIE is the only "nonproprietary" data standard designed for use with the predominant commercially available, off-the-shelf GIS, FM, and CAD systems (e.g., ESRI ArcGIS, Intergraph MGE and GeoMedia, Autodesk AutoCAD Map, and Bentley MicroStation and GeoGraphics), and SQL-compliant relational database software (e.g., Oracle, SQL Server, Informix, and Microsoft Access). This nonproprietary design, in conjunction with its universal coverage, has propelled the SDSFIE into becoming the data content standard for GIS implementations throughout 1,200 organizations and offices including the Department of Defense (DoD); Federal, state, and local government organizations; public utilities; and private industry.



In 2001, the National Committee for Information Technology Standards (NCITS) approved the SDSFIE as an American National Standards Institute (ANSI) standard.

Organizations with Implementations of the SDSFIE

STATE GOVERNMENTS

Alaska	Kansas
Arkansas	Massachusetts
Arizona	Maryland
California	Connecticut
Ohio	Montana
DC	Florida
Texas	North Carolina
Georgia	North Dakota
Hawaii	Mississippi
Indiana	Wisconsin

LOCAL GOVERNMENTS

Arizona	Kentucky	Pennsylvania
Maine	South Carolina	
Kansas	Idaho	Connecticut
Michigan	Florida	Minnesota
Georgia	Missouri	Virginia
Oregon	New York	Washington
Illinois	Utah	Tennessee
Colorado	Indiana	Oklahoma

- SDSFIE adopted at 50 airports in 15 states.
- SDSFIE implemented at 22 universities.

Since its inception in 1993, the SDSFIE has been designed to promote linkage to other existing national data standards, as well as Government and commercially available national data sets, thereby eliminating the need for developing redundant data systems. The SDSFIE incorporates *applicable* data content standards developed by the Federal Geographic Data Committee, Environmental Protection Agency, Defense Information Systems Agency, USGS, Bureau of Land Management, U.S. Department of Transportation, Federal Aviation Administration, Air Force, Navy, Army, Marine Corps, U.S. Army Corps of Engineers, and numerous state and local municipalities. Content standards from the International Standards Organization were also incorporated to provide both inch-pound and metric units of measure. It is the nature of the SDSFIE to be responsive to specific users' needs and evolve quickly to incorporate new needs and uses. Although a new business case, the Homeland Infrastructure Foundation Level Database requirements were easily added to the SDSFIE by including the MEDS.

Since the SDSFIE is based on a relational database structure that lends itself to a hierarchical order of data, a tiered approach to its implementation can be used to support multiple levels of GIS

"Now there will be a national standard for enabling the common collection and interoperability of spatial data by DoD facilities, state and local governments. Because these operations include our military facilities, civilian airports and other public facilities, infrastructure, and environment, this standard is fundamental for our homeland defense."

-- Henry Tom
Chairman of NCITS L1
GIS Technical Committee

experiences and requirements. The SDSFIE toolbox accommodates a wide range of GIS users frequently referred to as "Viewers," "Users," "Power Users," "Modelers," and "Database Managers" (Figure 2).

From a manager's perspective, a "Viewer" will typically access predefined maps and queries showing general or detailed feature information within a broad data category (Entity Set or Entity Class). However, most experienced GIS "Power Users" typically execute unique queries for detailed information at the Entity Type level and for specific attribute information. The third type of user, "Modeler," focuses on creating continuous surfaces from representative data values such as elevations, land use types, and chemical concentrations associated with domain values and what-if scenarios. The last type of user, "Database Manager," concentrates on the database structure and upkeep of database records stored in the graphic and non-graphic tables.

The SDSFIE comes with a "Toolbox" of several software tools that currently consists of ten software applications:

1. **SDS FMS Browser** – Provides viewing and printing capability.
2. **Filter Maker** – Permits the user to select the specific features needed for their GIS.
3. **Filter Eraser** – Permits the user to delete "Filters" when they are no longer needed.
4. **Access Builder** – Permits the construction of SDSFIE-compliant Microsoft Access 97 or 2000 databases for use with a GIS. Specifically, the Access Builder is designed to "connect" and read the contents of an existing Access Database. However, it

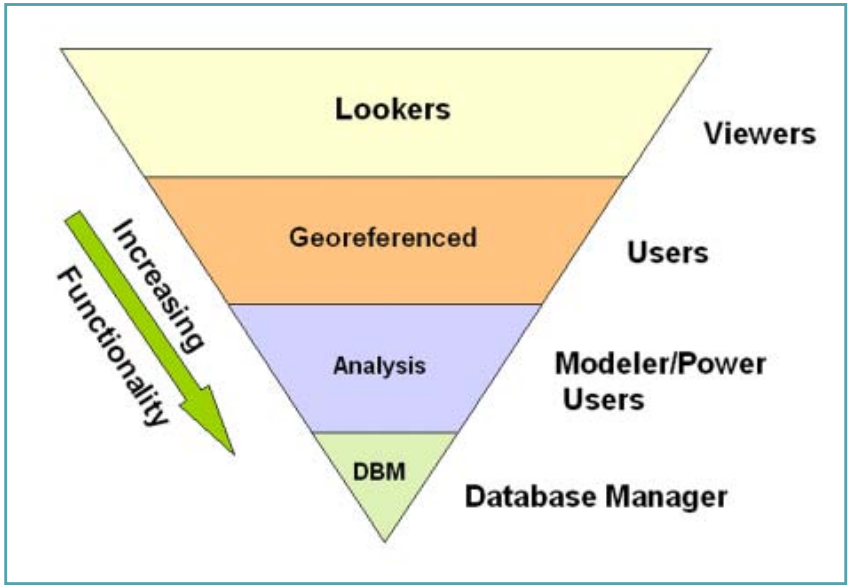


Figure 2. Geospatial Information is viewed by many but maintained by a few

is also possible to create a new Access Database from scratch and populate that database with attribute and domain tables that are consistent with the SDSFIE.

5. **SQL Generator** – Generates Structured Query Language (SQL) code for various GIS databases (Oracle, Intergraph RIS, and SQLServer) and the database tables for Microsoft Access.
6. **ESRI Geodatabase Builder** – Permits the creation of ESRI Personal Geodatabases (Access 2000) for use with ArcGIS.
7. **Geomedia Builder** – Permits the development of Geomedia databases for use with Intergraph GeoMedia GIS software.
8. **Access Data Creator** – Provides a data entry tool for use with SDSFIE- compliant Access database.
9. **Data Loader** – Automates the loading of a Geodatabase with Source Data from a variety of formats (Coverage, shapefile, etc.) and a variety of structures (the contained fields) into an SDSFIE-compliant Geodatabase in either Personal or SDE format, considering the constraints of geometry, projection, fields, values, and constants.
10. **Data Checker –** Connects to an existing Geodatabase (Personal or SDE) and reads its contents to determine the compliancy of the Geodatabase to the SDSFIE. Statistics about the elements being checked are summarized in a Results Window.

NIMA has developed a data dictionary known as the Feature and Attribute Coding Catalog (FACC) containing 421 data features. The FACC represents real-world features, attributes, and attribute values. A correlation matrix developed between the FACC and the SDSFIE reveals that approximately 407 of the features from the FACC already exist in some form in the SDSFIE. A majority of the FACC features are at the Entity Type level in the SDSFIE. The remaining FACC features are discriminated at the domain table level. The FACC features not found in the SDSFIE are related to details about building structure, war fighting operations, and emergency management requirements.

NIMA has contracted with the Center to address these omissions. The Center is developing software tools to convert datasets using

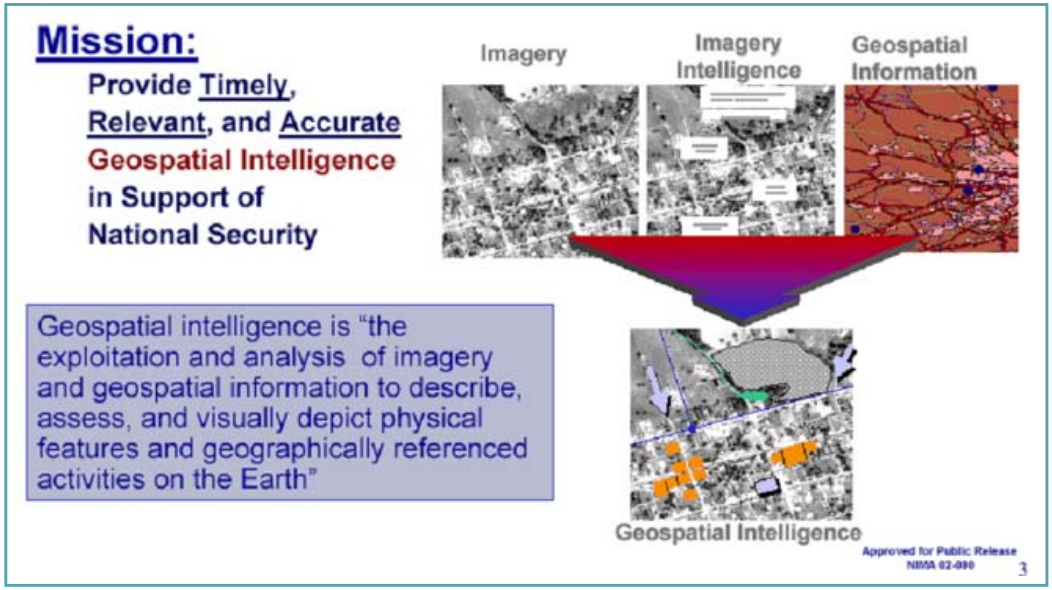


Figure 3. National Imagery and Mapping Agency is a national provider of geospatial data

an SDSFIE feature catalog to those which are FACC based, and vice versa. These tools are built on a common framework, based on the Common Delivery Framework (CDF), in order to facilitate reuse in other DoD business areas. The CDF, an approach to manage software guidance, capabilities, and resources for application developers in a consistent, corporate context, is based on industry standards for technology delivery. Testing for the FACC/SDSFIE export/import application will be conducted using four sample data sets as provided from NIMA.

The Center is also developing a pilot for the purpose of testing and demonstrating the integration of data from USGS, the National Map, and state and local data over the National Capital Region. The Pilot Project will assess data management requirements and linkages between USGS state and local data sets for use as an HSIP readiness, response, and recovery tool. The Pilot Project will include a summary and recommendations on any changes to the data structures and linkages to improve the utility of the data sets to support readiness, response, and recovery.

Through continued development of SDSFIE, the Center is playing a valuable role in Homeland Security. It is the nature of the SDSFIE to be responsive to specific user requirements and evolve quickly to incorporate new uses. With 10 years of experience and over $5 million dollars of development, the SDSFIE offers a valuable foundation for providing data content standards, a database schema, software development tools, established training, and a maintenance/development structure for the HSIP. The SDSFIE has truly become a national standard supporting the DoD and the nation.

Center Highlights for the Year

- NIMA, FBI, Smithsonian became Partners
- In addition to IM/CAD2 and ESRI, recent Contract Vehicles that are available for participating Partners
  - Michael Baker
  - Bentley Systems
  - InStep
- Center Products Released
  - SDSFIE, Release 2.30
  - FMSFIE, Release 2.30

Using GIS to Facilitate Anti-Terrorism/Force Protection (ATFP) Planning

By Ayman S.A. El-Swaify, P.E., CADD/GIS Division Manager, U.S. Navy Public Works Center Japan

The Japanese islands of Honshu, Kyushu, and Okinawa are home to numerous U.S. military installations belonging to all the DoD services, including Commander Naval Forces Japan (CNFJ).

In response to the events of 9/11, CNFJ installations began strengthening their anti-terrorism/force protection (ATFP) postures, but had a difficult time applying measures consistently throughout the region. This brought to light the need for a common way to plan, communicate, and illustrate force protection measures based on a stated Force Protection Condition (FPCON). Within a month after that event, CNFJ enlisted the support of the U.S. Navy Public Works Center Japan (PWC) to develop and deploy a GIS-based tool throughout the region that would aid them in this effort.

Implementation strategy

Since PWC Japan was already administering a robust GIS program throughout the region, the plan was to develop a tool that would leverage these existing GIS capabilities. The following criteria for the tool were set forth:

1. The tool would be designed to use existing GIS maps and other data pertinent to ATFP planning efforts.
2. It would be written in Visual Basic (VB)and designed to run inside the ESRI ArcGIS® environment.
3. It must be easy enough for security personnel to use on a periodic basis. Data editing would be limited to adding and moving point features and updating various attributes associated with pertinent map features.
4. It had to run in a secure environment (on SIPRNET (Secret Internet Protocol Router Network) computers).

With these criteria in hand, PWC employed the following implementation strategy:

1. Determine the functional planning requirements for ATFP and build these into a working VB prototype.
2. Procure unkeyed (stand-alone) ArcGIS 8.x licenses for SIPRNET computers within each sub-region that would use the tool. Also procure ArcGIS licenses for the CNFJ Force Protection Office so that all plans could be rolled up (via SIPRNET) and viewed in a regional context.
3. Enhance PWC's GIS database to provide better information in support of ATFP efforts. Conduct a perimeter fencing survey for various installations. Acquire commercial imagery for areas surrounding CNFJ installations.
4. Have PWC GIS personnel (with valid security clearance) perform software installation and hands-on training.

Following this strategy, a working prototype was developed and deployed at various sites. The functions of the tool are illustrated below.

ATFP planning tool functions

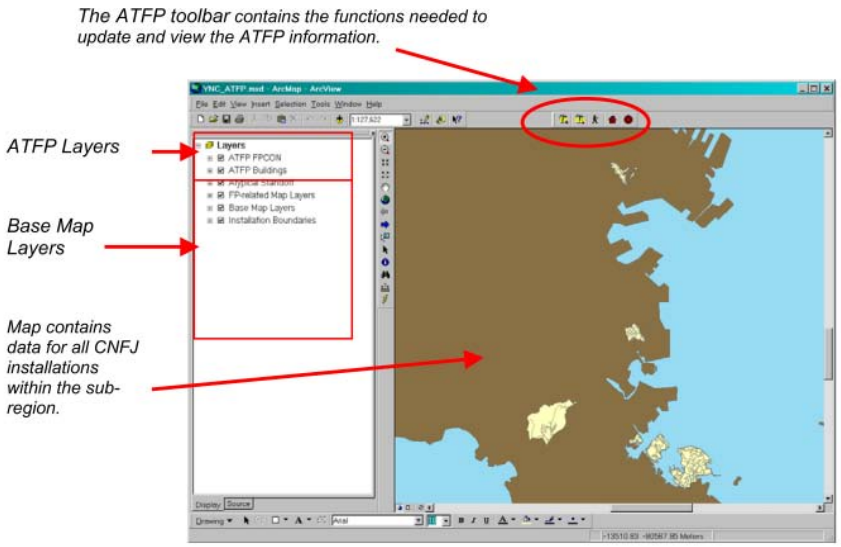
In order to use the tool, the following system requirements must be met:

1. ArcView 8.3 with Service Pack 2.

2. ATFP ArcGIS Application (no licensing involved) and related data files.
3. Up to 4 GB disk space for sub-region GIS data and commercial imagery.

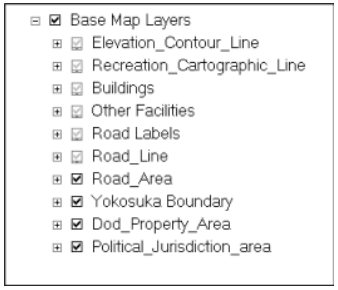
A pre-defined ArcMap document (mxd) is set up for the user in order to simplify start up. When the document is opened, the following screen is displayed.

There are several layers available for display in the leftmost pane.



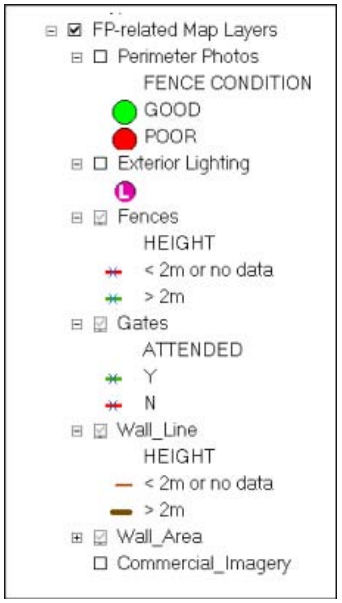
These are grouped into the following categories. By clicking the ⊞ box next to each group layer, the layer list can be expanded to view sub-layers within the group. Layers can be turned on and off by clicking the checkbox next to each.

Base Map Layers



These are general mapping layers maintained by PWC Japan or Public Works Departments. They are necessary to view the context of ATFP information. Normally the user will not need to manipulate the display of these items.

Force Protection (FP)-Related Map Layers



These layers are also maintained by Public Works and are of particular interest to Security personnel.

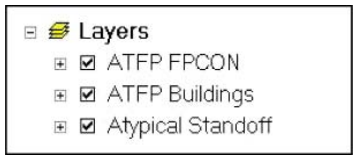
Perimeter Photos display locations of snapshots that were taken during the perimeter fencing survey. These photographs can be retrieved using the ArcGIS hotlink function.

