CADD/GIS Bulletin

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Tri-Service A/E/C CADD Standard Implementation Tools

by Stephen Spangler and Toby Wilson, Tri-Service CADD/GIS Technology Center

Computer-aided design and drafting (CADD) users throughout the Tri-Services have indicated a need for customized shortcuts or utilities to facilitate efficient production of architectural, engineering, and construction (A/E/C) CADD documents. Since the distribution of Release 1.4 of the Tri-Service A/E/C CADD Standard, users have been clamoring for tools to implement this voluminous standard.

Over the past fiscal year (FY), the Tri-Service CADD/GIS Technology Center has been developing AutoCAD and MicroStation applications that will transparently implement the CADD Standard (i.e., the user will rarely have to refer to the standard document when developing CADD files).

The MicroStation-based tool (called Workspace) will be distributed in three components: the Workspace generator, the Workspace itself, and a standard compliance checker. The generator creates the workspace tools (palettes, icons, etc.) using a Microsoft Access database that contains all the information within the hundreds of level/layer tables in the CADD Standard. Using a "generator" gives system administrators the ability to edit the Access database and rerun the generator to create a Workspace that meets site-specific needs.

The Workspace allows the user to make various selections as to the type of model or sheet file he/she wants to create (e.g., Architectural Floor Plan (Figure 1)) and a palette of the various items that

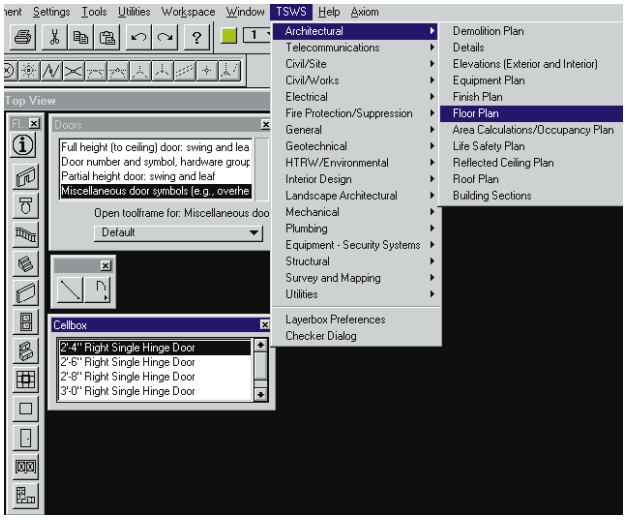

Figure 1. Workspace menu selections

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Visit: http://tsc.wes.army.mil

can be placed in that type of file is generated (e.g., doors, windows, etc.). The user then selects the specific type of item required (e.g., full height doors, partial height doors, door symbols, etc.) and the workspace sets the proper level settings (e.g., level number, color, line weight, line style).

The final part of the workspace is the checker, which can evaluate individual CADD files to determine if they are in compliance with the A/E/C CADD Standard (Figure 2). The checker records which elements are not in compliance and can locate those elements for the user within the file.

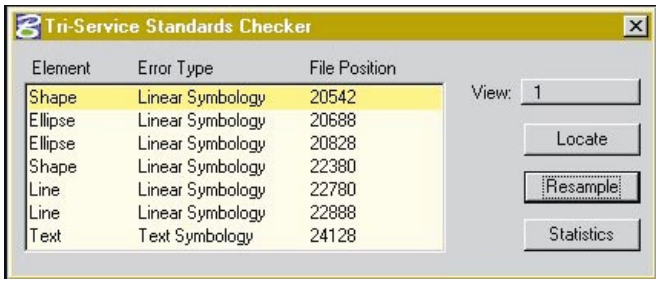


Figure 2. Workspace checker showing non-compliant

Currently, the Workspace is in final Beta testing and should be available from the Center in May 1999.

Training Classes on Workspace

Two types of training classes are being developed for the Workspace: a System Manager's training class will be offered by the Tri-Service CADD/GIS Technology Center in June/July 1999, and the Corps of Engineers is developing a User's training class. For further information/ updates, please visit the Center's Web site at

The AutoCAD counterpart to the MicroStation Workspace is the CE-CADD application developed by the U.S. Coast Guard. CE-CADD is an add-on application for AutoCAD Release 14 and currently implements the Coast Guard's CADD Standard. Through an agreement with the Coast Guard, the Tri-Service CADD/GIS Technology Center is modifying the CE-CADD software to implement the Tri-Service A/E/C CADD Standard. It is anticipated that the revised CE-CADD software will be available in the latter part of FY 99.

As is the policy of the Center, the A/E/C CADD Standard is compliant with the most recent prerelease version of the United States National CAD Standard. For additional information, contact Toby Wilson by e-mail (wilsonj@wes.army.mil) or by telephone (601-634-3604).

