When soldiers of the United States Army 96th Civil Affairs Battalion are called into action, they’re typically deployed to remote areas of the world, both hostile and peaceful, to aid with various humanitarian relief efforts and civil military operations missions.

As the only active duty U.S. Army Civil Affairs (CA) unit, the geographically and culturally oriented 96th Civil Affairs Battalion works with host nation civilian authorities and civilian populations around the world to lessen the impact of military operations during times of peace, contingency operations and declared war.

Joey Wilson and his team at Bradshaw Consulting Services, Inc. (BCS), a Trimble business partner, received a call from Army officials in 2003 requesting support in developing a mobile Geographic Information System (GIS) solution for CA soldiers collecting vital information for rebuilding efforts in Afghanistan. This effort was part of an overarching United States Central Command (CENTCOM) initiative to enhance the efficiency and accuracy of collecting, disseminating, and analyzing tactical humanitarian information in Afghanistan.

“The Civil Affairs soldiers needed a more efficient process for collecting and sharing data about hospitals, schools, water sources, power sources, and other infrastructure in their geographic area of operations,” said Wilson, mobile technologies manager at BCS. Previously, CA soldiers collected information in the field with pencil and paper using standardized paper forms. This data was manually input into text documents and spreadsheets on an office computer. Information was also plotted onto paper maps. Wilson and his team assisted the CA soldiers in designing a customized end-to-end GIS solution specific to the needs of the CA soldiers.

Humanitarian data consists of a broad range of information. The project was on a short timeline, so Wilson initially focused on those data sets that were absolutely critical to the soldiers being able to carry out their jobs properly and safely. These data sets included geographical and attribute information relative to schools, hospitals, wells, and other types of infrastructure.

As a first step, BCS teamed with ESRI to create a fully customized version of ESRI ArcPad software designed specifically for CA’s workflow, from the field to the command center, which was based in the United States. Once complete, the ArcPad software was loaded onto a Trimble® GeoXT™ rugged Global Positioning System (GPS) handheld receiver running Microsoft® Windows Mobile® software.

“The GeoXT handheld with ArcPad software was the perfect solution for the Civil Affairs soldiers because the unit is rugged enough to withstand the rigors of the harsh Afghanistan environment,” said Wilson. “The customized interface utilizing digital forms and pick lists was built into the ArcPad application to simplify data entry and ease of use for the soldier. It was simple for the soldier to learn and to synchronize weeks of field data collection with their ArcSDE Geodatabase. Simplicity is critical to accurate data collection in a setting such as Afghanistan.”

BCS worked with the United States Army Topographic Engineering Center (TEC), the government project lead, to develop a U.S.-based ArcIMS server to share the tactical Afghanistan data via Web services.

“It was critical, due to the short time frame, for TEC, ESRI, BCS, and Trimble to work closely together with our team in the development, testing and training in order for all of us to deploy on time and be successful,” said Master Sergeant Richard Hilliard, team sergeant for the deployed Civil Affairs Geographical Information System-Implementation Team (GIS-IT).

“A lot of the development effort focused around really understanding the soldiers’ needs in the field,” said Wilson. “We wanted to make the customized ArcPad application...
as easy as possible to learn and use so the soldiers can get in, get the information they need and get back to safety and on with the rebuilding efforts as quickly as possible.”

A “capture minefield” button, for example, could create a polygonal area by targeting its boundaries with a laser rangefinder and filling out the attributes in ArcPad. When recording data about a building, the soldier could select from a pick list of approximately 50 different types of buildings, and then get a customized form to collect additional data about that specific building type.

For each feature, the soldier collected all relevant attribute information, such as condition of the building, number of beds in a hospital, number of medical personnel on staff, and local contact person for that facility. Time, date and other required metadata is automatically populated and identifies the username that registered the GeoXT handheld for that specific collection period.

Customized functions were also created for the soldier in ArcPad. Roads and trails would be collected on the move and required special functions, such as locking the screen and allowing limited functionality while traveling since the terrain was extremely bumpy at times.

Soldiers were also required to collect data that they could not physically get to, such as objects in a minefield or a damaged structure located some distance from the road. Soldiers utilized the LaserCraft laser rangefinder with an ArcPad laser offset applet developed by BCS to accomplish this task. Distant objects were collected as points, lines, and polygons due to this integration of laser technology with ArcPad and the GeoXT handheld.

“Introducing new technology such as GIS, especially mobile GIS, to the soldiers was challenging. However, once they saw the benefit of their collection efforts in a geospatial perspective, they realized it was an invaluable tool,” says Hilliard. “A key component to our success was the ability to continually make changes to our GIS while deployed. Data sets and functionality requirements changed daily once we embraced the power of GIS. We would call BCS and tell them what we wanted our laser application to do and receive a new application via e-mail by the time we woke up the next morning.”

Tactical information that used to take several days to record and distribute can now seamlessly be collected and distributed without redundant efforts. Said Wilson, “With GIS, the Civil Affairs soldiers were able to rapidly collect, disseminate, and analyze information more efficiently than ever.”

THE EQUIPMENT USED ON THIS PROJECT INCLUDES

- GeoXT handheld
- ESRI ArcPad software
- ArcIMS server