Exterior Lighting shows the location of exterior lights.

Fences, Gates, Wall_Line and Wall_Area show each of these items. Perimeter fences, gates, and walls that were surveyed have details available (height, material, etc.) that can be retrieved using ArcGIS.

Commercial Imagery displays aerial photography for areas on and off base.

ATFP-Related Map Layers



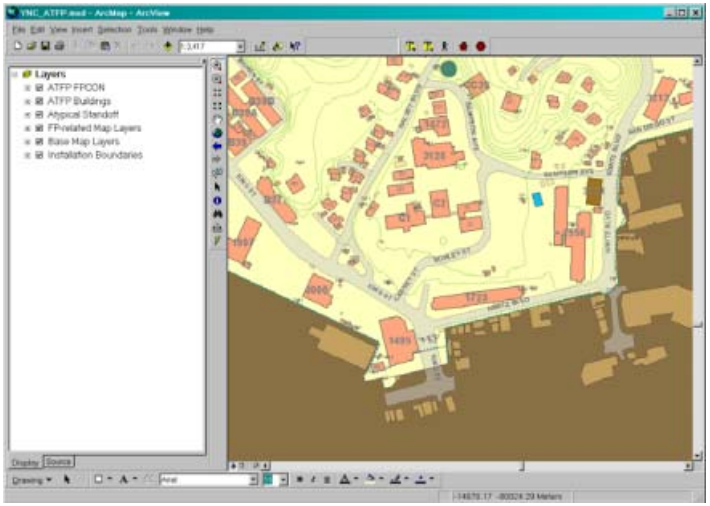
Data for the three ATFP group layers are maintained by security personnel at each sub-region. The user can change how these are displayed directly in the Layer list or by using the ATFP application.

Adding and modifying ATFP data

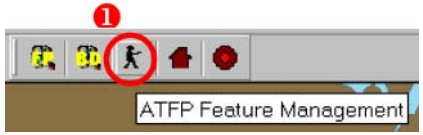
ATFP personnel are responsible for adding and modifying these layers. The data are stored in personal geodatabase (MS Access) format. After updates are complete, the single MS Access database file can then be forwarded to CNFJ for review.

The first step in adding data is to zoom to the installation and area in question by using Zoom In or a pre-defined Bookmark, or combination of the two methods.

Greater amounts of detail become visible as the user zooms in closer.



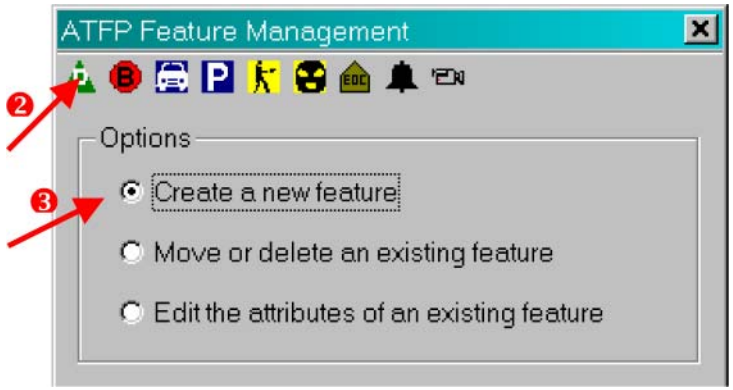
ATFP Feature Management



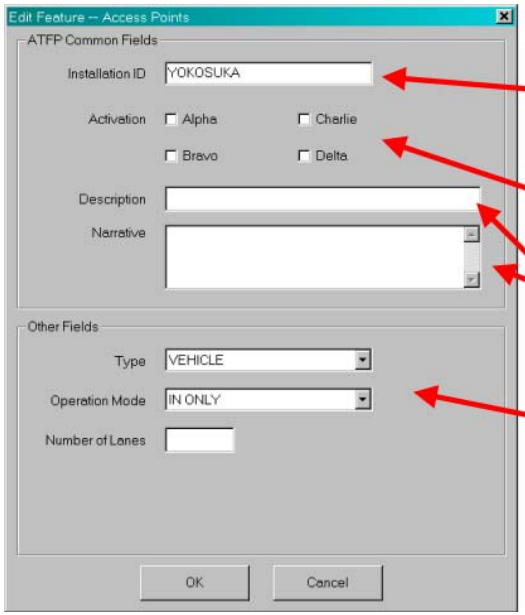
Clicking the ATFP Feature Management tool ❶ will bring up the related palette tool.

This tool lets the user insert points onto the map for several types of ATFP-related features.

To use the tool, the user must first click on the icon that represents the type of feature to be added or manipulated ❷, and then select either the Create, Move, or Edit option ❸.



In all cases (except deleting an item) the applicable edit screen will appear so that attributes can be set or modified.



Installation ID will be filled in automatically if the symbol is placed within a base boundary

Check the FPCON Level(s) for which the item is applicable.

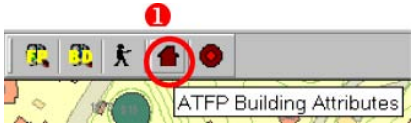
(OPTIONAL) Enter a brief description and/or narrative information about the item.

Complete other attributes as applicable. These are specific to the type of symbol and will vary. In many cases, they will affect how the symbol is displayed on the map.

The following types of point features can be placed on the map by using the palette tool:

- Access points
- Barriers
- Vehicle inspection areas
- Centralized parking
- Fixed and mobile posts
- Emergency staging areas
- K9 locations
- React force locations
- Command and control nodes
- Exterior personnel alerting systems
- Security cameras
- Perimeter intrusion detectors

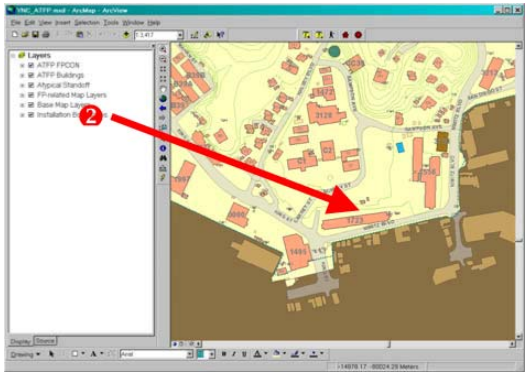
ATFP Facility Attributes



To edit ATFP information related to a facility on the base map, first click the ATFP Building Attributes Button ❶.

Then click on any facility in the map ❷.

This will bring up the record for the building (it will say "New Building Record" if one does not already exist).



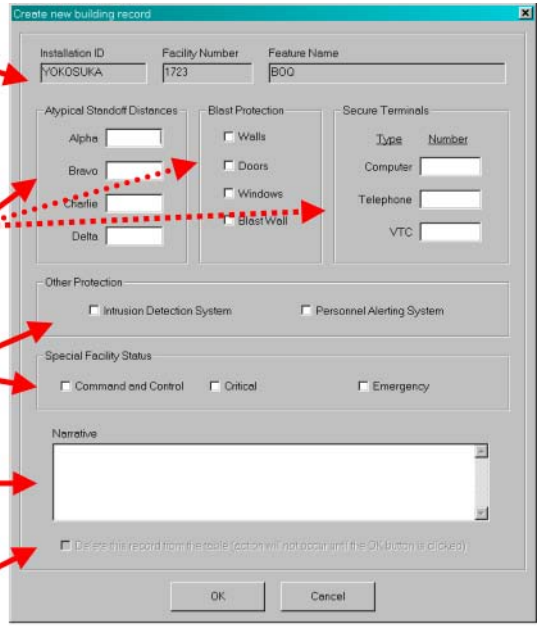
Basic information about the facility appears here.

Enter special standoff distances for varying FPCON levels, indicate whether Blast protection is in place, and enter the number of secure terminals within the facility (if any).

Check off any other items particular to the facility.

Use the narrative to add any special information that is useful to know.

Use the "Delete" check box to remove the entire record from the database if it is no longer applicable.



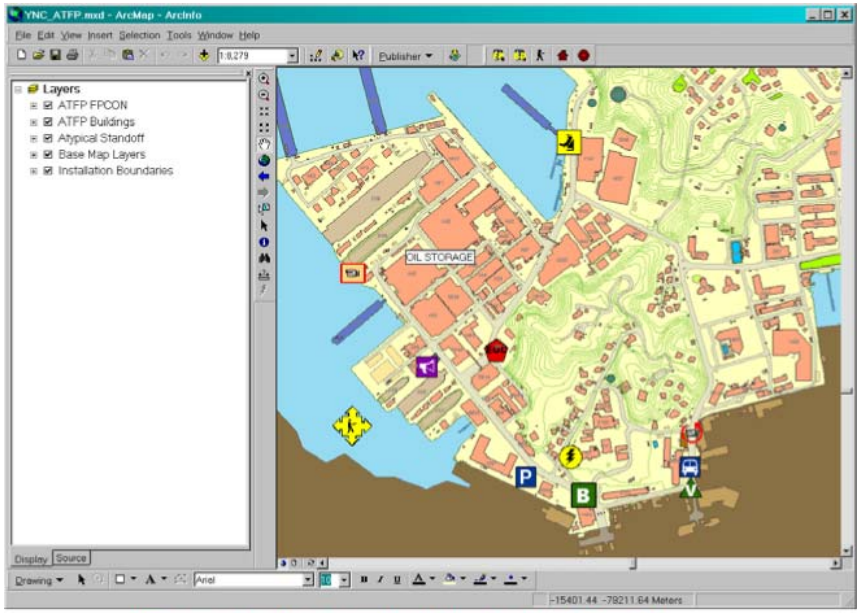
Computing Standoff Distances

Prior to viewing the results, click on the *Compute Atypical Standoff* button to compute buffers based on the data entered.

Viewing the Plan

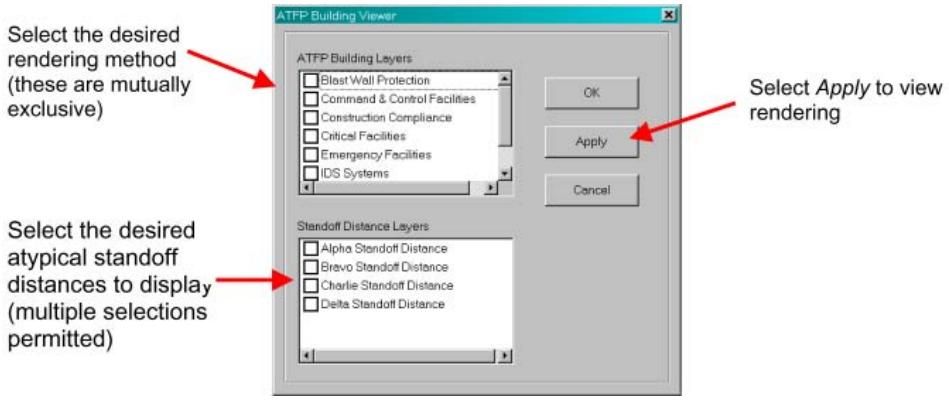
After the data have been entered and standoff distances computed, the ATFP FPCON Viewer and ATFP Building Viewer buttons can be used to display the plans.

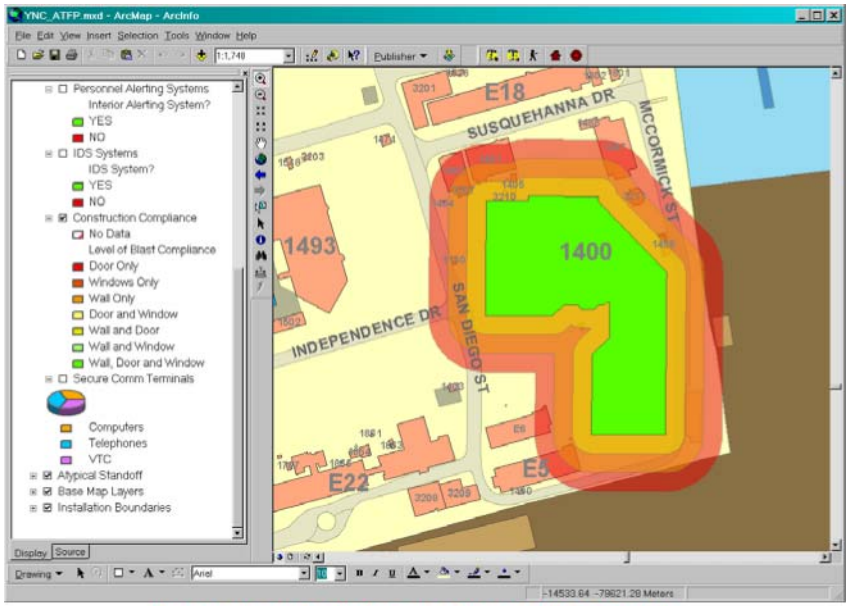
ATFP FPCON Viewer



Example of a completed plan (notional)

ATFP Building Viewer





Example of building rendering (notional)

Future enhancements

Work is underway to enable the computation of asset risk assessment based on Criticality Factors (importance, effect, recoverability, mission, functionality, sustainability, and reparability) and Vulnerability Assessment (based on DSHARPP (Demography, Susceptibility, History, Accessibility, Recognizibility, Proximity, Population) criteria). These will be available in a fall upgrade to the tool.

Conclusion

In partnership with PWC Japan, CNFJ has deployed a GIS-based ATFP Planning tool at various secure locations Japan-wide. This is an important step toward implementing consistent and effective force protection measures for our forward-deployed Naval forces and their family members.

About PWC Japan

PWC Japan provides many types of services including maintenance and repair, utilities, transportation, engineering, and planning to the military operating forces, shore establishment and other Federal agencies in our area of responsibility. As a part of our continuous improvement efforts, PWC initiated its GIS program in 1995 and now oversees the implementation of GIS for Naval shore installation management throughout Japan.

Acknowledgments

Many thanks to LJT & Associates and to Geographic Information Services, Inc., both of whom were extremely

instrumental in supporting PWC Japan in its deployment of the ATFP Planning tool. Appreciation is also extended to Major Shawn Farrington, USMC, of the CNFJ Force Protection Office for his boundless energy and enthusiasm in promoting the tool and in communicating real-world force protection planning requirements to all.

Author Information

Ayman S.A. El-Swaify
CADD/GIS Division Manager
Navy PWC Japan Code 440
PSC 473 Box 13
FPO AP 96349-1103
011-81-6160-43-7986; DSN 315-243-7986
FAX 011-81-6160-43-7845; DSN 315-243-7845
ElswaifyA@pwcyoko.navy.mil

Emergency Environment Response Tool: GIS Integration into the Environmental Management System

By James Smoot, Ph.D., Senior Scientist, John C. Stennis Space Center, National Aeronautics and Space Administration

At the John C. Stennis Space Center (SSC), National Aeronautics and Space Administration (NASA), facility management and safety officers are responsible for ensuring the physical security of the facilities, staff, and equipment as well as for responding to environmental emergencies, such as accidental releases of hazardous materials. All phases of emergency management (planning, mitigation, preparedness, and response) depend on data reliability and system interoperability from a variety of sources to determine the size and scope of the emergency operation.

In 2000, NASA's Environmental Office at SSC developed the Environmental Geographic Information Systems (EGIS) database, which has significantly aided all NASA facilities with noise pollution modeling, land cover assessment, wetlands delineation, environmental hazards mapping, and critical habitat delineation for protected species.

It was suggested that these data could be incorporated into a computerized management information program to assist facility managers. The idea was that the information system could improve both the effectiveness and efficiency of managing and controlling actions associated with disaster, homeland security, and other activities. It was decided to use SSC as a pilot site to demonstrate the efficacy of having a baseline, computerized management information system that ultimately was referred to as the Emergency Environmental Response Tool (EERT).

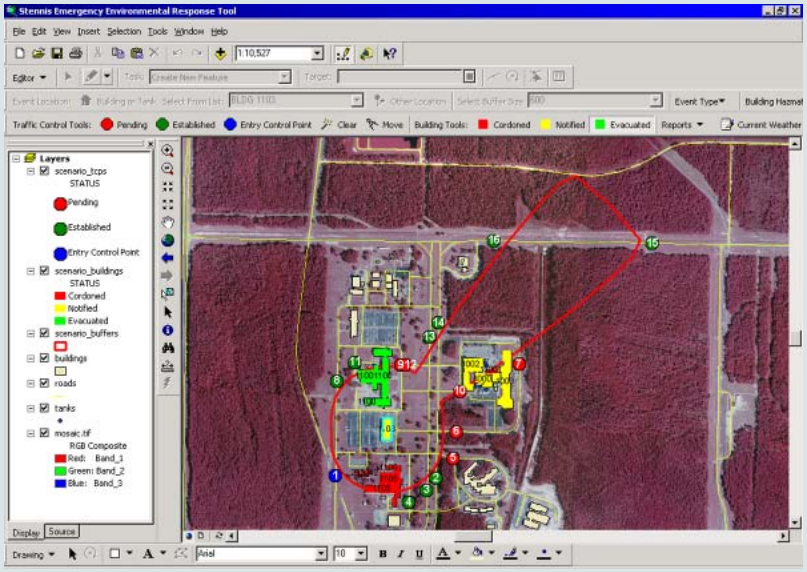


Figure 1. EERT Chemical Event Scenario

What is the EERT?