Key Federal Geographic Data Committee Activities

by Laurel Gorman, Tri-Service CADD/GIS Technology Center

- The latest Federal Geographic Data Committee (FGDC) Standard sponsored by the Facilities Working Group (FWG), ***Geospatial Accuracy Standard Part 4: A/E/C and FM***, is available for public review until May 20, 1999. The objective of this standard is to provide a consistent method for reporting the accuracy of geospatial data collected for Architectural/Engineering/Construction and Facility Management (A/E/C/FM). The A/E/C/FM Accuracy Standard will be based on the ASPRS Accuracy Standard for Large-Scale Maps. The Accuracy Standard will also include engineering and construction survey conventions based on existing State codes/statutes.
- The FGDC CADD Translation Profile is also out for public review. This Spatial Data Transfer Standard supports the exchange and transfer of CADD spatial data. For more information, see the FGDC Standards home page: *http://www.fgdc.gov/standards/status/ sub3_2.html/.*

  Dave Horner, from the Tri-Service CADD/GIS Center, will present an overview of the CADD Translation Profile at the 40th Annual Technical Conference of the American Design Drafting Association (ADDA), May 6-7, 1999, in Denver, CO.
- The FGDC is organizing the 1999 National GeoData Forum, which will be held June 7-9, 1999, in Washington, DC. The theme is "The National Spatial Data Infrastructure: What Next?" Scheduled topics include financing data development and maintenance, organization and communication, and emerging technology. For more information, visit the National GeoData Forum Web site at: *http://www.fgdc.gov/99Forum/.*

For additional information, contact Laurel Gorman by e-mail (*gormanl@wes.army.mil*) or by telephone (601-634-4484).

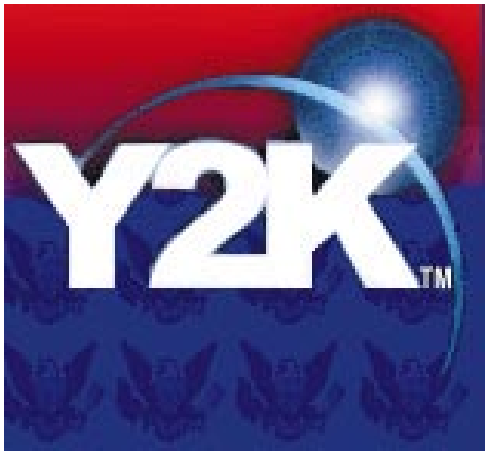
The Tri-Service Center is dedicated to fostering the application of computer-aided design and drafting (CADD) and geographic information system (GIS) technologies for facility life-cycle efforts throughout the Army, Navy, and Air Force. The CADD/GIS Bulletin *is published by the Tri-Service CADD/GIS Technology Center of the Information Technology Laboratory, U.S. Army Engineer Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180-6199.*

Is Your CADD and/or GIS System Year 2000 Compliant?

by John Hood, Tri-Service CADD/GIS Technology Center

This question is being posed more frequently as we approach the year 2000. The problem, especially to computer systems, is the handling of date information. In short, the year 2000, or Y2K, problem stems from the habit of using two digits, as in 99, to represent the year rather than the full four digits, as in 1999. Over the years, this two-digit shorthand representation of the year was used frequently in the design of both computer hardware and software. While the biggest potential threat would seem to be in systems dependent on time and date, such as financial-related systems, the proliferation and integration of computer-aided design and drafting (CADD) and GIS technology with other systems such as facility management could present problems.

Fortunately, the program has taken steps to assist those who acquired systems via one of the IM/FCAD2 (formally "CAD2") contracts. Some time ago, both contracts were modified to require that all equipment and software be either Y2K compliant or capable of being made Y2K compliant. The safest and recommended procedure is to provide the IM/FCAD2 vendor with your hardware and software configuration for Y2K certification. For those items determined not to be compliant, the remedy (and cost, if any) will vary depending on a number of factors, such as warranty, maintenance and/or software support agreements, age of equipment, software version numbers, etc.



The IM/FCAD2 vendors can be contacted as follows:

- INTERGRAPH, 1-800-747-CAD2, www.ingr.com
- TRACOR, 1-800-244-CAD2, www.tracor-es.com/ec/c-cad2-i.asp

We recommend that you take action as soon as possible as there will surely be a mad rush towards the end the year. If your systems were acquired from other sources, we recommend that you go directly to them for Y2K information.

If you need any additional Y2K information about your CADD and/or GIS systems, please call the Tri-Service CADD/GIS Technology Center at 601-634-4582 or e-mail hoodj@wes.army.mil/.

ArchiCAD, a Tool for Architects

by Ken Cook, Tri-Service CADD/GIS Technology Center

A recent demonstration of ArchiCAD at the Tri-Service CAD/GIS Technology Center piqued my interest enough for me to test-drive it for myself. What interested me in Graphisoft's ArchiCAD software was the process that is used to draw buildings. Other CADD packages draw buildings; however, the ArchiCAD software process is much akin to the architect's traditional design process.

ArchiCAD installed easily on my laptop. It will operate with as little as 32 megabytes of RAM, but 64 megabytes is recommended.

I was amazed at how easily I could draw a small building. With the assistance of my two-year-old son, I placed a slab for a simple building. We then selected a brick veneer exterior wall, which was the default. Next we added a simple hip roof. At this point we toggled over to the three-dimensional (3-D) window to view our design. My son immediately recognized the image as a house.

Example of a simple image created with ArchiCAD

From the 3-D window we placed windows, doors, and handrails before toggling back to the two-dimensional plan and adding three more stories. After we had placed furniture objects, our design was complete.

