

GIS DEVELOPMENT

GIS In Defence

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GEO-ENABLED PDFs usher in a new era



I imagine being deployed to a remote location and navigating through dangerous terrain. Your orders: ground-truthing information into military operational plans. Instead of appearing as visible terrain analysts, you and your unit are equipped with handheld devices and are able to operate in a covert manner.

Equipped with mobile devices and

geospatial technology, you are able to quickly delineate, assess and visually depict your surroundings. You and your unit can excise your field findings in shape (.shp) file format or keyhole markup language (.kml) and send that information back to plan developers-rendering the military's operational plans more accurate.

The file size is so small that it avoids constricting established networks-

making sure that the dissemination of accurate geospatial information is smooth.

By picking out rally points, as well as access roads, the special ops team that will be later assigned to this area of operation (AOR) will be able to come in and maneuver within the AOR because they use the information in their mission rehearsals.

This scenario is not far from reach and should come as no surprise. After the United States' National Geospatial-Intelligence Agency (NGA), a Department of Defense combat support agency, started converting its products to geo-enabled PDFs, it is only a matter of time before a paradigm shift will be seen in the method of its delivery. Mobile technology will become a target of vital interest for defence agencies and contractors pushing to provide easy access to geospatial information, mapping technology and collaboration among non-GIS users.

This information consists of map projections, geospatially registered comments, markups, photos, audio, video and observed measurements that can be exported and viewed as a GIS or overlaid on a Google Map.

Just as GeoPDFs paved the way to removing technology barriers to enable geospatial applications that meet the needs of all types of end users regardless of GIS expertise, hand held devices now offer more mobility to users across the globe with interactive maps.

WHERE MOBILITY GOT ITS ROOTS: PROJECT BATTUTA

Sarah Nusser, associate professor of Iowa State University's department of statistics and director of its Center for Survey Statistics & Methodology, among other professors at ISU and the University of California, Santa Barbara, supported emerging computing technologies in the area of geospatial field data collection and information management in a paper submitted to the 2004 National Conference on Digital Government Research.

Titled "Geospatial Information in Complex Mobile Field Settings", the paper said in order for geospatial data and emerging computing technologies to vastly expand the type and quality support available to the field worker during field campaigns, the development of appropriate field tools and computing systems is necessary in order to responsively and reliably support secure information exchange between the stored repositories, remote services and the mobile field environment. "For example, new models for extensible computing infrastructures are needed to support field activities with intermittent and highly-constrained mobile computing settings. At the same time, methodological principles are needed to guide user interface design for displaying geospatial information resources with limited screen environments for scientific data collection," the paper said.

Nusser and her colleagues provided an overview of investigations that focussed primarily on the field user and the application of Project Battuta, an interdisciplinary research initiative that delved into emerging technologies and geospatial information resources that brought about new functionalities to mobile field data collection.



"The ability to make use of advanced information technologies, particularly GIS, in a field context that is fully mobile and operational anywhere has the potential to impact field operations in numerous ways, and to change fundamentally the nature of such work," the paper said. "For example, the use of technology to continuously monitor and analyse data as they are acquired in the field raises new and interesting potential to modify sampling strategies, and to avoid the disadvantages of strategies that must be planned in the office in advance of the field campaign, and executed without review."

The Project Battuta findings gave way to the private sector, where TerraGo Technologies will advance after already helping pioneer the introduction of GeoPDFs to the market.

GEO-ENABLED PDFS GO MOBILE

Initially developed for In-Q-Tel customers like the Central Intelligence Agency, Department of Defense Human Intelligence Management Office (DHMO), National Geospatial

Intelligence Agency (NGA), Army Topographic Engineering Center (TEC), the Department of Homeland Security (DHS) and the State Department, TerraGo Mobile came to market just this year as a means to provide disconnected users with the ability to mark up maps and send them peer to peer—an application highly desirable by many of the aforementioned agencies. (In-Q-Tel identifies and partners with companies developing cutting-edge technologies to help deliver these solutions to the Central Intelligence Agency and the broader US Intelligence Community (IC) to further their missions.) Through the use of TerraGo Technologies' underlying infrastructure of mobile technology and Map2PDF software, field personnel can collaborate via e-mail, infrared or through Bluetooth technology, creating a more accurate, real-time decision making environment.