Developed by General Dynamics Advanced Information Systems (formerly Veridian), the EERT is a prototypical geospatial tool application developed at SSC to support NASA's emergency response and preparedness requirements. The EERT was customized from ESRI's ArcGIS 8.3 software with the goal of making it completely functional for a non-GIS expert. It offers an efficient and coordinated response to both man-made and natural disasters. The EERT assists first responders during environmental emergencies that require quick and coordinated efforts between emergency response agencies to reduce the risk to property and life. It handles not only environmental (chemical) events but also evacuation-type events, such as bomb threats or hostage situations.

The EERT geographically combines satellite imagery, GIS vector data (such as roads, buildings, and chemical storage vessels), and a weather data model for forecasting chemical plume dispersion. Customized graphical user interfaces allow non-GIS experts to utilize GIS technology effectively. Because of its effectiveness, it is now a key geospatial component of NASA's Environmental Management System that uses both GIS technology and remote sensing data to support NASA's response and preparedness requirements.

How does the EERT work?

The EERT integrates and utilizes existing NASA environmental and facility information, including GIS vector layers, hazardous materials (HAZMAT) and point-of-contact information, and satellite imagery. Furthermore, it incorporates real-time weather information and can model chemical release plumes from government validated and approved models, such as the Aerial Locations of Hazardous Atmosphere (ALOHA) model. The EERT allows emergency response team members to monitor traffic control points, identify entry control point(s) into and out of a cordoned area, and monitor evacuated buildings within the cordoned area. It facilitates data sharing among several agencies, allowing an efficient and coordinated response and mitigating loss of life and property.The primary EERT functions are to:

- Ingest and geographically plot plume dispersion using the ALOHA model.
- Display wind speed and direction and provide notification of major changes.
- Establish and geographically plot security perimeters.

- Update and monitor the status of impacted buildings and traffic control points.
- Incorporate and display real-time weather information.
- Generate building and traffic status reports.
- Generate plume models.

On-the-ground use

The EERT is a dynamic application for a command post or for an emergency operations center (EOC). It provides immediate situational awareness for the EOC dispatcher to direct first responders properly, and it provides a baseline for responding to the emergency as more information is gathered. The program can display specific information about affected buildings, nearby dangerous substances (such as hazardous chemicals) stored in close proximity to the site, and recommended locations for roadblocks surrounding the safety buffer or cordoned area. During a chemical spill, the chemical plume fallout will be added to the display. The EERT databases contain building HAZMAT information as well as the telephone numbers for building managers and other information needed for the EOC dispatcher to manage the emergency properly.

The primary advantages of using the new system are the flexibility of quickly identifying unique aspects of the event site, identifying specific locations of hazardous materials, specifying safety zones and their appropriate sizes, and tracking dangerous plumes. This flexibility permits more efficient and effective use of resources, such as the placement of blockades, emergency response teams, and special equipment.

Functional system requirements

The EERT requires the following data, software, and hardware:

- Highly accurate high-resolution imagery.
- Government-approved weather data.
- Building, road, and tank shapefiles.
- HAZMAT data.
- Point-of-contact list.
- ArcGIS 8.3 (ArcView).
- ALOHA model.
- Laptop computer.

Benefits

The significant impact of the EERT relates to its benefits:

- Precision and accuracy of information – the control system increases the probability of controlling situations with minimal damage and injury. The information reduces threats by eliminating much of the uncertainty concerning facilities, presence of dangerous items (such as chemicals), and the potential impact of weather on the situation. The system reduces the time required to make decisions and to take corrective actions.
- Improved communications and coordination – the management control system does not change the primary communications channel during emergency response operations, which is person-to-person radio. However, communications and coordination are greatly enhanced by laptop computers displaying

real-time representations of the emergency area. These visualizations reduce the time required for accurate assessments and coordination of actions, which is of special significance when external agencies are a part of emergency operations.

- Increased flexibility in reacting to changing situations – such flexibility is achieved through common visual displays, the capability to identify the best locations for roadblocks, and the ability to forecast and track physical conditions such as hazardous plumes.

Future Growth Opportunities

The EERT prototype is a good foundation for future GIS-based applications. These applications can be easily matured to support NASA EOCs. The EERT can be readily adapted to provide quick answers to the following questions:

- What are the best potential evacuation routes?
- How can we reroute traffic most efficiently around a dangerous area?
- Where are medical and public health assets located? How long should it take those assets to arrive at the site of the emergency?
- What fire stations are located within a 5- or 10-minute response time of the emergency site?
- What is the building's floor plan?
- Using transceivers enabled by the Global Positioning System, what is the exact location of emergency personnel?

The EERT can also be modified for environmental efforts, such as identifying and tracking areas of noncompliance and cleanup sites; automating and organizing natural, cultural, and historical resource baseline data; developing pollution-prevention methods; identifying irrigation and natural runoff paths; and monitoring compliance.

For additional information, please contact:

James Smoot, Ph.D.
Senior Scientist
LMSO, Building 1105
Stennis Space Center, MS 39529
jsmoot@ssc.nasa.gov

Hugh Carr, Ph.D.
Environmental Specialist
NASA, Building 1100
Stennis Space Center, MS 39529
hcarr@ssc.nasa.gov

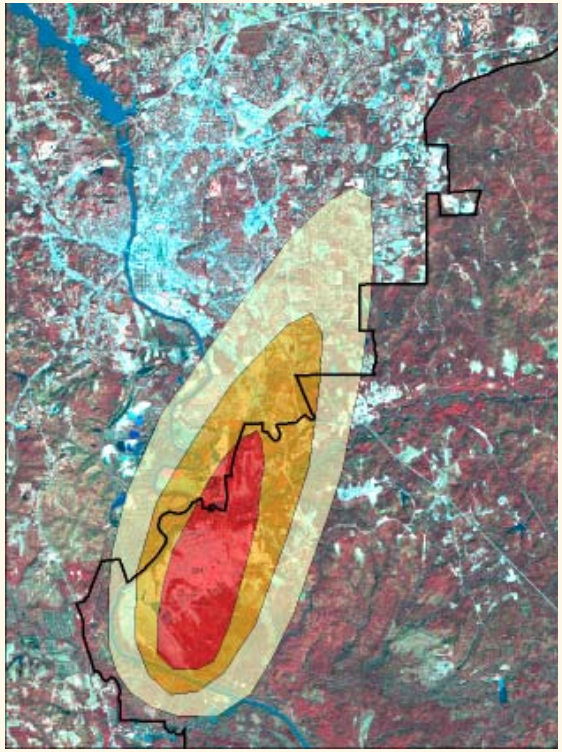
Keith Jester
Deputy Director, Stennis Operations
General Dynamics, Building 1103
Stennis Space Center, MS 39529
Keith.jester@veridian.com
228-688-3535

Geospatial Risk Assessment Modeling System (GeoRAMS): Assessment of Sub-Chronic Health Risks Resulting from Release of Hazardous and Toxic Substances

By Rose Kress, Ph.D., and Linda Peyman-Dove, Ph.D., Environmental Laboratory, Engineer Research and Development Center and Jim Westervelt, Ph.D., Construction Engineering Research Laboratory

The problem

Common hazardous and toxic substances (HTS) have the potential of offering terrorists a convenient, cost-effective weapon for disrupting and threatening human health and the environment. These materials are ubiquitous in modern life. Intentional release of these materials can pose an immediate threat to human health. Industrial chemicals carried in railroad cars and in tank trucks provide opportunities for terrorist attacks as well as accidental releases or spills. Releases of HTS pose health threats extending beyond the immediate, acute health risks. Methods exist for assessing and responding to the short-term, acute hazards. Methods also exist to characterize long-term, chronic health risks of low-level contamination. There are no readily available methods for assessing intermediate, sub-chronic health risks (2 days - 1 year) spanning the period between the initial release and source area cleanup and the long-term remediation or attenuation. Thus, installation managers and local residents are vulnerable if training, living, or working in areas that have been contaminated are not fully remediated.



GeoRAMS

The Geospatial Risk Assessment Modeling System (GeoRAMS) is being designed for use by military installation environmental and force protection offices to enable evaluation of health and environmental hazards in specified locales. Initial development of this software will result in a 2004 release applicable to one demonstration installation and one artificial site. Preliminary funding for this project is provided through a special congressional program called the Environmental Response and Security Protection (**ERASP**) Program.

GeoRAMS will allow use in a planning mode as well as an incident response mode to address these questions:

- *What areas remain unsafe for use or inhabitation following the initial evacuation and cleanup phase?*
- *When can use of contaminated areas or resources, such as buildings, work areas, training lands, streams, lakes and*

reservoirs, and drinking water, be safely resumed?

GeoRAMS is ported to a geospatial reference so areas of concern can be delineated and visualized on maps. Risks associated with exposure to air, surface water, land/soil, and water supply systems that may have been contaminated through terrorist activities, accidental releases, or spills are addressed. Maps and other information, such as contaminant concentrations at locations of interest, will be available as predicted time series over the course of a year. GeoRAMS Phase I addresses only human health aspects. GeoRAMS Phase II will be extended to include ecological health.

HTS release scenarios

GeoRAMS Phase I will have the capability to assess three types of HTS release scenarios:

- Rapid HTS release into the air from a tank truck, railroad tank car, airplane, or other means.
- Dumping HTS directly into a water body.
- Pumping HTS directly into a water distribution system.

Demonstration site benefits/uses

GeoRAMS can be instrumental in the development of:

- Vulnerability assessments (human health risk assessment key component)
- Scenario analyses to identify vulnerable areas and determine actions to be taken, e.g.:
  - Alter traffic routes
  - Place certain areas off limits to trucks
  - Restructure security forces
  - Deploy early warning sensors in key areas
- Planning tools following an attack or release
  - Reschedule training until the level of contamination drops to an acceptable level
  - Determine when workers and residents can return to work areas and homes
  - Determine where to deploy sensors and collect samples

Demonstration site involvement

The demonstration site will provide assistance in the following manner:

- Provide point of contact
- Provide supplemental data
- Review documentation and designs
- Alpha and Beta test software
- Act as proponent

Development of GeoRAMS for specific locations involves site-specific setup of water pipe, water body, air, and soil models. Costs for development for new locations will be determined during the initial development phases.

For more information, please contact Dr. Rose Kress at 601-634-3665 or send e-mail to *Rose.M.Kress@erdc.usace.army.mil* or Dr. Linda Peyman-Dove at 601-634-2267 or *Linda.P.Peyman-Dove@erdc.usace.army.mil*.

GIS-Based Dispatch Supports First Responders

By Robert H. Scott, P.E., Intergraph Solutions Group

In the new world order, fear and terror have become weapons on an asymmetrical battlefield that has transformed firefighters and police into urban warfighters. In this environment, security must include assessment and response to be practical. To properly detect, assess, mitigate, and respond to threats, Federal, state, and local agencies must interoperate. The primary obstacles are the lack of integration and the volume of data requiring assessment. Budgets are not large enough to reengineer how we deal with these challenges. However, using technologies such as GIS for systems integration, agencies can begin the evolutionary process of improving operational readiness and response.

When technology gets in the way

Systems integration often conjures up images of long-term projects requiring staggering budgets, but there are ways to augment existing capabilities and improve the flow of information to decision makers. Too often technology is viewed as a means to make quantum leaps in performing specific tasks. In the process, the system users often get overlooked. The technology designed to solve a problem becomes a new problem by overwhelming the operator with yet another system to learn and use. The operator is deluged with disparate systems that provide individual solutions but together deliver too much data to be useful.

The core issue is getting the right information to the right person in the fastest amount of time. All sensors, communications, and information technologies must come together on a common network in a manner usable by an operator so that evaluated data can be filtered and shared with higher levels of command and decision makers. With the proliferation of extensible markup language (XML), it is becoming easier to integrate the many systems available for problem solving. GIS provides an ideal interface for the integrated capabilities because it provides a consolidated view of events and can link to many systems.

A current Advanced Concept Technology Demonstration (ACTD) being sponsored by the Defense Information Systems Agency (DISA) is a means to provide interoperability between various levels of command. The ACTD supports the needs of the national command authority as well as regional commanders and local government. HLS-1, as it is currently labeled, interfaces with GIS-based computer-aided dispatch to provide first responder support (Figure 1).

GIS-based emergency response

Many people are familiar with GIS. Computer-aided dispatch or CAD (not to be confused with computer-aided design) is less familiar. A CAD is a computer system that matches a call for service with an appropriate response. It stores information about units, personnel, deployment plans, beats, fire zones, event types, and a geofile. In text-based CAD systems, which are prevalent throughout the industry, the geofile contains text records of all roads and addresses within an agency's jurisdiction. In Intergraph's GIS-based CAD, the geofile provides a picture of all the streets and roads with intelligent links to address and name information.

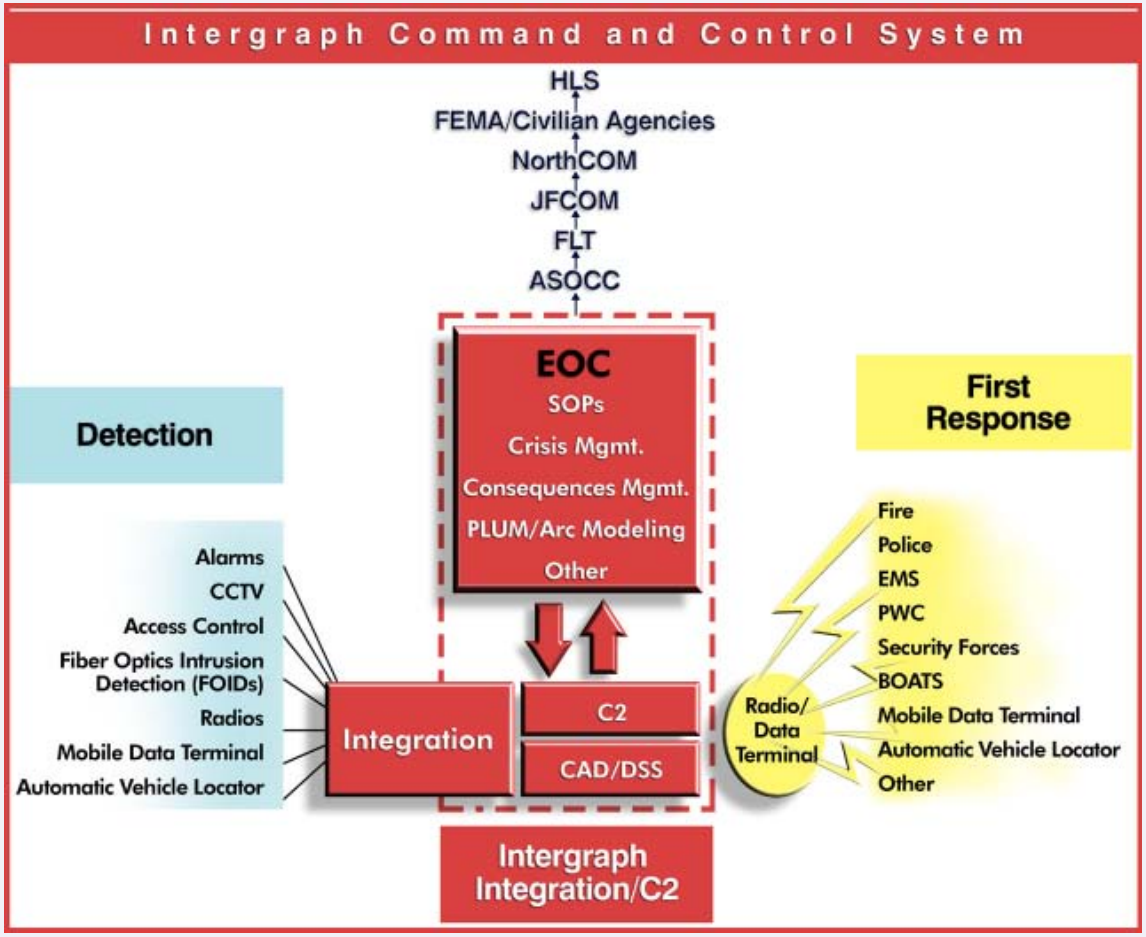


Figure 1. Intergraph's command and control concept developed for DISA provides an emergency operations center (EOC) that integrates many detection devices, communicates with multiple responders, and supports the national command authority

When a citizen dials 911, the telephone company and the enhanced 9-1-1 (E9-1-1) system at the communications center retrieves the caller's telephone number, which is used as a search key in a subscriber database. When the call taker answers the call, the E9-1-1 equipment matches the voice with automatic location identification (ALI) and automatic number identification (ANI) information – i.e., the caller's telephone number and address. The CAD system receives this information from the E9-1-1 system as well. The location information is automatically entered into a form on the call taker's CAD workstation, which searches the map and zooms to the location, indicating it with an arrow. Now the call taker knows where the call is coming from and can refer to the map.