The robust object library in ArchiCAD is organized using the Construction Specifications Institute's (CSI) 16 division format. With the exception of my son's random key selection at critical points, we easily created a small building within 30 minutes. I plan to take some training in ArchiCAD this year, although I think the software is so intuitive that it may not be necessary.

Graphisoft produces ArchiCAD for the Macintosh operating system as well as Microsoft Windows. In fact, ArchiCAD development began on the Macintosh, which explains its intuitiveness.

Graphisoft has provided this tool primarily for architects. What is needed is more development in the engineering disciplines to bring them up to the same level as the architectural discipline. For example, the 3-D capability could be utilized for interference checking as well as architectural presentations. I hope that Graphisoft develops the engineering interfaces with the same intuitiveness as the architectural interface.

I have not inserted drawings created with other CAD engines into ArchiCAD, but according to Graphisoft this procedure is not a problem.

A demonstration CD-ROM of ArchiCAD can be obtained by calling 1-800-344-3486, or you can browse the Graphisoft Web site at http://www.graphisoft.com/.

RAILER GIS as a Tool to Help Manage Railroad Track Networks

by D.R. Uzarski and M.J. Smejkal
U.S. Army Construction Engineering Research Laboratories

The U.S. Army owns and manages approximately 2,500 miles of railroad trackage that must be regularly inspected and maintained. In response to the need for an expedient and cost-effective tool for management of these transportation networks, the U.S. Army Construction Engineering Research Laboratories (CERL), Champaign, IL, developed the RAILER® Engineered Management System. This decision-support system was designed to assist railroad track managers in their inventories, inspections, condition assessments, and maintenance and repair (M&R) plans. RAILER has been continuously upgraded over the past several years to add new features and capabilities and produces a number of text and graphical reports covering inventory, inspection, condition assessment, and M&R planning. Although these reports are extremely useful, an optional means for showing that same information spatially was needed. Track information displayed on a network map provides both a "big picture" perspective and specific information at any track location. To this end, CERL was tasked by the U.S. Army Center for Public Works to develop RAILER GIS.

The commercially available ArcView GIS product was chosen as the development platform. The first two versions of RAILER GIS focused on track segment information because until the development of RAILER Version 5.0, all data were collected and stored at the track segment level. The ability to show information independent of segments such as track structure changes and specific track inspection findings was lacking. The answer to this was to utilize route themes that take advantage of the fact that RAILER data are keyed to track station location. RAILER Version 3.0 incorporates route themes.

RAILER GIS Version 3.0 greatly expands the ability to display RAILER information. The RAILER GIS program creates a variety of views and themes for logically displaying the information by location. The views include track structure, track information, crossings, turnouts, detailed inspection findings, safety inspection findings, last inspection dates, condition assessment, and M&R plans. Each view has a variety of themes to support that view. As examples, two of the track structure themes are rail weight and tie spacing. Also, each inspection theme relates to specific track component groups, and condition themes address track standards and condition indexes.

To use RAILER GIS Version 3.0, the user must first implement RAILER Version 5.0a (or higher) and ensure that ArcView Version 3.0a (or higher) is installed. Next, the user must establish the route themes. A digitized track map must be brought into ArcInfo where the tracks are identified and the routes established. Once this is completed, the resulting track file is imported into ArcView where the RAILER GIS scripts are run establishing the views and themes. RAILER data are displayed through ArcView by pressing a "GIS" button located on the RAILER button bar. Pressing this button opens ArcView, and current RAILER information is automatically displayed in the various views and themes.

The Naval Surface Warfare Center, Crane, IN, sponsored the development of RAILER GIS Version 3.0 as part of its RAILER implementation. RAILER GIS Version 3.0 has been successfully field tested at the Naval Center. A whole new dimension of track management has resulted.

RAILER and RAILER GIS are available through the RAILER Support Center by contacting Lynn Brownfield, COMM 217-333-5414, Department of Continuing Education, University of Illinois, 302 E. John St., Suite 202, Champaign, IL 61820.

Joint EWG/FTAG/FWG Meeting May 17-21, 1999

The Annual Meeting of the Executive Working Group, Field Technical Advisory Group, and all Field Working Groups will be held in Las Vegas, NV, during March 17-20, 1999. Key meeting activities include ranking of FY00 funded projects, briefings of FY99 accomplishments and FY00 strategic plans, and identifying future procurement needs for IM/FCAD-2. For further information, please contact Amy Sullivan at 601-634-4582 or sulliva@wes.army.mil.

What Are the Best Soil Erosion Models for DoD Land Managers?

by Laurel Gorman, Tri-Service CADD/GIS Technology Center

Many land managers are tasked with minimizing and mitigating the undesirable effects of military land use activities. Installation land managers have employed a variety of land rehabilitation and maintenance practices. These activities have included both engineering and non-engineering solutions such as placement of reveted berms or dams along watercourses, construction of paved crossing sites along streams, reseeding or re-vegetation of damaged areas, and designation of limited-use areas to solve soil-erosion problems. Another mitigation approach used by some military installations is to stop cross-country vehicular movement during wet (Condition Red) soil conditions, when most rutting and compaction occurs. In order to plan and implement these soil-erosion mitigation techniques, land managers must evaluate the training areas using available field data with soil-erosion prediction technologies, specifically soil-erosion models. In addition, natural resources and land managers are responsible for complying with Federal Laws that protect the landscape, including the Clean Water Act (CWA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Superfund Amendments and Reauthorization Act (SARA); and the National Environmental Policy Act (NEPA).