HOW IT WORKS

Using the capabilities inherent in Windows Mobile, users need only know how to use the Windows interface and open a PDF. The end result of TerraGo's mobile application is simple: provide data gathering in the field and allowing disconnected users to share it. Some of the mobile application's features include:

- Display imagery through GeoPDF maps—which also include the Military Grid Reference System (MGRS)
- GPS tracking through coordinates on a map, giving users an indicator of accuracy
- The ability to zoom in on coordinates with the Google Earth application
- Search functions available through text in annotations, PDF files, object data and by address
- View of multi-page PDFs and map books with navigational hyperlinks

While the mobile application current-

ly runs on Windows Mobile 5 and 6 operating systems, TerraGo is in compatibility planning stages for other mobile operating systems in popular use worldwide, such as Symbian phones, Blackberry and the iPhone.

Initial design and development began in August 2006, and user group sessions began shortly thereafter. On April 24, 2007, TerraGo conducted a design review and released a beta version. Field tests of the company's mobile application have been underway with various US defence and federal agencies since that time. TerraGo will formally launch its geo-enabled PDF mobile application to the global Defence and Intelligence community this month.

RISKS STAVE OFF ADOPTING MOBILITY

Just as the US Defence sector is eager to build a bridge of geospatial collaboration between its deployed personnel and staff that's state side, going mobile with GIS technologies still has its risks for defence users not only in the United States but across the globe. Some agencies have been slow to adopt GIS mobile technology due to security and control fears. A divide exists between those that think all geospatial Intelli-



In order to calm the fears triggered in the minds of those willing to adopt mobile applications, developers leverage encrypted file transmissions for users, made possible via bluetooth and infrared



gence (GEOINT) should be widely distributed and others who have the intent on making sure GEOINT stays behind closed doors. This yin and yang of sorts has stunted the method in which users receive their geospatial data and has created a potential roadblock for mobile GIS technology to take flight internationally. A comparison of how commercial satellite imagery was adopted in the industry may reveal a way forward.

After commercial imagery was made available globally in early 2000 through the launch of Space Imaging's IKONOS satellite, the military, defence and even the private sector, i.e. Google Earth, now have access to unclassified earth imaging products. Previously, mapping and imagery of the earth and targets existed only with the defence sector under classified conditions. A huge outcry followed shortly thereafter, involving the preconceived notion that terrorists will use these products in their goals and missions against the security of the United States. The fear was that any given country's national security was in jeopardy because previously protected geospatial information was now widely available. The first thought that came to the mind of global defence industry was: users who were previously denied access because of the special protocols are now capable of viewing strategic information.

This climate of fear is not only associated with the advent of mobile GIS technology, but oftentimes takes shape with any advanced methodology that's introduced to an industry. e-mail, a staple of electronic communication in the 21st century, saw the same trend during the time of its birth. While Ray Tomlinson is credited for sending the first e-mail with the @ sign in 1971, according

to a Forbes article by Sasha Cavendar, he was quoted saying, "Don't tell anyone! This isn't what we're supposed to be working on," after he showed a fellow colleague.

GONE IS THE WAY OF THE PAST

Just as Tomlinson's e-mail beginnings were modest, as Cavendar explains, so too is the future of mobile geo-enabled PDFs. In order to calm the fears triggered in the minds of those willing to adopt mobile applications, developers leverage encrypted file transmissions for users, made possible via bluetooth and infrared.

But, like the use of email, forward-looking, global professionals in any sector (not just defence and not just geospatial information systems) must maintain an "adapt and survive" mentality when accepting the paradigm shift presented by a new technology. When it comes to a nation's enemies, in this day and age, they will always have access to the latest technology. The United States has instituted protective measures in order to prohibit a security breach, i.e. export controls and commercial firms like Adobe have created suites of products like LiveCycle that allow users to establish policy controls and restrict the use of protected data through the use of server technology. But the main deterrent in thwarting security risks is making sure the global military and defence sector employ these new methodologies, understand them and use them decisively to defeat their enemies. ■



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