The call taker questions the caller to determine what the emergency is. As the information is being relayed, the call taker enters it into the system. The event types (fire, e.g.) are already listed in the system. The location allows the system to identify the appropriate police beat, fire zone, and emergency medical area. The event type allows the system to access the deployment plan for this type of call. For instance, a residential structure fire may require two engines, a ladder truck, a battalion chief, and two police traffic units. This information is then used to search the database for the units and personnel that are currently on-shift and available. If the beat police officer is already listed on a call, the system refers to the backup plan and selects the next available unit.

This information is presented to the dispatcher for acceptance or change. If accepted, the proper units are marked as dispatched in the status monitor, and the dispatcher calls the units on the radio to inform them. The status monitor keeps track of all on-duty units and personnel, what they are doing, and where they are.

The CAD allows the dispatcher to track the information and provides a tool to effectively manage these resources without having to rely on memory. All of the information and status changes made for each call is stored in the database with a time stamp. It then becomes easy to retrieve information at a later date with a few clicks of the mouse. For example, if requested, the dispatcher can pull up the call reception time on an event summary and access the information quickly.

The system keeps track of all unit locations. When a police officer reports that he is on the scene, the dispatcher selects his unit on

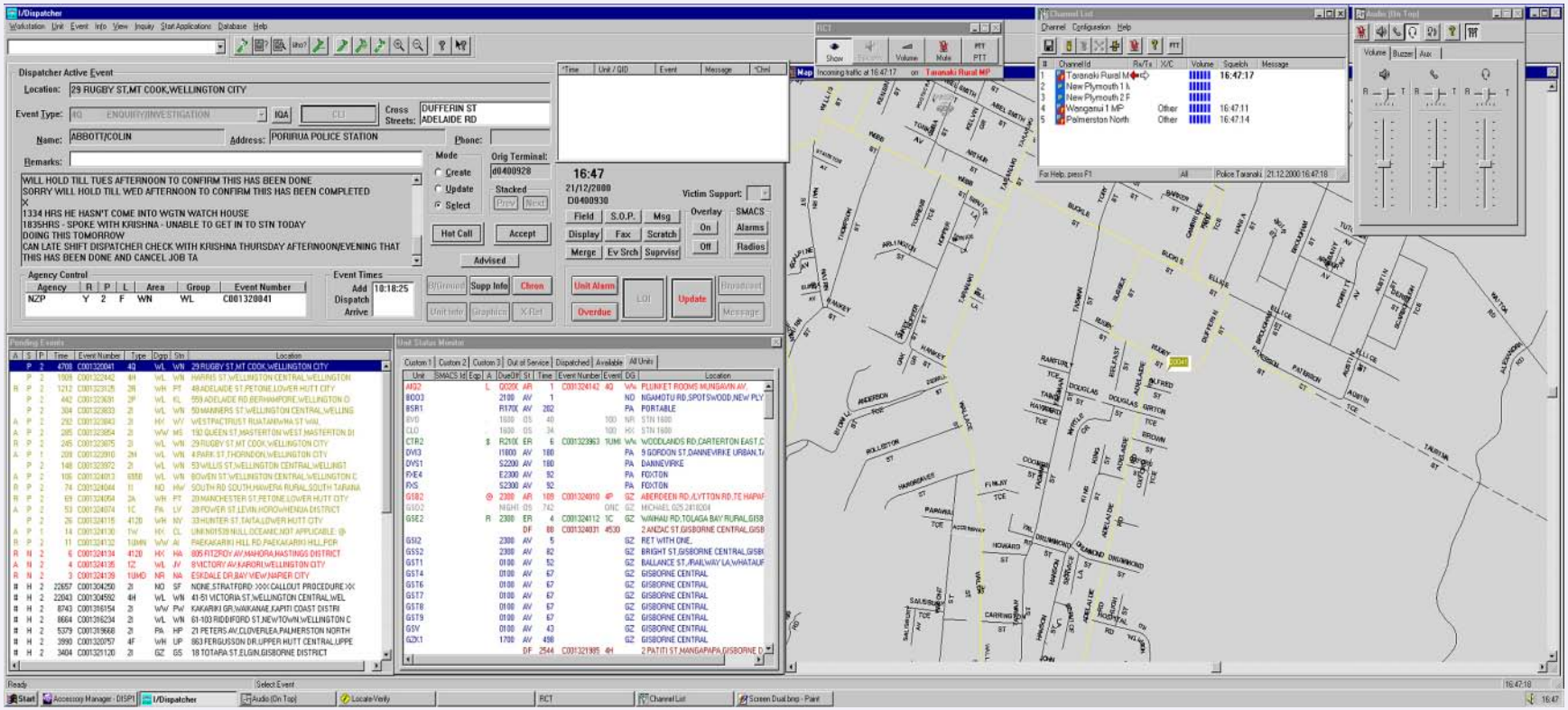


Figure 2. CAD system consolidates data on a single dual-screen workstation that presents map data on one screen and textual data, such as queued events, on the other

the CAD status monitor and chooses the on-scene command, which automatically moves the unit's symbol on the map display and changes the unit's symbol and status entry to a predefined color. Color codes allow the dispatcher to quickly assess the status of units. Blue may indicate available, green dispatched, red on scene, and white out of service.

Automatic vehicle location (AVL) and mobile data terminals (MDTs) help the dispatcher track and deliver information to vehicles. AVL uses global positioning systems (GPS) to automatically update the CAD system with the location of vehicles in near real time. MDTs allow the dispatcher to send the location and call information electronically to the terminal in the response vehicle. This procedure reduces miscommunication errors inherent in voice radio messages and is more secure since it cannot be picked up on radio scanners used by many thieves to tip them off (Figure 2).

Facility monitoring

Capable of integrating and displaying alarm systems, the GIS-based CAD system not only supports emergency response, but is also ideal for monitoring facility status over a large geographic area. Lawrence Livermore National Laboratory (LLNL), California, applied CAD and GIS to solve this type of problem. The premier Department of Energy installation in the United States for weapons systems research and development, LLNL maintains a campus of approximately one-square mile, with several hundred buildings, more than 900 plant engineers and craftsmen, and nearly 9,000 total personnel. To perform its mission of delivering technologically superior solutions for national security, it must continually maintain a high state of readiness. Given the nature of the research mission, LLNL has to assure its scientists that the research facilities are safe and in peak operating condition, requiring prompt maintenance and emergency response.

Over its history, LLNL developed an advanced but highly complex network of monitoring systems, including gas, water, telephone, electrical, generator, heating, ventilation, air conditioning, and others. In some cases, alarms were nothing more than simple lights on a display, which, by their nature, prevented detailed maintenance requests. Paper logs and other manual methods made the dispatching process tedious and prone to human error. Not only did these aging systems need to be upgraded, LLNL determined that a central command and control center should provide the integration of alarm, monitoring, and dispatch functions necessary for better facility management. This solution would provide a more comprehensive view of trouble events, allowing more accurate diagnosis of the cause of a situation involving multiple alarms. LLNL chose Intergraph to develop and support a solution based on its CAD software.

The key to improving efficiency was the integration of GIS with computer-aided dispatch. GIS lets personnel input, manage, analyze, and output information in a concise form. By allowing dispatchers to visualize incidents with Intergraph's location-based system, the solution provides a greater understanding of the complexities of the facility situation.

The system Intergraph installed consists of two dispatching workstations, a supervisor workstation, a multiprocessor database server, and a dedicated alarm server. An Oracle® database stores geographic information such as maps and floor plans. Intergraph's CAD software provides an interactive map display system that shows the location of campus buildings, alarm systems, and critical, ancillary data. During multiservice events, such as drills and emergencies, a projection system provides management and observers with a large map display screen. An alarm interface that receives

standard (serial RS-232 communication) digital input signals was developed to support LLNL's alarm system. This provides built-in scalability because additional alarms and subsystems can be inserted into the existing configuration to accommodate growth and provided a single, integrated and consistent view of the facilities.

Integration of disparate agencies and technologies

Integrating legacy systems and newly developed technologies into a cohesive operational environment for decision makers is best demonstrated at the Naval District Washington (NDW). At the heart of the National Capital Region, NDW provides services, support, and interagency coordination to U.S. military commands within the District's geographic area to help them fulfill their missions. As part of its regionalization effort, the Navy centralized its public safety and security operations organizations. Disparate approaches and technology existed across the region and did not allow for proper coordination of response to emergency events. In addition, the region as a whole was working under the constraints of a downsized operational budget to develop a system that could support a regionalized communications center.

The Navy and industry technical team devised a vision based on an integrated approach. The heart of the solution is Intergraph's CAD system, which integrates disparate pieces of information in a comprehensive database and upgrades communications systems to establish 9-1-1 as a common emergency response number. The vision also required the integration of fire alarms, security alarms, radio systems, security cameras, fiber optic intrusion detection, and other technologies. To accomplish this, Intergraph transferred industry best practices and commercial off-the-shelf (COTS) software from the civilian world and worked in partnership with NDW to meet the requirements of a military region and the evolving antiterrorism and force protection initiatives. The COTS applications have been developed under strict management with software certification practices accepted worldwide.

The primary goal of the regional commander was to improve operational efficiency for emergency services and to provide the capability to manage large-scale events. Within those guidelines, it was necessary to present disparate pieces of information being generated from various sources in a coherent manner so that NDW could make proper decisions. The key was the integration of GIS and CAD. Personnel input, manage, analyze, and output information in a concise form. By allowing personnel to visualize incidents, the solution provides a greater understanding of the complexities of an emergency situation. Once the public safety agencies – each with different information responsibilities – could access data from a central resource across the network, the system provided the basis for integrated information exchange.

The configuration supports a Regional Operations Center, an Emergency Operations Center (EOC), and an alternate EOC. It supports Navy, Marine Corps, and Air Force operations in the National Capital Region and will soon include Army operations. The configuration provides a high-availability back-up site.

In a major incident like a terrorist or weapons of mass destruction (WMD) threat, a coordinated response is an absolute requirement. Information flow to multiple response agencies must remain operational and well coordinated under the most hostile conditions. The channels of communication must be open at all times. Many lives are at stake, and the ability to provide different agencies with timely and accurate information is imperative. During the September 11 attacks, Intergraph's solution was put to the

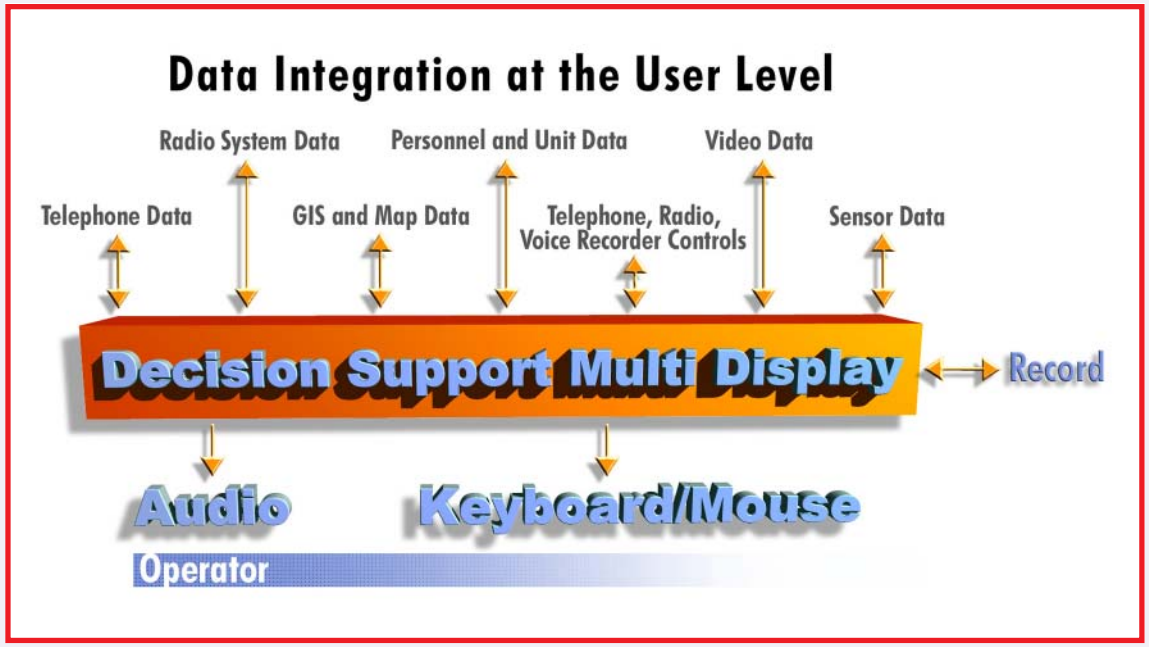


Figure 3. An infrastructure security approach that integrates multiple data sources and simplifies display is most effective

test as NDW coordinated the move of all Navy facilities to THREATCON Delta, activated the EOC to manage response issues for the Pentagon attack, and helped assess casualties. Throughout the process, Intergraph provided system support and training to NDW. The NDW regional commander related soon after the horrific events that the system exceeded expectations and thanked Intergraph for the support. Based on this success, NDW is planning on expanding the system to include additional antiterrorism / force protection capabilities.

This technology is being deployed and used by public safety agencies around the world. In airports and military and Federal installations, CAD and GIS are the cornerstones for building a Security Decision Support System (Figure 3). These systems integrate CAD for command and control, GIS with alarm and CCTV systems for a common operational picture, external databases and applications (HAZMAT, plume/bomb blast modelers) for analysis, and higher echelon systems like the Area Security Operations Command and Control for interoperability. With access to information that is fused and displayed to provide up-to-date situational awareness, decision makers cost-effectively detect, assess, and manage a response to security threats.

Robert H. Scott, III, P.E., is executive manager of the Public Safety/Force Protection/Anti-Terrorism/HLS competency area at Intergraph Solutions Group. He can be contacted at *rhscott@ingr.com*, 1-703-264-5616, 1-703-264-5655 (fax), or 1881 Campus Commons Drive, 4th Floor, Reston, VA 20191-3413.

Faster, Better, Cheaper Security Response

By Ian Thompson, Standing Stone Security Consulting, Inc.

In today's security conscious world, the need to incorporate an all-hazards security program into a facility's design and planning has reached a boiling point. The reason for this is the need for speed. There is great pressure to "do something." The need for speedy action has given rise to the *one size fits all* approach as a stopgap until proper security planning can take place. This approach, although understandable in the aftermath of such incidents as the September 11 terrorist attacks, is expensive and can actually create vulnerabilities and liabilities.

One size does not fit all

In looking for tools to assist our clients to better understand and manage this issue, the staff at Standing Stones Security (SSCI) focused on how the planning and design process could be adapted to produce better, more informed solutions. The SSCI team identified a need for a process with strong visuals, excellent project data, and integrated open standards that allows for collaboration (even at a distance). The process must allow for the development of tools for testing potential solutions before deployment. It should allow clients to better manage assessment data while keeping the costs equal to traditional design fees.

The SSCI team found this process in an international strategic alliance created by Onuma Architects, Webscape, Design Atlantic Ltd, and AEC InfoSystems, called this the Strategic High-Performance Integrated Planning or "the SHiP Process."

The SHiP Process uses three-dimensional (3-D)/parametric objects, interoperable technologies, database-driven design processes, and integrated strategic planning to demonstrate the impact of design choices on facilities and allows for appropriate adjustments. The process is open and can go from two-dimensional (2-D) to 3-D, back to 2-D, a capability that enables SSCI to accommodate the client's existing infrastructure as opposed to forcing them into any specific system. SHiP uses 3-D databases (models) to allow all team members and stakeholders to see how the facility is impacted throughout the project. The process is appealing because it uses real facility and operational information in the building information models and is not simply a pretty picture representation. The process is designed for collaboration at a distance, allowing access from anywhere in the world at any time.

The SHiP Process improves control

At its base, the SHiP Process imitates real-world physical attributes through a system of databases linking graphics and a wide range of assessment tools. This system allows for the embedding of assessment data into models that can be accessed by all team members. One of the tools used in the system is *Threat Objects*. Because of the data quality, the system allows the user to estimate which systems are being damaged in any event, as shown in Figure 1. Potential casualty rates, as well how the loss of a facility will impact the organization's operations, can also be modeled. Even debris fields and their impact on triage and recovery sites can be forecast. This capability allows us to review numerous threat scenarios in a fast and cost-effective manner and to forecast the impact on the facility, prior to spending money on capital projects.