The Natural and Cultural Resources (NCR) Field Working Group (FWG) addressed these land management issues and field concerns regarding soil-erosion problems and available soil-prediction tools by sponsoring the Tri-Service Center Project No. 98.015. As illustrated in Figure 1, NCR managers require decision-making information about soil-erosion models, such as model parameters, how the model analyzes the data sets and terrain conditions, and the final output products. Through FWG meetings and a series of conference calls with U.S. Army Corps of Engineers (USACE) research laboratory experts, a detailed project plan was written to evaluate current soil-erosion models useful for geographic information systems (GIS) integration. The project objectives were to:

- Collect cursory information on available (24) soil-erosion models.
- Describe the strengths and weaknesses of all (24) models.
- Develop workflow diagrams for the eight models that can be integrated with GIS.

Figure 1. Soil erosion model workflow

The final product is the Center report entitled "The Soil Erosion Model Guide for Military Land Managers: Analysis of Erosion Models for Natural and Cultural Resources Applications." This report provides an assessment of current soil-erosion models and a practical evaluation of each model against a set of criteria established by the FWG. The report provides an updated evaluation of each model, including the model concepts, constructs, and formulation. A set of 13 criteria provided by the NCR FWG was used to evaluate the available soil-erosion models. Five of the criteria (class, applications, known limitations, assumptions, agency support/points of contact) were descriptive, and eight (data requirements, model results, cost/complexity, hardware requirements, GIS integration, commercial off-the-shelf integration, graphical user interfaces, and ease of use) were evaluative, in nature. Three qualitative ratings (excellent, fair, and poor) were used in the evaluation, based upon the usefulness to the Department of Defense (DoD) user community. Ongoing developments and enhancements for each model are also discussed. Finally, the linkage of models to GIS and user interfaces to facilitate data input and analysis is included.

Recommendations are made as to which models provide the greatest potential for solving the unique erosion problems found on military lands. While established empirical models, such as the Revised Universal Soil Loss Equation (RUSLE), continue to have useful applications for some purposes, the study recommends that several of the new generation of physically based, distributed parameter models have the greatest potential for use by DoD land managers. In particular, the Water Erosion

Prediction Project (WEPP) model, the CASC2D rainfall-runoff model, and the Simulated of Water Erosion (SIMWE) model are the most highly developed and supported within this class of models. Several recommendations are made as to how these models can be revised or enhanced to tailor them for military land use applications. These recommendations provide the foundation for identifying future research initiatives in soil-erosion prediction technologies that should be supported by the DoD.

Quick references to Web resources, agency support and points of contact, available models and classification, model evaluations, and summary fact sheets are provided in Appendixes A-E, respectively. Appendix D, a useful soil-erosion model summary, lists each of the 24 erosion models that have been subjectively rated according to nine criteria with an overall evaluative rating. Based upon the ratings provided in the matrix, as well as the applications and limitations of each model described in this report, the following models are recommended for consideration and use by military land managers (note: models listed alphabetically):

- Agricultural Nonpoint Source Pollution (AGNPS) - single-event and continuous.
- CASCading run-off for two-dimensional (CASC2D) - single-event.
- Revised Universal Soil Loss Equation (RUSLE) - long-term average.
- Unit Stream Power-based Erosion/Deposition (USPED) - long-term average.

However, there is no "best" model. Many quantitative methods of the soil-erosion process have been proposed and applied with varying degrees of success. A critical limitation for all available soil-erosion models is the accuracy. Soil-erosion rates are estimated to be within only 50 to 70 percent of the actual rates on the landscape profile. Improvements in several research areas and field data collection are needed to enhance erosion-prediction technologies applied by military land managers. As summarized in the report, these areas include:

1. Development of a comprehensive spatial and parameter database for a typical military training area (to include historical rainfall, stream flow, and sediment flow data) that could be tested with various erosion models for parameter calibration and results verification.

2. Programmatic support for automated and manual data collection within military training areas.

3. Integration of data collected from military land use impacts, such as tracked vehicle impact studies, with erosion input model parameters and modification of land use factors applicable to military activities.

4. Characterization of the spatial distribution, frequency, and intensity of military land use activities.

5. Adoption of enhanced visualization techniques for dynamic simulation and model output assessment.

Soil-erosion problems will continue to present military land managers with significant challenges in the 21st century. Currently, soil-erosion modeling is used only sparingly on military lands. Modeling cannot replace practical knowledge and experience of the land and the land user. However, erosion-prediction technology in the form of integrated, automated, and user-friendly erosion models has great potential to enhance the understanding of the impacts of military activities on landscape processes. Many of the models and related tools described in this report, with some refinements, can be implemented rapidly as practical tools to assist military land managers in mitigating these impacts.

A copy of "The Soil Erosion Model Guide for Military Land Managers: Analysis of Erosion Models for Natural and Cultural Resources Applications." can be downloaded from the Tri-Service Center's Web site at http://tsc.wes.army.mil/. For related project information, visit the FWG Home Page at http://fwgcom. wes.army.mil/fwg/natcult/natcult.htm/. For additional information, contact Laurel Gorman by e-mail (gormanl@wes.army.mil) or by telephone (601-634-4484).