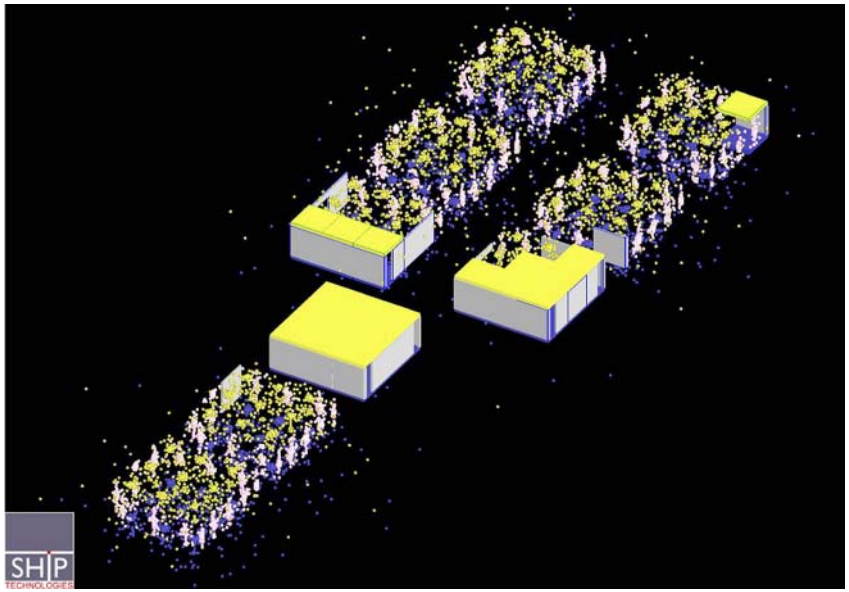


Figure 1. Threat Objects

Further innovations such as Vulnerability Stamps (*V-stamp)* and Mitigation Stamps (*M-stamps)* solidify the planning process. The *V-Stamp* highlights the vulnerability and shows the data from the assessment. It can then be linked to the appropriate *Threat Object* to show how it can be exploited. The *M-Stamp* allows the team to view the reasoning from which a strategy was developed and run scenarios against it to ensure that it will fit the needs of a specific situation. All of this has sped up the planning process by 50 percent. What typically took 6 months now has the potenital of being done in as little as 3 months (or even less).

Make decisions earlier...and more accurately

This process provides the ability to conduct preliminary analysis to determine which facilities are at heightened risk. It allows for better prioritization of large-scale project scenarios and can be run against the chosen countermeasures. This allows the team to see how effective their chosen methods of mitigating risks will be prior to spending any resources on implementation. The SHiP Process can also be used as a tool to demonstrate the vulnerability of current conditions and allow clear communication between all key stakeholders when synthesizing countermeasures. We have found that understanding the local situation and visualizing threats is directly tied to the quality of the communication. This process lets each person view the same image and the same data and lets them provide immediate valuable input, whatever their location.

After a comprehensive planning has been completed and countermeasures have been implemented, each facility will still change over time. A 3-D model based system allows for changes to be shared with the assessor and concerns addressed without the necessity of an on-site visits, thus saving time and money. When 3-D modeling is available, more accurate bids may be obtained, as the scope of the project is more clearly defined. This allows clearer and better specification of project requirements resulting in lower costs, faster projects, and improved relations between owners and contractors.

For additional information, contact Ian Thompson, Standing Stone Security, at *ithompson@sscsecurity.com*.

Test Pilot of NetSPEX CADD Standard Implementation Software

by Stephen Spangler, The CADD/GIS Technology Center

Implementing the A/E/C CADD Standard – how to do it?

When the A/E/C CADD Standard was first released in 1995, the CADD/GIS Technology Center immediately received requests for tools to implement such a massive standard. The first A/E/C CADD Standard CD did contain symbols and linestyles in electronic format, but field personnel needed something more. In response, the Center staff developed the A/E/C CADD Workspace, which was released for MicroStation in 2000 and updated for MicroStation V8 and AutoCAD in 2002.

Both workspaces were successful, but there were still issues. First, the two workspaces did not look the same (Figures 1 and 2). While the AutoCAD Workspace and the MicroStation Workspace achieved exactly the same results, users who wanted to work with both tools had to learn both to determine how to place information on the same level or layer.

A second problem was the time it took to implement changes to the Workspace and disseminate this information to the field. If a change was made to the A/E/C CADD Standard (like a level color change or a symbol addition), that change had to be incorporated into the A/E/C CADD Standard database. Depending on the revision, these incorporations could be simple or quite cumbersome. Once the modification was made, the MicroStation Workspace had to be regenerated. The results of that regeneration had to be made available to all users, and the resulting files had to be copied into the correct location on their computer or server before they could implement the latest revisions to the Standard.

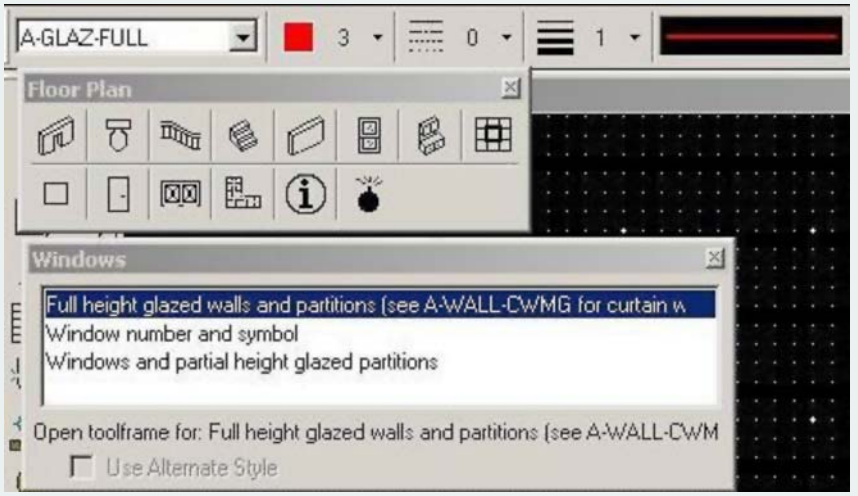


Figure 1. MicroStation Workspace

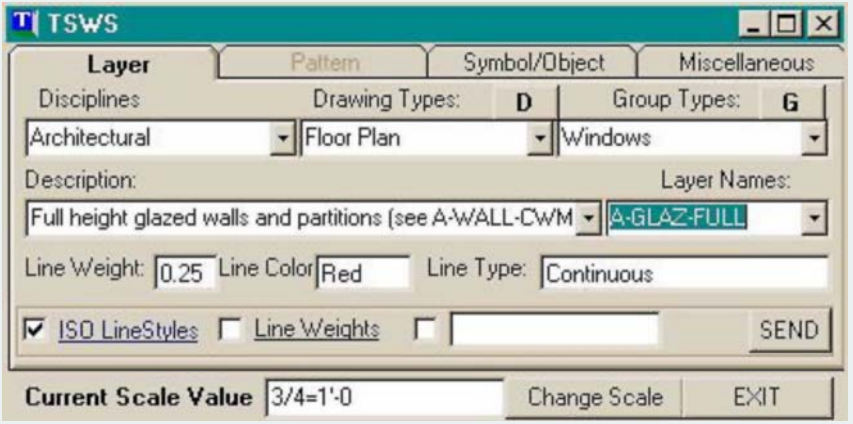


Figure 2. AutoCAD Workspace

Similarly, the resulting resource files from the MicroStation regeneration had to be made available for the AutoCAD Workspace. Once the Center ensured that all updated files were available via CD or the Internet, there was no way to guarantee that the users had or were using the latest updates. This process took considerable time, resulting in a lag between the field receiving the latest A/E/C CADD Standard data and incorporating revisions of the Workspace.

The search for other implementation methods

In an effort to speed up the time in getting updates out efficiently and quickly to the users, the Center initiated a review of various third party CADD Standard implementation packages. The focus was on three questions:

1. Did the package work in the latest software releases of both AutoCAD and MicroStation?
2. Did the package look the same in both AutoCAD and MicroStation?
3. Did the package use a single database for inputting and exporting Standard information?

NetSPEX from Professional Software Solutions, Inc. (ProSoft) was the first package in our evaluation to meet all three criteria. An additional bonus feature of NetSPEX is that the A/E/C CADD Standard is already included as a ready-to-use standard.

NetSPEX

Whether users are in MicroStation or AutoCAD, the look of NetSPEX is the same (Figures 3 and 4). It operates in a manner

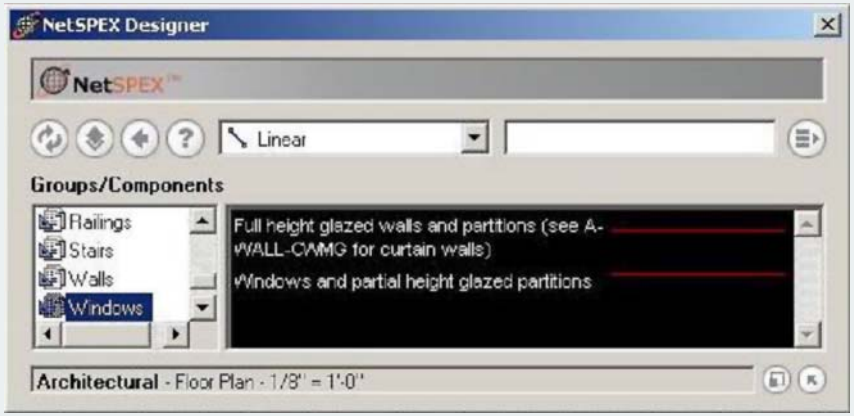


Figure 3. MicroStation NetSPEX window

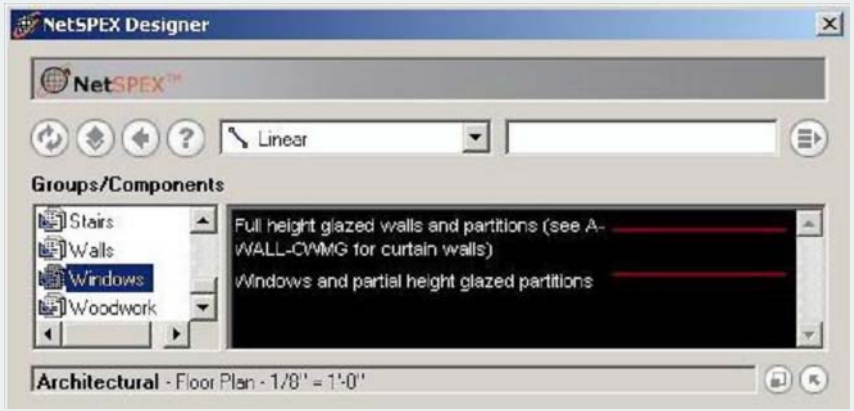


Figure 4. AutoCAD NetSPEX window

that is similar to the MicroStation A/E/C CADD Workspace, but with a twist. Users select the graphic component they want to place (e.g., pattern, symbol, or line) instead of the type of item(e.g., door or window). When the component is selected, the database is queried to display a listing that contains only the items

that meet that type of component (i.e., fire wall patterning would not be available if a Linear component were selected). This feature makes it easier to locate the type of component users are trying to create/place. Once an item has been selected for placement, the NetSPEX window collapses into a small "hotlink" icon window, thereby freeing up monitor display space until the next time NetSPEX is used (Figure 5). NetSPEX also contains a more robust Checker application for verifying that files are in compliance with the Standard. Whereas the Workspace Checker shows only the items that are noncompliant, the NetSPEX Checker offers suggestions for making the item compliant. Various compliance/noncompliance reports can be generated easily on-the-fly by the user.

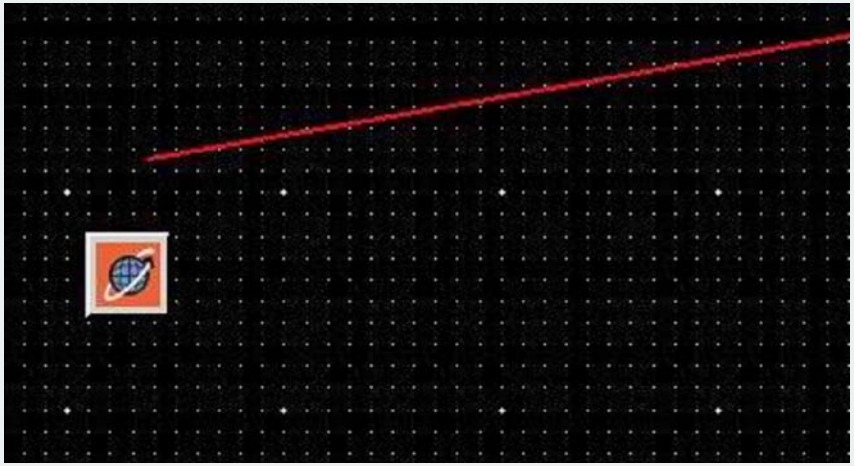


Figure 5. NetSPEX "hotlink" button

NetSPEX and the Center

As part of Project 96.017 (Maintenance, Revision, and Implementation of the A/E/C CADD Standard), the Center was tasked with purchasing NetSPEX software for a test implementation to determine if NetSPEX could ultimately replace the Workspace methodology for implementing the Standard. In April, the Center purchased the following: the NetSPEX Main Server software, 2 copies of the NetSPEX Mirror Server software, and 100 licenses of NetSPEX Designer. The Center will maintain the A/E/C CADD Standard database on a server located at the Center, using NetSPEX Administrator. Two remote locations (Corps of Engineers District offices) willhost the mirror servers. When a change is made to the A/E/C CADD Standard, the Center can "push" those changes at any time to the mirror servers. Once the change is pushed to the mirror servers, any person capable of using NexSPEX Designer Workstation within the network will see these changes immediately (Figure 6).

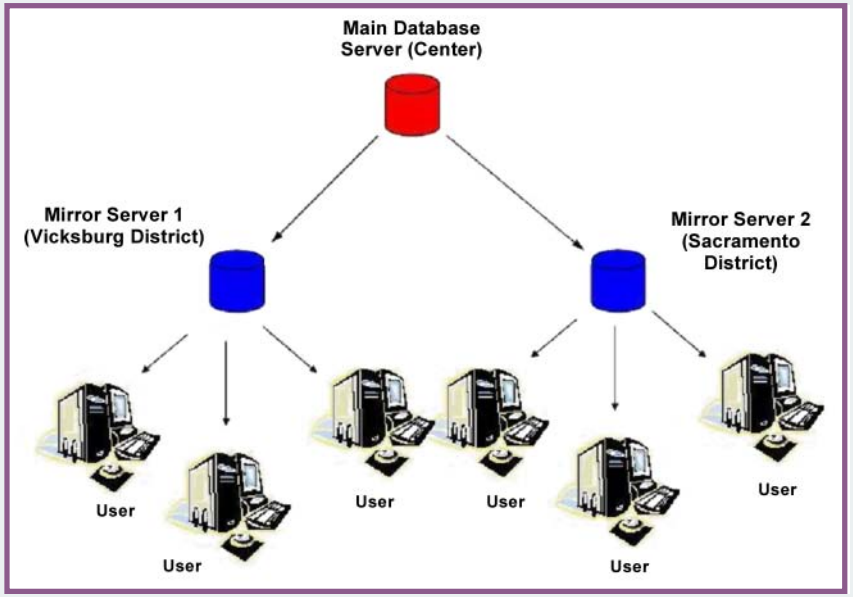


Figure 6. How NetSPEX data gets to the user

NetSPEX system requirements

Current CAD Platforms supported:
AutoCAD 2000i, 2002, 2004
MicroStation J, V8 and V8.1

NetSPEX Designer Workstation requirements:

- Windows 2000 Professional or
- Windows 2000 Server or
- Windows NT Workstation 4.0 SP6 or
- Windows NT Server 4.0 SP6 or
- Windows XP Professional
- At least 5 MB hard drive space reserved for application files and cache
- LAN/WAN/Internet connection to one of the two NetSPEX mirror servers
- Internet Explorer 5.5 or later

Edward Huell and Stephen Spangler, Center staff members, are in the process of reviewing the A/E/C CADD Standard database provided with NetSPEX and are making revisions as necessary. In September, the Center developed a Web site where DoD personnel can download the NetSPEX Designer software and a license/configuration file to attach to the appropriate mirror server. Because the Center has only 100 licenses, the Center's NetSPEX site will be restricted to people within the .mil domain. Llook forward to any feedback on this exciting endeavor!

For additional information, contact Stephen Spangler (*Steve.C.Spangler@erdc.usace.army.mil*) or Edward Huell (*Edward.L.Huell@erdc.usace.army.mil*).

SDSFIE, Release 2.30, Features Significant Changes

By Nancy Towne, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

On October 1, 2003, the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE), Release 2.30, will be available from the CADD/GIS Technology Center's Web site. As with past major releases, this version includes several significant changes:

1. In Release 2.30, references to the FMSFIE (the Facility Management Standard for Facilities, Infrastructure, and Environment) have been removed. In the SDSFIE these non-graphic elements (Entity Classes, Tables, etc) are now referred to as **Supporting Infrastructure** (SI). This is only a name change made to prepare for the revised Transactional Facility Management Standard, which is being introduced in concept in FMSFIE (Release 2.30). This new FMSFIE will continue to expand and will eventually be integrated into both the SDSFIE and the A/E/C CADD Standards. The "splash screen" has been modified to allow users to install the SDSFIE or the FMSFIE.

2. This is the last major release of the SDSFIE that will include Integrated Definition (IDEF) data models. Future major releases of the SDSFIE will include Unified Modeling Language (UML) class diagram data models.

In support of major initiatives with our DoD partners and comments submitted from field users, several modifications to the SDSFIE were made to accommodate the following programs:

1. Homeland Security.
2. Naval Facilities Gap Analysis (Paxtuent River).
3. Communications Gap Analysis (Tinker AFB).
4. Marine Corps Air Station Cherry Point.
5. Geologic Boring Programs.
6. A/E/C CADD Standard Symbology for polygons, lines, and points.

The content has been expanded significantly to include 37 new tables and 1,322 new attributes. Minor revisions affect one attribute name and data type. At the domain level, 33 new list domain tables have been added, and 2 domain tables have been deleted. There are 55 new values in existing domain tables and 27 modified domain values.

By Entity Set, the SDSFIE Release 2.30 modifications are:

- **Boundary**

New Entity Classes:

boundary_disaster_preparedness	Activities conducted principally to plan, equip, and train personnel to react to large-scale disasters that threaten the installation and surrounding community.

New Entity Types:

shelter_site	Predetermined areas used to house personnel during an emergency.
force_protection_site	The geographic location of equipment or personnel used during times of heightened security. This may include bunkers, portable light carts, portable guard houses, jersey walls, concertina wire, and sentries.
evacuation_route_line	A predetermined route used to evacuate personnel during an emergency.
emergency_management_area	A geographic area under the responsibility of an emergency management.

- **Buildings**

New Entity Classes:

buildings_administrative	Any structures that are designed to be used as health facilities of a type required to be licensed.
buildings_commercial	Any structures that are designed to be used as commercial facilities, such as bottling plants and industrial types.
buildings_facilities	Any structures that are designed to be used as general facilities.
buildings_governmental	Any structures that are designed to be used as governmental facilities.

New Entity Types:

hospital_structure_site	A hospital structure that was created by man for occupation, storage, or to facilitate an activity.
health_structure_site	A health structure that was created by man for occupation, storage, or to facilitate an activity.

shopping_structure_site	A shopping structure that was created by man for occupation, storage, or to facilitate an activity.
plant_structure_site	A plant structure that was created by man for occupation, storage, or to facilitate an activity.
financial_structure_site	A financial structure that was created by man for occupation, storage, or to facilitate an activity.
state_structure_site	A state structure that was created by man for occupation, storage, or to facilitate an activity.
postal_structure_site	A postal structure that was created by man for occupation, storage, or to facilitate an activity.
federal_structure_site	A Federal structure that was created by man for occupation, storage, or to facilitate an activity.
fedcritical_structure_site	A Federal critical structure that was created, by man, for occupation, storage, or to facilitate an activity.

- **Communications**

New Entity Classes:

communications_transmission	Information necessary for the management of all communications transmissions.

New Entity Types:

voice_switch_site	The location of equipment used to receive or transmit the visual portion of a communications signal.
video_site	The location of equipment used to receive or transmit the visual portion of a communications signal.
radio_transmitter_site	The location to store individual radio transmitter sections that may be in one piece of radio equipment.
radio_receiver_site	The location to store individual radio receiver sections that may be in one piece of radio equipment.
network_systems_site	The Standard System name, architecture (i.e. protocol), number of facilities where installed, and number of users of system.
segmented_cable_site	The location of all communications cable types.

- **Env Hazards**

  New Entity Types:

env_remediation_utility_point	Location of a temporary environmental remediation systems utility. Examples include soil vapor extraction wells, junction boxes, electrical poles, and product recovery wells.
env_remediation_utility_line	Temporary line and pipe utilities used in remediation systems. Examples include extraction lines and electrical lines.

- **Geology**

  New Entity Types:

substrata_unit_area	The location of substrata, subsurface geologic formations.

- **Improvement**

  New Entity Types:

security_perimeter_line	Linear feature used to prevent access to a secure area.
security_access_line	Linear feature used to control access between secure and non-secure areas.

- **Land Status**

  New Entity Classes:

land_status_land_management_si	Information necessary for the management of the areas of land controlled or designated for specific purposes or uses.

- **Military Operations**

  New Entity Types:

military_limited_access_site	A site where access may be limited due to safety or security considerations.

- **Soil**

  New Entity Types:

soil_disturbed_area	An area of soil that has been altered / disturbed to suit man's needs, such as filling in wetland areas, agriculture, development, and filling in land areas with different soil types.

- **Transportation**

New Entity Types:

regulated_airspace_area	Non-military regulated airspace.

- **Utilities**

New Entity Classes:

utilities_nuclear	The components of a nuclear system such as nuclear fuel, nuclear research, nuclear waste, and nuclear weapons.

New Entity Types:

energy_distribution_control_facility_site	The location of a facility (including associated buildings, structures, and appurtenances) that control the distribution of energy-related products (e.g., electrical, natural gas, or oil).
nuclear_weapons_plant_site	The location of a facility (including associated buildings, structures, and appurtenances) whose purpose is the production of nuclear weapons. Nuclear weapons consist of bombs, warheads, or projectiles using active nuclear material to cause a chain reaction upon detonation.
nuclear_waste_facility_site	The location of a facility (including associated buildings, structures, and appurtenances) whose purpose is the processing and storage of nuclear waste. Nuclear waste consists of unusable solid and liquid byproducts left over from the processing of nuclear energy or weapons.
nuclear_research_facility_site	The location of a facility (including associated buildings, structures, and appurtenances) whose purpose is nuclear research. Nuclear research involves scientific investigation aimed at discovering and applying new facts, techniques, and natural laws related to nuclear energy and weapons.
nuclear_fuel_plant_site	The location of a facility (including associated buildings, structures, and appurtenances) whose purpose is the processing or production of nuclear fuel. Nuclear fuel is a fissionable or fertile isotope with a reasonably long half-life, used as a source of energy in a nuclear reactor.

SDSFIE Release 2.30 software applications and other information are available for downloading under the "Products" area at *http://tsc.wes.army.mil*. For additional information, contact Nancy Towne at (601) 634-3181 or *Nancy.A.Towne@erdc.usace.army.mil*.

SDSFIE Training News

By Laurel Gorman, CADD/GIS Technology Center

Since 1992, the Center staff has taught 14 Basic and Advanced Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) Implementation Workshops onsite in Vicksburg, MS, and offsite at various District and agency training facilities. A combination of instruction techniques including lecture, labs, demonstrations, and practical exercises are used throughout these course to teach the fundamental concepts.

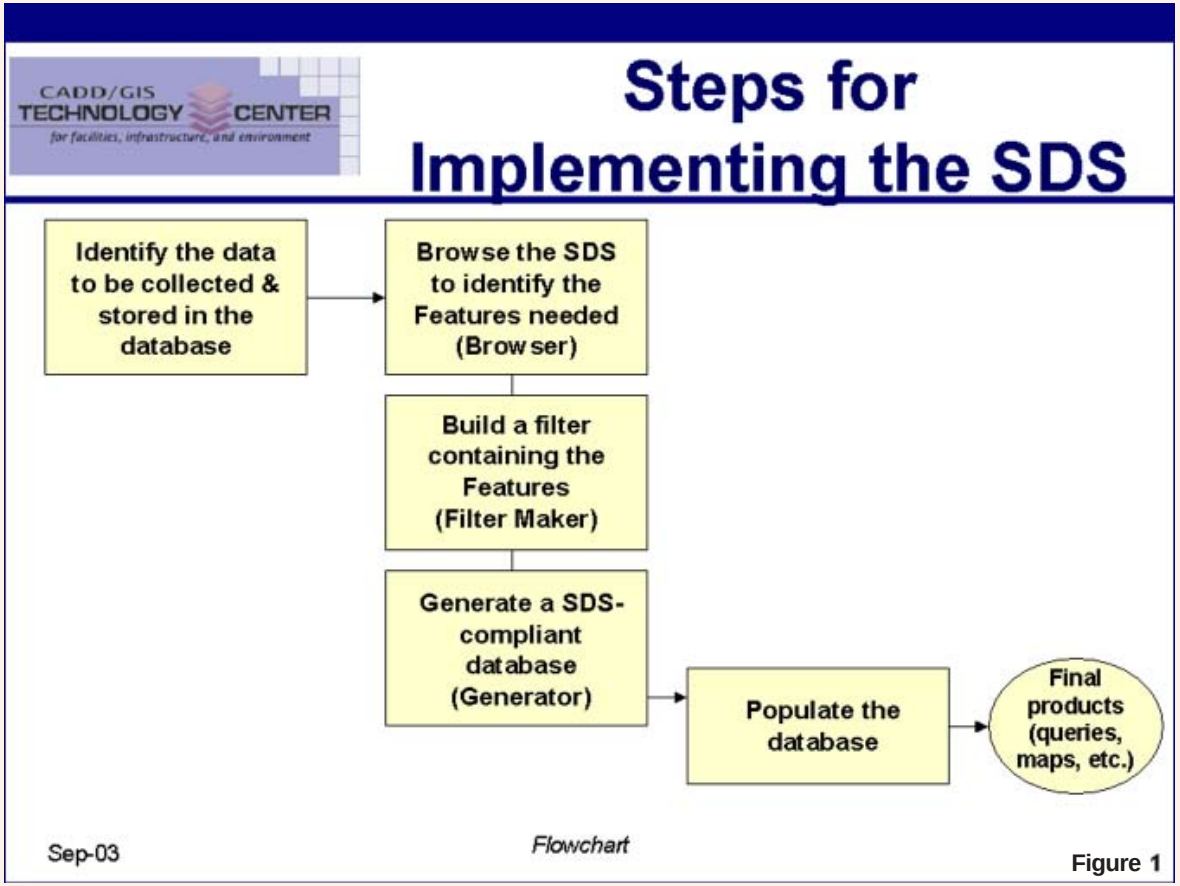


Figure 1

The Basic and Advanced SDSFIE Implementation Workshops follow an established workflow of converting non-compliant project data into an SDSFIE database as illustrated in Figure 1. The Basic SDSFIE Workshop stresses the fundamentals of GIS, SDSFIE organization, and use of three core SDSFIE tools, the Browser, Filter Maker, and Access Builder. The Advanced SDSFIE class focuses on creating and maintaining an SDSFIE-complaint geodatabase. Other course topics cover data-processing issues such as spatial references, feature level metadata, and data migration. Many students gain the confidence and skills to undertake the data conversion and migration into an SDSFIE database. Enterprise-wide GIS programs promoted by the Air Force Geobase Initiative, Army National Guard Bureau, the Army ITAM Integrated Training Area Management (ITAM) program, Corps-wide Districts, Naval Facilities Engineering Command (NAVFAC) offices, and Marine Corps are developing SDSFIE-compliant geospatial data sets for centrally located servers. Cross-agency cooperation in support of Homeland Security and Emergency Management has also spurred many agencies to adopt the SDSFIE.

The Basic and Advanced SDSFIE Implementation Workshops have been revised to cover the latest SDSFIE Release and enhancements of the SDSFIE Toolbox Suite. The course length was also adjusted to 2-½ days each for the Basic and Advanced sessions. Most students opt to sign-up for both courses held during the same week, thus saving on travel expenses. Changes in payment policy to accept credit card payments have made it possible for students from industry and other non-DoD agencies to attend these classes.

The FY04 schedule and online registration is now available from the Center's Website at http://tsc.wes.army.mil/news/classes/ClassRegistration/. Table 1 summarizes the dates, workshop session, and class size for next year's offerings. If you have any specific course questions, please contact Laurel Gorman at *Laurel.T.Gorman@erdc.usace.army.mil* for Basic SDSFIE Implementation Workshop and Nancy Towne at *Nancy.A.Towne@erdc.usace.army.mil* for the Advanced SDSFIE Implementation Workshop.

Table 1
FY04 SDSFIE Training Schedule
CADD/GIS Technology Center, Vicksburg, MS

Date	Title	Class Limits
Feb 9-11, 2004	Basic SDSFIE Implementation	35
Feb 11-13, 2004	Advanced SDSFIE Implementation	18
Jun 14-16, 2004	Basic SDSFIE Implementation	35
Jun 16-18, 2004	Advanced SDSFIE Implementation	18
Aug 17-19, 2004	Basic and Advanced SDSFIE Implementation Overview	TBD

First Transactional Facility Management Standard Released

By Bobby Carpenter, The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

The Facility Management Standard for Facilities, Infrastructure, and Environment (FMSFIE), Release 2.30, marks the first release of the "transactional" Facility Management Standard (*FMSFIE*). Previously, the FMSFIE has been developed as a subset of the Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) data model. The goal of the "transactional" FMSFIE is to provide a robust data content standard designed to improve efficiency and lower costs associated with the collection, management, analysis, and reporting of facility management data.

The FMSFIE is distributed via CD-ROM and the Internet (*http://tsc.wes.army.mil*).

The basic goals and purposes of the FMSFIE are to:

- Provide a relational "transactional" data content standard that focuses on legal and Federal reporting requirements related to asset management, work management, environmental management, public safety management, organization management, information security management, and financial management at DoD installations, Army Corps of Engineers Civil Works activities, and other Federal Government organizations. Transactional is defined as communicative actions or activities, involving multiple parties or things that reciprocally affect each other in a near real time setting that is based on life cycle events (Figure 1).
- Provide a data content standard designed for use with commercially available, off-the-shelf, relational database software, and enterprise CADD and GIS implementations.

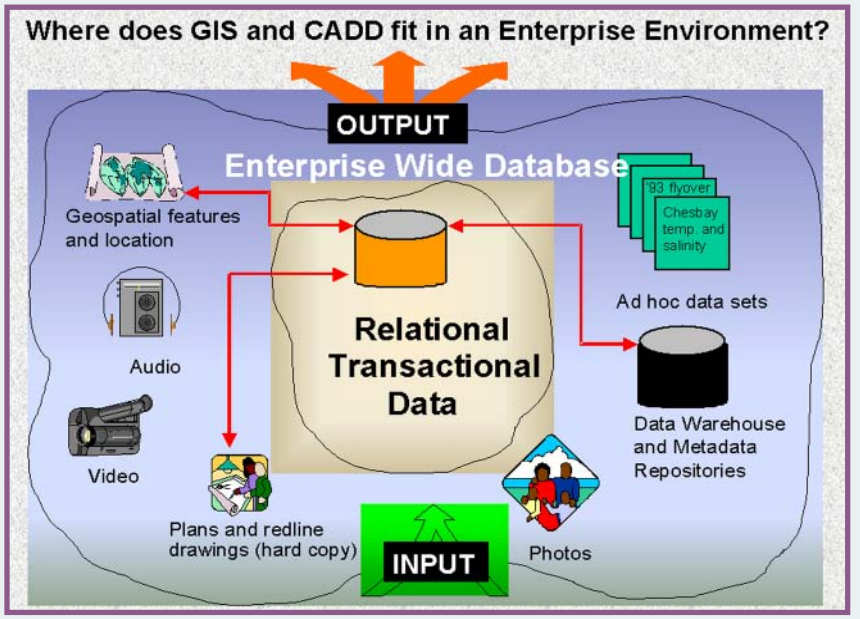


Figure 1. Conceptual Enterprise Transactional FM Database

- Provide a non-proprietary data content standard that permits organizations, contractors, and vendors to freely use the data schema and data dictionary, share FMSFIE compliant data with other organizations, and build applications based upon the FMSFIE data schema.

The FMSFIE provides a data model and data dictionary for facility and real property management. The FMSFIE is closely integrated with the CADD/GIS Technology Center's GIS and CADD standards. It also addresses the data content requirements of

various information management systems currently deployed within the DoD (e.g., Army Integrated Facilities System (IFS), Air Force Interim Work Information Management System (IWIMS), Air Force Automated Civil Engineer System (ACES), Internet Navy Facility Assets Data Store (NFADS), and the Army Corps of Engineers Facilities and Maintenance System (FEM)).

Federal Real Property Management (RPM)

The underlying basis for FMSFIE development is to support compliance with the multitude of Federal (e.g., NASA) and DoD laws and regulations governing the management of real property within the DoD and Federal Government (Figure 2). A Web site (*http://rpm.wes.army.mil/*) has been developed to support Federal and DoD components in complying with U.S. Codes and Executive Orders governing Acquisition, Maintenance, and Disposal of Real Property. The RPM site also provides a listing of the Federal legal reporting requirements and RPM regulations supported by the FMSFIE.

FMSFIE strategic plan. In 2000, the CADD/GIS Technology Center's Standards Working Group (SWG) and Corporate Staff (CS) approved an FM Strategic Plan that provides a framework for development of the FMSFIE based upon a robust "transactional" data model. Development of the transactional data model began with an initial focus on Asset Management.

A copy of the FMSFIE Strategic Plan can be downloaded from:

http://tsc.wes.army.mil/products/tssds-tsfms/fms/fmsprods.asp

Design considerations. The FM data schema and dictionary developed in support of these functions encompass broad data groups that fit within the facilities, infrastructure, and environmental management categories.