Tri-Service Spatial Data and Tri-Service Facility Management Standards - Release 1.80

by Bobby Carpenter, Tri-Service CADD/GIS Technology Center

Final Release 1.80 of the Tri-Service Spatial Data Standards (TSSDS) and Tri-Service Facility Management Standards (TSFMS) is available for download from the Tri-Service CADD/GIS Technology Center's Internet Web Site (http://tsc.wes.army.mil). Release 1.80 will be available for distribution on CD-ROM in April 1999.

The TSSDS and TSFMS are being developed to provide:

- A standard for GIS and facility management (FM) (using CADD/GIS) implementations at DoD Air Force, Army, and Navy installations and USACE Civil Works activities.
- A "nonproprietary" GIS/FM standard for use with commercially available "off-the-shelf" CADD, GIS, and relational database software.
- A GIS implementation schema for approved Federal Geographic Data Committee (FGDC) Data Standards.
- A GIS implementation schema for approved Defense Information Systems Agency (DISA) Data Standards.
- A *de facto* standard for GIS implementations in other Federal, State, and local government organizations; public utilities; and private industry.

A user-friendly interactive Microsoft Windows based software application installs the TSSDS/TSFMS Release 1.80 "Browser' (viewing and printing) and "Generator" (generates SQL code for database construction) on desktop computers and networks.

The Center annually updates and expands the TSSDS and TSFMS. Release 1.80 constitutes the first release of the TSFMS. The TSFMS:

- Consists of attribute tables containing "business" facility management, or "event" type information (e.g., construction, operation, maintenance, repair, and inspection records), concerning the "real-world" features/objects depicted in the TSSDS and A/E/C CADD Standards.
- Provides the capability to link to and share data with "corporate" databases, computerized information management systems, and commercially available FM systems.

Other significant Release 1.80 highlights include:

- The development of a GIS Implementation Schema for the FGDC Vegetation, Wetlands, and Soils Standards.
- The introduction of "Filters," which permit viewing and implementation of the TSSDS/TSFMS for specialized disciplines or activities. Filters were developed for small-scale mapping, military range and training, Civil Works, Regional Engineering and Environmental GIS (REEGIS), environmental restoration, and environmental compliance.
- The development of a GIS Implementation Schema for approved DISA Standards in the areas of facilities and environmental.
- New Environmental Facility Management tables were added for asbestos-containing material (ACM), hazardous materials, hazardous waste, regulated storage tanks, environmental management, air quality, indoor air quality, lead-based paint, environmental field measurements, surface water discharges, environmental remediation, polychlorinated biphenyls (PCBs), and toxic substances.
- Incorporated the Mississippi Valley Division's REEGIS schema.
- Developed a total of 149 new TSSDS Entity Types. The Entity Sets with new TSSDS Entity Types include: Boundary (1), Cadastre (12), Communication (2), Cultural (1), Demographics (1), Ecology (5), Environmental Hazards (7), Fauna (1), Flora (1), Geology (4), Hydrography (17), Improvement (33), Land Status (11), Landform (7), Military Operations (14), Transportation (30), and Utilities (2).

For additional information, contact Bobby Carpenter by e-mail (carpenb@wes.army.mil) or by telephone (601-634-4572).

Training Class: Implementation of Tri-Service Spatial Data Standards (TSSDS)

A workshop to provide training in the implementation of the TSSDS using commercially available Geographic Information System (GIS) and relational database software will be offered at the Tri-Service CADD/GIS Technology Center, Information Technology Laboratory, Waterways Experiment Station, Vicksburg, MS, on June 22–25, 1999. For further information/updates, please visit the Center's Web site at http://tsc.wes.army.mil/.

TeleEngineering Operations

TeleEngineering operations provide rapid solutions to the U.S. Army in support of maneuver engineering and force support engineering, using command and control architecture with existing communications systems (Figure 1).

The engineer's role in FORCE XXI (redesign of Army operational forces) force projection and force protection has significantly increased, and that role will continue to increase in the "Army after Next." Force projection issues require the engineer to rapidly assess the in-theater transportation network and expedient engineer-emplaced substitutes. Additionally, force protection issues require the engineer to rapidly assess the threat to our military force from both conventional and terrorist weapons threats and then erect countermeasures to these threats.