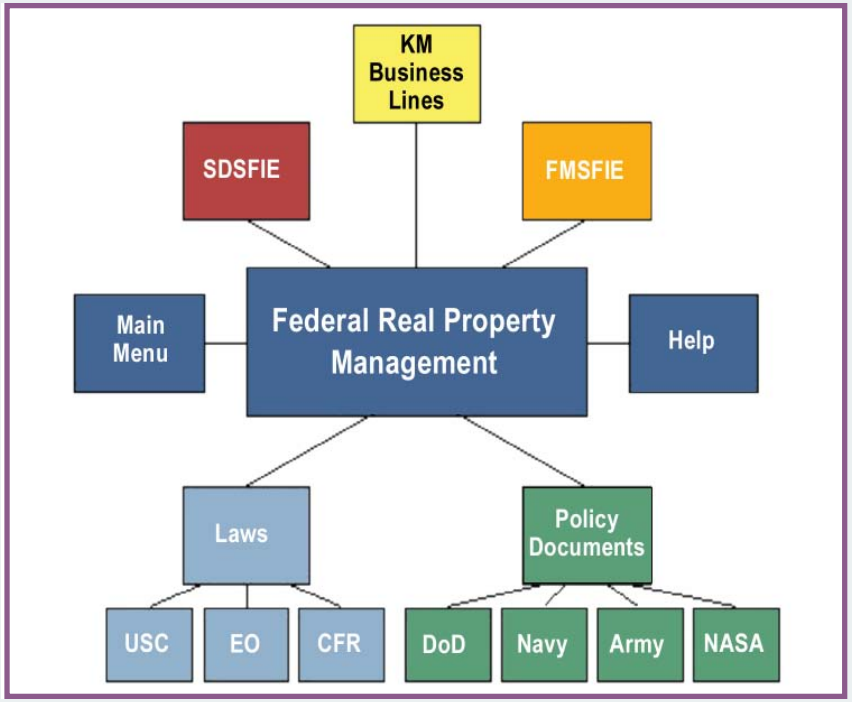


Figure 2. Federal Real Property Management

The FMSFIE has been designed for implementation using commercially available relational database management system (RDMS) software (e.g., Oracle, Informix, and SQL Server) and a Microsoft Windows Operating System (e.g., Windows 2000, XP, and NT).

Data model. The FMSFIE relational data model consists of four basic levels of hierarchy: Entity Sets, Entity Classes, Entity Subclasses, and Entity Families (Figures 3, 4, and 5).

Database schema. The FMSFIE provides definitions, table and attribute descriptions, and allowable ranges and values, and

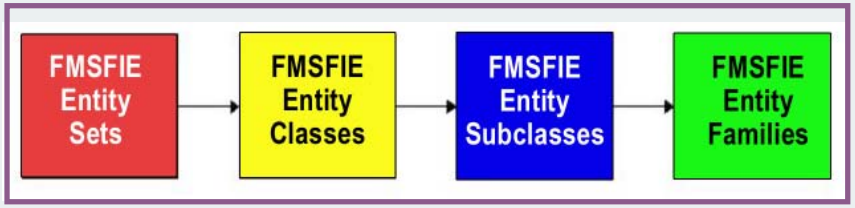


Figure 3. FMSFIE four basic levels of hierarchy

FMSFIE Data Model Hierarchy	
Entity Set	*Entity Sets* are the highest level of the FMSFIE data model structure. *Entity Sets* are broad, generalized themes containing one or more sub-groupings (called Entity Classes). The FMSFIE currently contains seven Entity Sets.
Entity Class	*Entity Classes* comprise the second level of the hierarchical FMSFIE data model structure, and comprise a sub-grouping of similar FM and real property classifications based on legal reporting requirements. *Entity Classes* contain one or more Entity Sub-Classes.
Entity Sub-Class	*Entity Sub-Classes* comprise the third level of the hierarchical FMSFIE data model structure. They comprise a sub-grouping of an Entity Class based on similar life-cycle event and temporal real property information. *Entity Sub-Classes* may contain one or more sub-groupings called Families. Some Entity Sub-Classes do not contain an underlying Family sub-grouping.
Entity Family	*Entity Families* comprise the fourth (or last level) of the hierarchical FMSFIE data model structure. They comprise a sub-grouping of a sub-class based on similar life-cycle event and temporal real property information.

Figure 4. FMSFIE data model hierarchy

modeling technology, which is organized in a hierarchical order using standard organizational naming conventions developed by the DoD, American National Standards Institute (ANSI), and the Federal Geographic Data Committee (Figure 6). Detailed information concerning the FMSFIE naming convention and schema is available at:

http://tsc.wes.army.mil/products/tssds-tsfms/fms/fmsprods.asp

FMSFIE Entity Sets	
Asset Management	Items comprising the Federal real property inventory and other related entities based on classification and need to support organizational requirements. Includes: (1) Tangible items comprising the Federal real property inventory that can be referenced by location, and (2) non-tangible items that cannot always be defined by a location or do not exist as an inventory item in the real property management inventory.
Work Management	Change management processes that consist of planning, programming, acquisition, operations, maintenance, revitalization, evaluation, and disposal actions affecting real property and other related entities.
Environmental Management	Defines the stewardship responsibilities as they relate to the Federal real property environmental management practices.
Organization Management	A structured grouping of personnel and the roles they perform as it relates to an integrated work environment.
Public Safety Management	Issues related to the protection of personnel and property.
Information Security Management	Controlled access to data and information as it relates to the roles of personnel.
Financial Management	Planning, programming, and execution of appropriations associated with real property management.

Figure 5. FMSFIE Entity Sets

FMSFIE Toolbox Suite

The FMSFIE Toolbox is a user-friendly interactive Microsoft Windows-based software application (modeled after the SDSFIE Toolbox), which installs on desktop computers and networks with a Microsoft Windows operating system (e.g., Windows NT, 2000, and XP). The FMSFIE Release 2.30 Toolbox consists of the FMSFIE Browser, which provides viewing and printing capability. Future releases of the FMSFIE will include an Access Builder and SQL Generator, which will facilitate the construction of an FMSFIE-compliant database, and the performance of diagnostic tests on the database.

Attribute Table	Relational database tables containing data, or information, about a specific life-cycle event, temporal occurrence, change occurrence, real property inventory, or other facility management information. A database can be defined as a structured collection of data items about a specific topic. A database table can be defined as a group of similar records. It is like a spreadsheet where the columns represent the fields, or 'attributes,' and the rows represent the records, such that each row will be associated with a single record. The FMSFIE has been designed for use with commercial-off-the-shelf relational database management system (RDBMS) software. RDBMS software provides a means of managing related data contained in one or more database tables. Examples of RDBMS software include Oracle (Oracle Corporation) and Access (Microsoft Corporation), SQLServer, and Informix. RDBMS software provides electronic tools for defining relationships (i.e., connections) between the different database tables. These relationships can be defined as: (1) one to many (most common); (2) one to one (rare, usually merge tables to one); and (3) many to many (needs a junction table).
Domain Table	Database table containing a listing of valid (also called permissible or reference) values. Also called a "look-up" table. Domain tables contain standardized lists of permissible values for specific attributes. They provide a predefined finite set of allowable values, which may be enlarged by each user. Included are diverse tables of units of measure, codes, types, styles, status, names, methods, materials, dispositions, sources, dimensions, data, classes, building numbers, etc.

Figure 6. Tables

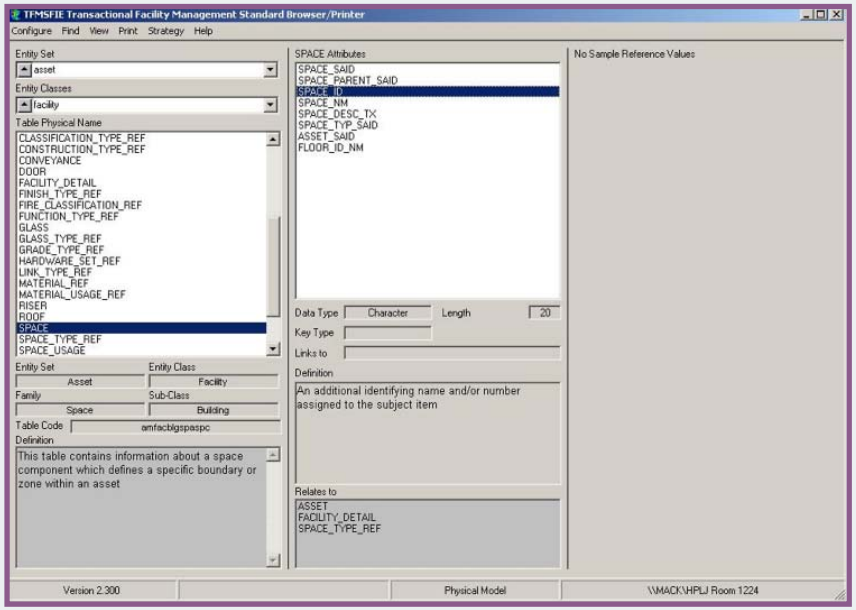


Figure 7. FMSFIE Browser

For additional information contact Bobby G. Carpenter, P.E., The CADD/GIS Technology Center for Facilities, Infrastructure, and Environment, Information Technology Laboratory, Engineer Research and Development Center at 601-634-4572 or e-mail to *Bobby.G.Carpenter@erdc.usace.army.mil*.

New Bentley Systems Contract Awarded

The CADD/GIS Technology Center awarded a Blanket Purchase Agreement (BPA) to Bentley Systems, Incorporated, on September 12, 2003.

This BPA offers the Center and its partner agencies preferred pricing below GSA rates for software licenses, software training courses, consulting services, and software maintenance subscriptions. Agencies and organizations that consolidate all of their Bentley software maintenance fees from other contracts under the BPA are eligible for additional discounts.

Bentley software solutions have a long history of helping make engineering projects successful for the Corps of Engineers and the other participating member agencies of the CADD/GIS Technology Center. "The CADD/GIS Technology Center has been instrumental in defining and propagating the standards which are so important to the users of Bentley's solutions" said Jerry King, Vice President of Bentley Federal Sales. "This BPA extends additional value to each of the Center's member agencies and helps streamline the delivery of new solutions from Bentley to these organizations."

"The CADD/GIS Technology Center has been instrumental in defining and propagating the standards which are so important to the users of Bentley's solutions"

-- Jerry King
Vice President
Bentley Federal Sales

The Bentley Federal Portfolio subscription program, which is exclusively available for Federal agencies, is also available under the BPA. The Federal Portfolio program offers an organization access to a comprehensive portfolio of Bentley software products at one of two levels. The Desktop level subscription provides access to all eligible Bentley Desktop software (MicroStation, InRoads, TriForma, etc.), and the Server level subscription provides access to all eligible Bentley Desktop and Server software (ProjectWise, Publisher, Digital InterPlot, etc.).

Bentley is working together with Environmental Systems Research Institute (ESRI) to develop and deliver solutions that provide better interoperability of data from Bentley's AEC solutions with GIS solutions from ESRI. These software products will also be available under the BPA when released.

The contract is immediately available to the Corps of Engineers and all Center partnering agencies. All Corps of Engineers Contracting Officers are preauthorized to place orders directly.

Other agencies may obtain a delegation of procurement authority to use the contract by contacting Ms. Carla Koestler at the Vicksburg District Consolidated Contracts Office, Vicksburg District, Vicksburg, MS 39180. Phone: (601) 631-7903. E-mail: *carla.c.koestler@mvk02.usace.army.mil*.

The Bentley point of contact is Mr. Doug Moat, Senior Federal Accounts Manager for DoD. Phone: (952) 892 3699. E-mail: *Doug.Moat@Bentley.com*.

Information on using the contract, product availability, and ordering procedures are available on the Center's Bentley BPA Site at *http://tsc.wes.army.mil/BentleyBPA*. Center POC is John Hood, who can be reached at 601-634-3184, e-mail: *John.A.Hood@erdc.usace.army.mil*.

Highlights from ESRI 2003 User Conference

by Blaise Grden and Laurel Gorman, The CADD/GIS Technology Center

The ESRI International User Conference held July 6-11, 2003, showcased the latest advances in GIS software, server-based architecture, and related technologies such as remote sensing and CADD. More than 11,000 professionals from 135 countries attended this year's conference and trade exhibitions. The Center's presence was felt at the many DoD and Federal User Group meetings; several presentations focused on Center standards products. This article highlights key conference points-of-interest to our diverse, field user community.

ESRI productuUpdates

Jack Dangermond opened the plenary session with an update on core products and future direction of ArcGIS.

ArcGIS 9.0. The next generation of ArcGIS, Version 9.0, will complete the migration of ArcInfo's functionality into the ArcGIS environment (Figure 1). New enhancements include:

- Open scripting
- 3D Symbols
- ArcObjects (Controls, Objects, and Tools)
- Geoprocessing tools
- 3D visualization (ArcGlobe)
- ArcGIS Engine
- ArcGIS Server

ArcGIS Business Analyst software and the business Web Services. ArcGIS Business Analyst provides tools, applications, and data to assist users with mission-critical decisions. The users

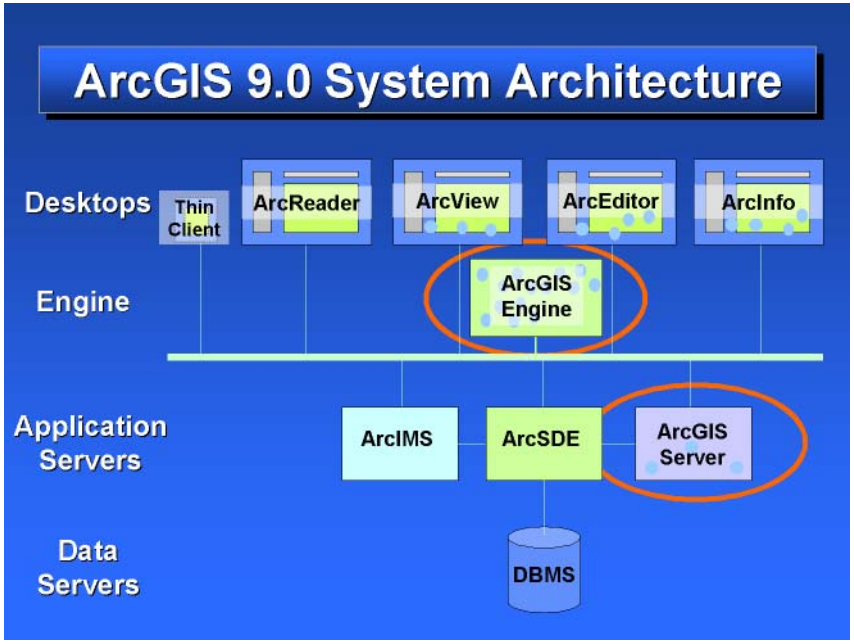


Figure 1. System architecture for the ArcGIS 9.0, available next year (courtesy of ESRI International Users Conference 2003)

can identify patterns, trends, and markets they might not have identified using tabular data alone. The type of data available include: census data by state, county, zip code, tract, and block group, household consumer data, shopping centers, business locations, traffic counts, streets, water, land marks, schools and airports. Projected population data sets contain projected population for 2003 and 2008. The software can also perform drive time analysis, find locations of the best store, define customer-based trade areas, conduct market penetration analysis, customer or store

prospecting. Trade areas can be defined through a variety of methods. The software also includes Centrus Geocoder from Sagent Technologies, Inc., and Crystal Decisions' Crystal Reports 9.0. ESRI is providing the data through Web services.

National Geographic (NG)TOPO. This product, which is included in ArcWeb for Developers, is the only series of USGS 1:24000 topographic "quad" maps that directly integrates with ArcGIS. NG Topo allows modification of raster images. The images have been scanned at a much higher resolution then the original USGS (U.S. Geological Survey) scans, resulting in print quality equal to the original. The data include seamless 30-m USGS Digital Elevation Models, and TOPO 30-m hill shade.

For more information, visit *www.nationalgeographic.com/topo*.

Map gallery

Many organizations and government agencies contributed posters to the Map Gallery. At the David Rumsey Historical Map Collection, over 8,800 historic maps were available online. The collection focuses on rare 18th and 19th century North and South America maps and other cartographic materials. Historic maps of the World, Europe, Asia, and Africa are also represented. Collection categories include antique atlas, globe, school geography, maritime chart, state, county, city, pocket, wall, children's, and manuscript maps. The collection can be used to study history, genealogy, and family history. Telemorphic, Inc., developed the GIS Map browser. Another special interest display was sponsored by the Smithsonian Institute and the National Zoo. Photos, maps, and imagery including three-dimensional terrain models showcased the Amazon Basin GIS project.

The Kansas City District, U.S. Army Corps of Engineers, exhibited maps published in the "Lewis amd Clark Bicentennial Lower Missouri River: A Guide to Recreation and Visitor Safety." Kim Penner and Greg Miller from Kansas City District won first place in Cartographic Publication Category for maps they submitted. These maps can be viewed at: *http://www.esri.com/events/uc/results/map_gallery_results.html#singlemapproduct/*

Federal products

Geospatial-One Stop was unveiled at the Department of Interior Exhibit Hall. A new Web portal, Geospatial One Stop, is part of the Presidents E-Government Strategy. This site, developed by ESRI, is to be the foundation for a National GIS that will provide access to maps, data, and other services. All GIS communities are asked to participate. The site was developed by ESRI. Currently, there are 17 data categories on the site. Along with the metadata, the site contains a map viewer, with various tools. The Web portal site can be accessed directly at *http://geodata.gov/*.