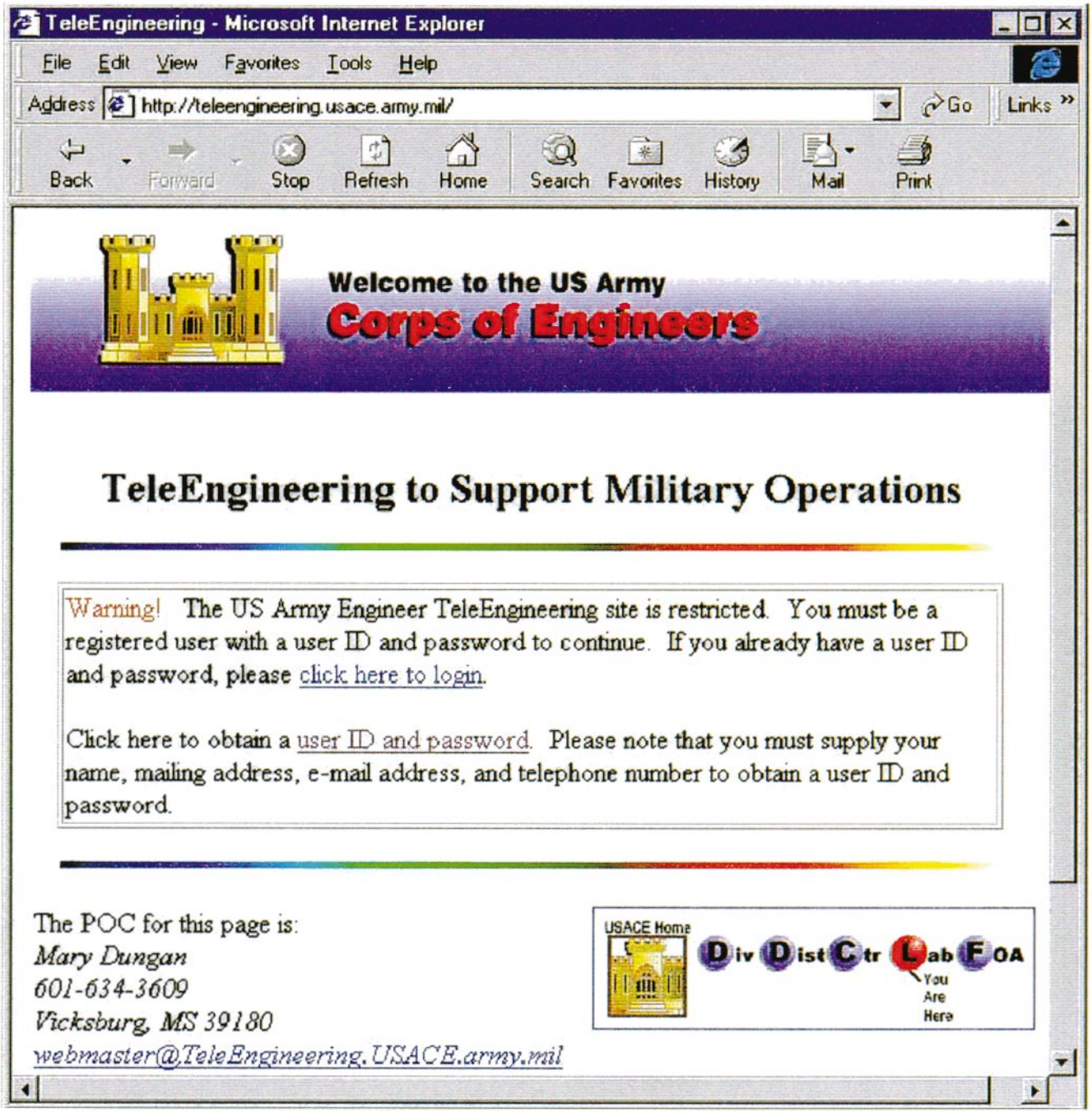


Figure 1. TeleEngineering Web site

Deployed engineers can become overwhelmed as the result of limited expertise or computational capabilities available in the field. Coupling the active duty engineer force with the most highly skilled DoD civil engineering practitioners and computational assets available will provide the support required for force projection and force protection.

The U.S. Army Engineer Research and Development Center (ERDC) is currently developing and demonstrating an engineering tele-presence (TeleEngineering) focused on assisting engineers in planning and executing their operational and tactical missions (Figure 2). TeleEngineering is being developed under the proponency of the U.S. Army Engineer School (USAES). Representatives from the USAES, the Maneuver Support Battle Lab, and the eight ERDC laboratories (Coastal and Hydraulics Laboratory, Cold Regions Research and Engineering Laboratory, Construction Engineering Laboratories, Environmental Laboratory, Geotechnical Laboratory, Information Technology Laboratory, Structures Laboratory, and Topographic Engineering Center) are on the Task Group. Additionally, Special Forces, Communications, and Electronics Command representatives and the U.S. Army Signal School have been involved with the communications components. The overarching concept for TeleEngineering is the exploitation of the Army's command, control, and communications architectures to provide a linage between engineers and the appropriate non-deployed subject matter experts (SMEs) for resolution of engineer challenges. This exploitation will allow engineer SMEs to evaluate a problem, engage in dialogue with the deployed individuals performing the work, and provide solutions to the problem. Solutions to the problems being addressed will exploit state-of-the-art technologies from the Army Research and Development community, SMEs within the training and doctrine (TRADOC) community, DoD high performance computing assets, the expertise of USACE Districts and Divisions, private sector construction industry experience, and the knowledge base of academia.