DoD activities

Several recurring ideas were discussed in each agency's meeting on enterprise GIS solutions. Architecture issues related to hardware, software, GIS map display, and management of object-based databases were raised during each service meeting. During the AF Geobase User meeting, the majority of the discussion revolved around procurement of hardware and software at deeper discounts.

At the Army meeting, Paul Dubois and Josh Delmonico discussed regional management of GIS. Some key announcements were:

1) A data call from the Army BRAC committee was scheduled during July and August 2003.
2) To prepare for BRAC, 250 installations from the Army, Air Force, and Navy will be getting satellite imagery produced by Space Imaging.
3) Army GIS information and documents are available on the Web at: *http://gisr.belvoir.army.mil*.

During the Navy User Group Meeting, many participants expressed interest in more coordination between the Intel and facilities community. Major topics of the meeting focused on an enterprise-wide architecture for hardware, CADD and GIS applications, and increased availability of data on Web portals. Navy users showed interest in participating in an ESRI-sponsored Homeland Security User's Group and the FGDC Homeland Security

At the USACE User Group Meeting, a variety of topics were brought up by the facilitator and the 42 USACE CADD/GIS staff that attended one of the two user group meetings held during the conference week.

The following issues were discussed:

a) Create a list of people in the Corps that are using GIS and what they are working on. The Center staff suggested using the Army Knowledge Online (AKO) site or the CADD/GIS/FM Registry and Clearinghouse developed by the Center-sponsored Civil Works Field Working Group. The registry contains projects, contacts, software, etc., and can be queried by many different fields including applications.
b) Douglas Moat and Jerry King of Bentley explained how ArcGIS 9.0 would have a tool to better integrate CADD drawings into the ArcGIS. However, the Bentley graphic tool pallets were not going to be integrated into ArcGIS.
c) Acquiring data from cities and counties was also discussed. Several Districts have been asked to sign agreements that they will not distribute these local data sets. Legal council in the Districts have informed the GIS project managers that they cannot sign these agreements. This matter needs to be resolved and then posted on the USACE Geospatial Web site.

Technical Sessions

Geospatial Intelligence, NIMA Support Team for Iran. The philosophy of "We map'em you zap 'em" describes the team support given by NIMA (National Imagery and Mapping Agency) for the IRAN war effort. This was the first time that electronic maps were used in the battle field. A map warehouse was initially designed to hold upwards of 33 million printed maps at a cost of $20 million. The electronic data sets almost eliminated the need for the warehouse. The team used existing commercial-off-the-shelf (COTS) and available technologies. NIMA created a chat room for support in the field, thus enabling the command to visualize information instantly ("show me the picture") and the field could obtain data quickly.

National Center for Geospatial Intelligence for Standards (NGGIS). The current status of NGGIS was presented by NIMA. The NCGIS will address standards issues relevant to enabling technologies, data architecture, and software tools as NIMA moves toward implementing a comprehensive, enterprise-wide

standards management policy for the National System for Geospatial Intelligence (NSGI). This standard applies to the military operations.

NGGIS was established in September 2002.

Commercial/Joint Mapping Toolkit (C/JMTK). An overview of C/JMTK was presented by NIMA sponsors. TASC, a business unit of Northrop Grumman Information Technology, is the prime contractor for the NIMA's C/JMTK Program. C/JMTK is a standardized, commercial, comprehensive tool kit of software components for the management, analysis, and visualization of map and map-related information. The C/JMTK program will provide standardized tools in a net-centric environment. The toolkit building, populating, managing, and delivering geospatial information for exploitation in the battlefield theater is illustrated in Figure 2.

Employing Geospatial Technologies for BRAC '05. Col. Brian Cullis, USAF, Chief HAF Geo Integration Office, gave a presentation on the Installations Visualization Tools (IVT), which will support BRAC 2005 data calls. The project strategy is to have "One map....One Installation" that leverages existing DoD GIS investments. The bases are to be on a level playing field with each base having the same data. The public will have an organized set of existing data. The data sets include Geo-referenced IKONOS satellite photography, boundaries that are defendable, noise contours, clear zones, explosive zones, 100-year floodplains, and wetlands. BRAC will also deal with encroachment issues, which will address the uncontrollable growth surrounding military reservations from both residential and commercial landowners. The IVT architecture mandates SDSFIE compliance, FGDC Content metadata compliance, and data quality assurance procedures.

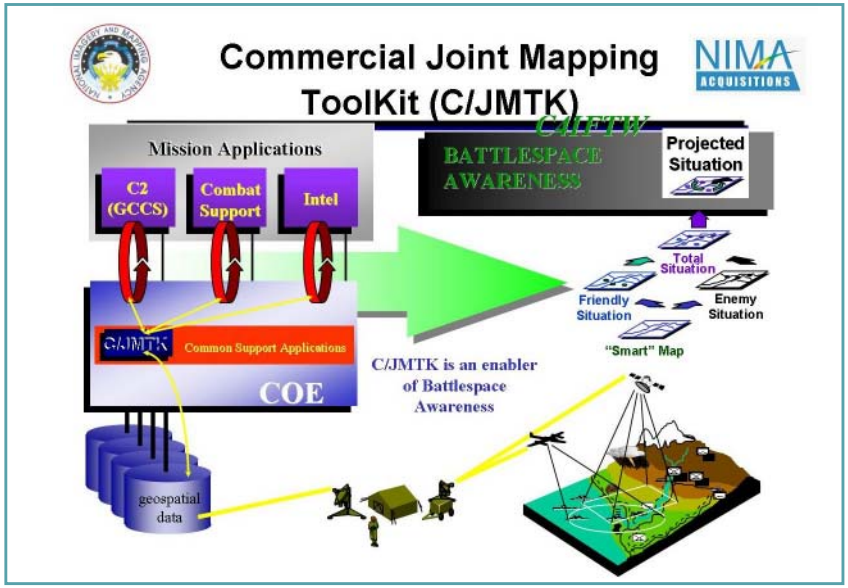


Figure 2. System architecture of C/JMTK program

Presentations of interest

It was impossible to attend all the concurrent technical sessions. The latest Information technology (IT) implementation news was also presented, as summarized below.

Web portals lessons learned. The Bureau of Land Management discussed lessons learned for developing Web portals.

1) Separate the IT and Technical; the IT personnel do the "how" and the Technical are the "What" (content).
2) Develop a process.
3) Simple and fast performance.
4) Marketing.

5) Use COTS.
6) Develop storyboards.
7) Communicate with feedback, walk through, storyboards, testing, and training. Remember to balance quality, time, and money.

United States Geographic Information Standards; International, National and Federal. Norm Anderson, Chair of the International Committee for Information Standards-L1 Geographic Information Activities presented an overview of current standards at all government levels including international, national, and Federal. Key standards discussed included:

1. Project 987-D: Spatial Data Transfer (INCITIS 320:1998).
2. Project 1411-D: Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) (INCITS 353;2002).

The last project on the list number eight was Project 1574-D Geographic Information Framework Content Standards.

It was announced that the Center's SDSFIE, which is now a National standard and updated each year, is proposed to become an International Organization for Standardization (ISO) standard. The ISO has 147 members one from each county, each with one vote. ISO works in partnership with international organizations, governments, industry, business, and consumer representatives. The ISO serves as a bridge between public and private sectors.

Summary

As in the past, the conference week went by fast with full days consisting of user meetings, technical sessions, software workshops, and meetings with all vendor/industry partners. The Center representatives coordinated with key proponents and users affiliated with the CADD/GIS Technology Center During the closing plenary session, attendees voiced their concern about printing ESRI maps and stressing problem solving in GIS courses in colleges and universities rather than the technical GIS skills.

ESRI announced that next year's User Conference will be held August 9-13, 2004. The deadline for submitting abstracts is November 3, 2003. (Please note that 2004 ESRI User Conference is one week prior to the Center's CADD,/GIS/ FM, Remote Sensing, Survey, Mapping Symposium and Exposition, which will be held in San Antonio, TX, during August 17-19 2004). The ESRI Conference Planning Committee also announced that subsequence conference dates are scheduled for July 25-29, 2005, August 7-11, 2006, August 20-24, 2007, and August 4-8, 2008. Mark your calendars!

Natural and Cultural Resources Forum

By Laurel Gorman, CADD/GIS Technology Center for Facilities, Infrastructure, and Environment

Welcome to the Natural and Cultural Resource Forum, a column dedicated to GIS knowledge and issues related to natural and cultural resources management. This issue's column highlights the FY03 accomplishments of the Natural and Cultural Resources Field Working Group (FWG).

FWG Meetings… Incoming Chair, Dr. Chris Hamilton (Army Fort Benning) and Vice-Chair Lonnie Mettler (USACE Walla Walla District) led the annual Joint – Corporate Staff and Field Working Group meeting held May 27-29, 2003, in Vicksburg, MS. The purpose of the meeting was to prepare the business plan for the Natural and Cultural Resources FWG and contribute to the Center's FY04 project selection process. In addition to the officers, the members present included Ken Bristol (Eglin AFB), Kevin Porteck (HQ AFCEE), and Jim Wojtala (USACE Vicksburg District), who worked on FWG objectives, goal strategies, and Top Ten FY04 projects. The FWG objectives were revised to support the Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) in three major areas:

1. Improve SDSFIE for Cultural Resources Management
   - *a.* Historic buildings
   - *b.* Traditional cultural properties/archeological sites
   - *c.* Native American consultation
2. Improve SDSFIE for Sensitive Species Management: natural heritage data integration
3. Improve SDSFIE for Forest Management
   - *a.* Forest management
   - *b.* Urban forest management
   - *c.* Image capture and interpretation

With a natural and cultural resources perspective, the FWG championed and developed Center projects satisfying the above objectives. The anticipated projects over the next 2 years include:

FY04	SDSFIE for Historic Buildings and Structures – Phase 2
FY04	SDSFIE for Native American Non-Portable Artifacts
FY05	Natural Heritage Data Integration
FY05	Forest Management

Additionally, the Natural and Cultural Resources FWG endorsed other Center projects, such as military encroachment, historic and digital map collection, range and training standards, and force protection symbology. At the July Corporate Staff meeting and September Board of Directors, Phase 2 of the SDSFIE for Historic Buildings and Structures and SDSFIE for Native American Artifacts projects were approved for FY04 funding.

Kudos... Dr. Chris Hamilton was recognized for his leadership and contributions to Field Working Group at the Joint FWG meeting. Chris received a plaque from the Center, which was presented by Brigadier General Benjamin Freakley (Installation Commander) at a ceremony held in Fort Benning, Georgia (Figure 1).

Figure 1. Brigadier General Benjamin Freakley, Installation Commander, Fort Benning, GA congratulates Dr. Chris Hamilton on receiving Center plaque

Standards Development… Although this year's project – Spatial Data Standards for Historic Buildings - Phase 2 – was delayed, several Placeware conferences kept alive the ideas, reviews, and future direction of this project. During Phase 1, an in-depth report of proposed and existing historic building standards was completed, which is available from the Center Web site at:

http://tsc.wes.army.mil/contacts/groups/FWG/Natural-Cultural/

Robust discussions during FWG meetings and conference calls by the Cultural Resources Task Group resulted in identifying data needs to address installation queries and reporting requirements including:

- Legal and regulatory compliance
- Financial information on historic assets and repairs
- Links to real property systems for each Service
- DoD cultural resource management policies
- Preservation and treatment non-graphic information
- BRAC (Base Relignment and Closure) 2005 data calls

Conferences… On behalf of the FWG, Laurel Gorman gave a presentation on "Implementation of GIS Standards for Historic Buildings/Structures" at the ESRI Users Conference on July 10, 2003. The audience was very receptive to the organization of buildings and structures as separate geospatial features and management of historic buildings based on a life-cycle approach of acquisition, compliance, operation and maintenance, and disposal, as shown in Figure 2. Many users were interested in the Historic Buildings report (available from the Center's Website) and the proposed data model with definitions of the related features, attributes, and domain lists. The moderator, Bob Booth from ESRI, is forming an archeology data model group. The Natural and Cultural Resources FWG will participate in this data model group and fold the standards results into the SDSFIE. Immediately after the conference, the Center received several e-mail requests including an inquiry from Ireland on the Historic Buildings/Structure Standards and draft data model. These new Cultural Resources points of contact will be added to e-mail distributions for project updates and will be invited to future Placeware conference calls.

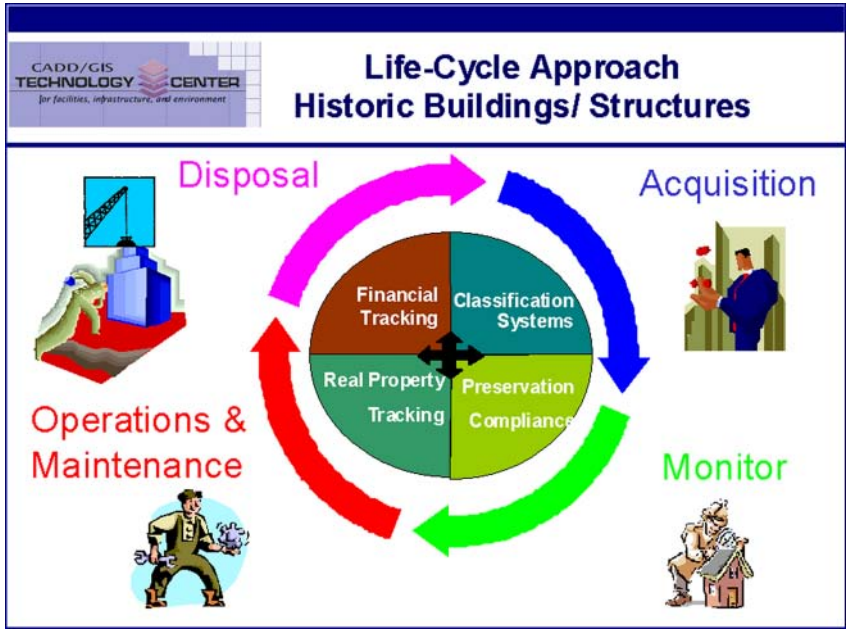


Figure 2 . Life-cycle approach proposed for historic buildings and structures

For additional information, contact Laurel Gorman at 601-634-4484 or send e-mail to *Laurel.T.Gorman@erdc.usace.army.mil*.

Calendar of Events

Meetings

November 19-20, 2003

Corporate Staff Meeting. Humphrey Engineer Center, Springfield, VS
POC: Martha Pettway, 601-634-4109, *Martha.Pettway@erdc.usace.army.mil*

Early May 2004

Joint-Corporate Staff and FWG Annual Meeting. To be determined.POC: Martha Pettway, 601-634-4109, *Martha.Pettway@erdc.usace.army.mil*

August 16, 2004

FWGs Symposium Meeting. Henry B. Gonzalez Convention Center, San Antonio, TX. POC: Martha Pettway, 601-634-4109, *Martha.Pettway@erdc.usace.army.mil*

Conferences

October 14-17, 2003

GEO-INTEL 2003 – The Foundation for Security Symposium. New Orleans Marriott, New Orleans, LA. POC: Jennifer Hoff, *jhoff@ntpshow.com*, *http://www.geointel.org/*

December 2-5, 2003

Autodesk University 2003 – MGM Grand Conference Center, Las Vegas, NV. POC: Autodesk, 415-446-7717, *autodeskuniversity@autodesk.com*, *http://www.autodesk.com*

May 12-14, 2004

Geospatial World 2004 – The Intergraph Geospatial User's Community International Training and Management Conference. Fontainebleau Hilton, Miami Beach, FL. POC: Arlen Reimnitz, 1-800-791-3357, *iguc@intergraph.com, http//www.geospatialworld.com*

May 23-27, 2004

Bentley International User Conference. Walt Disney World Swan and Dolphin Hotel, Orlando, FL. POC: Bentley Systems, Inc., *bentleyreg@neocentrix.com*, *http://www.bentley.com/biuc/*

June 10-12, 2004

American Institute of Architect's 2004 National Convention and Design Expo. McCormick Place, Chicago, IL. POC: AIA, *aiaexpo@mc-comm.com*

August 9-13, 2004

24th Annual ESRI International User Conference. San Diego, CAPOC: ESRI, Inc., *uc2004@esri.com*, *http://www.esri.com/events/us/index.html*

August 17-19, 2004

2004 Symposium and Exposition. POC: The CADD/GIS Technology Center, Toby Wilson, *James.T.Wilson@erdc.usace.army.mil*, *http://tsc.wes.army.mil*

August 17-19, 2004

9th Joint Services Pollution Prevention and Hazardous Waste Management. Henry B. Gonzalez Convention Center, San Antonio, TX. *http://www.p2-hwmconference.com/index.cfm*

August 17-19, 2004

2004 Geobase Compass Conference. Henry B. Gonzalez Convention Center, San Antonio, TX. *http://www.usafa.af.mil/iita/Conference.htm*

August 23-26, 2004

13th Annual ITAM Workshop. Parks Reserve Forces Area, Camp Parks, CA. *http://www.army-itam.com/workshop/overview.jsp*