The TeleEngineering will support the engineer using a multitude of forms: CADD/GIS data, tabular data, and graphs through design drawings and materials specifications for construction or repair of structures to graphics depicting results of computationally

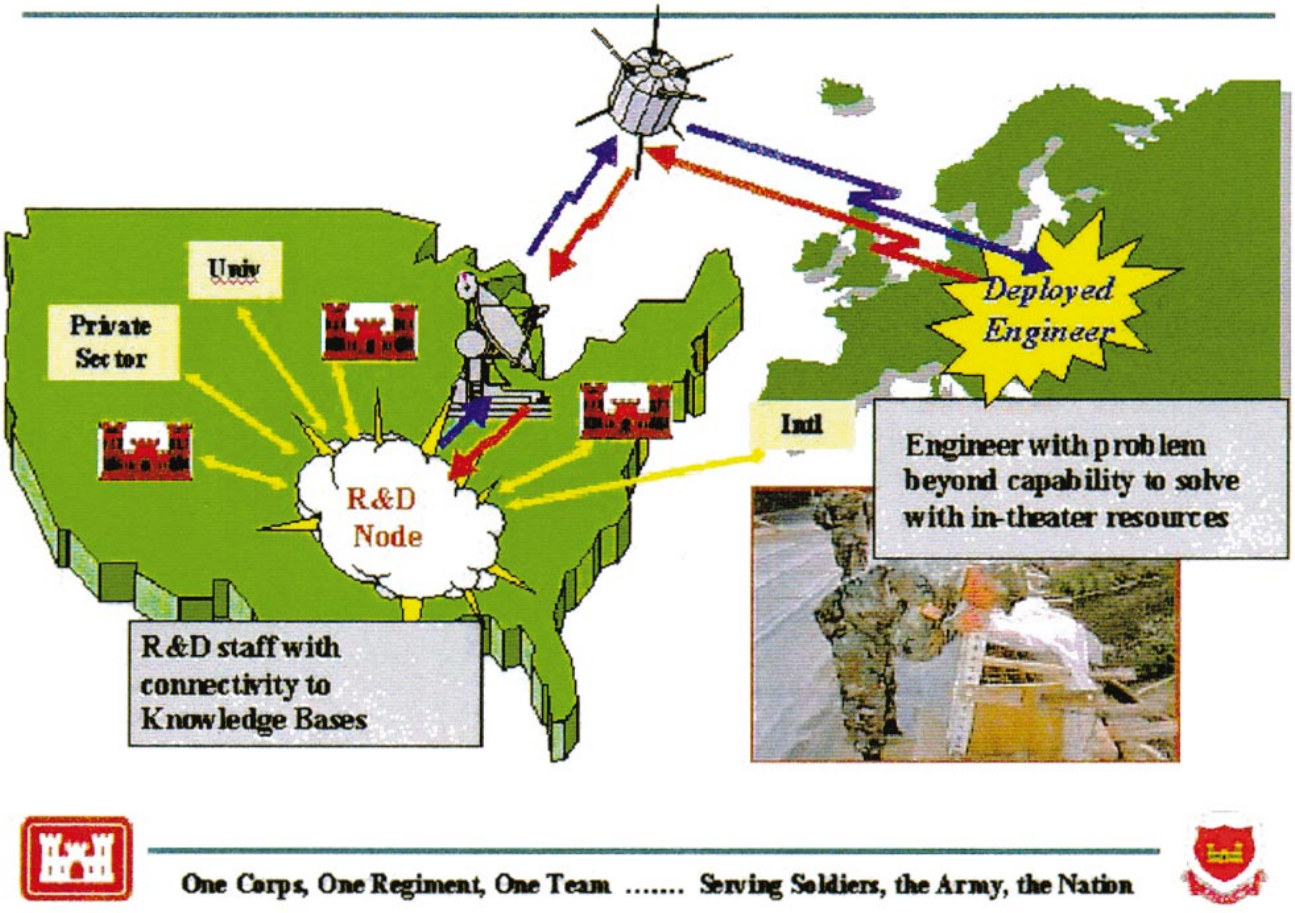


Figure 2. Demonstration concept

intense analytic assessments such as vulnerability, hydrology, contaminant transport, snow or ice adhesion/accretion, or residual load-bearing capacity of damaged structures.

TeleEngineering utilization will be operational scenario dependent. It will provide engineers engaged in war planning or preparation of contingency plans and Corps or Division engineers with both large-scale assessments (military hydrology assessments, transportation network throughput assessments, sea-state predictions for logistics-over-the-shore operations, etc.) and smaller, detailed assessments (load classification of damaged and undamaged bridges, vulnerability of individual structures, airfield runways, utilities capacity of proposed base camp sites, etc.) (Figure 3).

Engineers engaged in combat, combat support, or combat service support operations will receive TeleEngineering assistance consisting of detailed assessments and solutions (determination of site-specific force vulnerability, designs and materials specifications for construction of force protection measures; techniques and materials for repair or maintenance of bridges, roads, or runways; expedient construction guidelines or techniques for site-specific cross-country mobility enhancement, etc.).

TeleEngineering will also be used by engineers involved in military operations other than war (MOOTW) (i.e., structural safety assessments of buildings, dams, bridges, and other structures; hydrology; base camp selection; airfield rehabilitation; construction in frozen soils; vertical construction with indigenous materials for humanitarian assistance; unexploded ordnance detection; etc.).

For additional information, please contact Mr. Leonard Huskey, 601-634-3933, huskeyl@wes.army.mil, or Dr. Larry Lynch, 601-634-4274, lynchl@TeleEngineering.usace.army.mil.

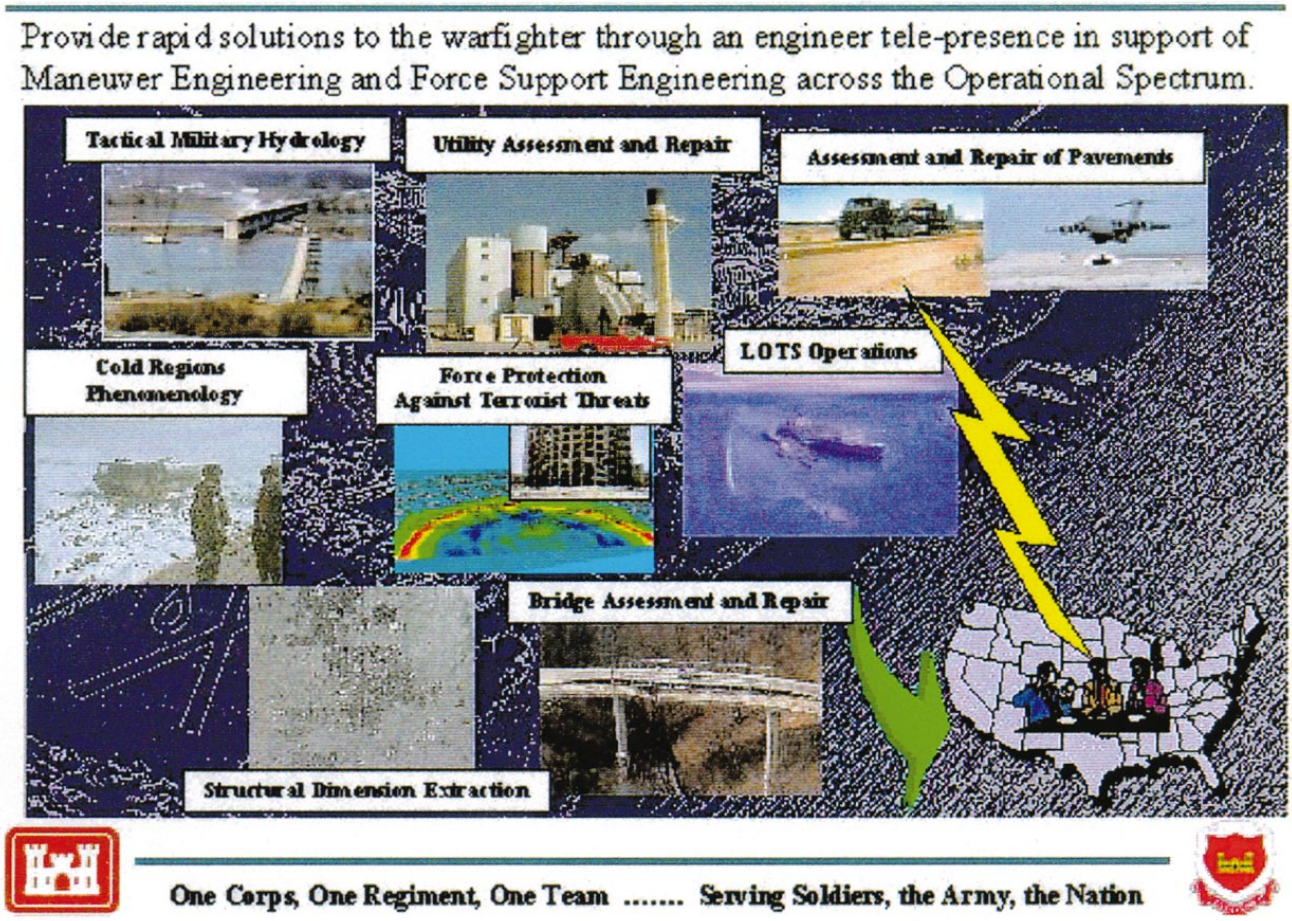


Figure 3. Objective of technical demonstration

Latest Products Available on the Center's Web Site		
Product	**URL**	**POC and E-Mail Address**
Center Calendar - Staff Schedule and Events	http://tsc.wes.army.mil/calendar/calendar.asp	Chris Crocker crockec2@wes.army.mil
Tri-Service Center Video	http://tsc.wes.army.mil/video/we97.rm/	Denise Bullock bullocc@wes.army.mil
TSSDS/TSFMS Release 1.80	http://tsc.wes.army.mil/headlines/newsmar1299.htm	Bobby Carpenter carpenb@wes.army.mil
A/E/C CADD Standards, Rel. 1.7	http://tsc.wes.army.mil/html/standards/aec/default.htm	Toby Wilson wilsonj@wes.army.mil
CADD Details, Rel. 2.0	http://tsc.wes.army.mil/downloadtracking/DownloadData.asp?PID=79	Stephen Spangler spangls@wes.army.mil
CADD/GIS Bulletin	http://tsc.wes.army.mil/headlines/bulletins/default.htm	Laurel Gorman gormanl@wes.army.mil
SEMMS, Rel. 1.2.02	http://tsc.wes.army.mil/products/semms.htm	Dr. Danuskodi danushv@wes.army.mil
EBS	http://tsn.wes.army.mil	Elias Arredondo arredoe@wes.army.mil

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