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Building on Google Earth

Software expert A.J. Clark explains how the earthquake in Haiti provided a template for delivering life-or-death information aid to workers — and also to war fighters.

The U.S. is working to extend cloud data to the forward edge of its war fighting and intelligence gathering apparatus by equipping service members with geospatially capable smartphones.

A major catalyst for the community’s embrace of this approach came on the afternoon of Jan. 12, 2010, when Haiti’s capital of Port-au-Prince was struck by a magnitude-7.0 earthquake. Miami-based Southern Command, which was assigned to coordinate the U.S. response, recognized immediately that saving lives would require establishing a common situational awareness picture for users at multiple organizations from the U.S.
departments of Defense and State to nongovernmental organizations such as the Doctors Without Borders humanitarian group, which was already rushing staff to the scene.

Over the next 72 hours, software experts from Southern Command and private industry established a collaborative, unclassified website for aid workers, using Google Earth as a foundation. Geospatial data was made available ubiquitously over the site and via mobile devices connected to it. Anyone could go to the site and view the data, but a user account and password were required to modify the data.

This web service was not perfect. Software experts from my company, Thermopylae Sciences and Technology, had to find workarounds to make some classes of data sharable over the site. But workers were able to view critical information about which roads were passable, where survivor camps were being established and which areas might still harbor survivors. They could telestrate on maps displayed to managers at command and control sites, and simultaneously to other workers equipped with smartphones and laptop computers.

SIGNS OF PROGRESS

In the months since the earthquake, these online data-sharing technologies have begun permeating the U.S. war fighting and intelligence communities. In 2010, intelligence users began using some of them within their classified version of the Internet, called the Joint Worldwide Intelligence Communications System, or JWICS. In 2011, the Army licensed two of Thermopylae’s software products for use on its secure networks. The service plans to test them in May and June as part of an Intelligence fusion system for mobile devices, called WIndshear. The tests will be conducted at the next Network Integration Evaluation at the Fort Bliss/White Sands range in new Mexico. If all goes as planned, troops in Afghanistan could soon have a highly protected version of the Mobile, collaborative intelligence system built on the fly for relief workers in Haiti.

So that the country is ready for the next humanitarian crisis, the National Geospatial Intelligence Agency has established a program called Longview, for which Thermopylae is helping to build an unclassified Google Earth globe that will display government data and imagery.

EMERGENCY RESPONSE

It is worthwhile to look in more detail at these technologies, and their use in Haiti, as the government continues to roll them out elsewhere.
As the founder of Thermopylae, I was among those who received the “all hands on deck” call from Southern Command in the hours after the quake. I worked on-site at their Miami headquarters, where I helped coordinate the effort to create and then improve the website. A member of the Thermopylae staff also joined a team in Haiti that was working to ensure the site was working properly at the humanitarian edge.

At the time of the quake, Southern Command was testing two Thermopylae software tools as part of a prototype situational awareness website, called the User Defined Operating Picture. One tool, called iSpatial, correlates imagery and data and feeds them to a common website, so that users carrying mobile devices or seated at Web browsers can view a common situational picture. The other software, called Ubiquity, lets users go online and assemble widgets into apps that can be loaded onto Android or iPhone devices.

We used these to add collaborative tools and the ability to provide a common picture to multiple users. The site was challenging to establish because of the range of information and data formats that needed to be accommodated, and because its underlying technologies were still in the prototype stage at Southern Command, although they were being used commercially.

The importance of Google Earth as a foundation cannot be overstated. Imagery updates occurred every four to twelve hours in Haiti, which provided a canvas for visualizing other relief data using iSpatial and Ubiquity.

The Google Earth globe is commonly recognized by many, but the technology to build it and keep it up to date is not as widely understood.
ability for multiple users to collaborate. In the first hours after the Haiti earthquake, for example, people were using the desktop version of Google Earth to plan relief work, but their pictures didn’t match up. These users were trying to visualize their information individually as opposed to collectively, which led to duplicative efforts and a lack of shared situational awareness.

For the online user, iSpatial serves as a wrapper around Google Earth. This wrapper contains standard tools like those you would find in the Google Earth desktop software, but it makes these available on a web page combined with the Google Earth or Google Maps Web interface.

We designed iSpatial to handle data that changes rapidly or that a user might want to edit. in the military domain, examples would be the locations of friendly forces or the status of a bridge that troops plan to use. This allows any user to tap the intuitive Google Earth interface for access to the latest imagery and maps, while also having the ability to view and interact with them from his or her own organization.

**BEHIND THE FUSION**

To accommodate multiple kinds of data with iSpatial, we settled on two methods. First, thanks to an industry group called the Open Geospatial Consortium, most government geospatial data today is generated and shared in the Keyhole Markup Language (KML), a format for data sharing developed by the Silicon Valley company Keyhole Corp. with investment from the CIA’s In-Q-Tel venture-capital arm. In 2004, Google purchased Keyhole Corp. and created the online service we now know as Google Earth.

KML geospatial data is meant to be displayed via Google Earth and other geospatial visualization software, so it was relatively easy for iSpatial to handle these products. In Haiti, for example, relief workers used iSpatial and the Google Earth interface to view real-time updated KML maps of aftershocks published by the U.S. Geological Survey. Weather forecasts and sea conditions were fed into the net-work from the National Oceanic and Atmospheric Administration.

But in Haiti and elsewhere, not all data that a user might want arrives in the KML format. We needed a second method for displaying text, numerical data or the disposition of relief personnel. The answer was to utilize a library of known database formats that was built into iSpatial, which we call iSpatial data connectors. This software determines the format of the data the user wants to share and acts as a bridge so it can be displayed on the same website as the KML information. An iSpatial
We designed iSpatial to handle data that changes rapidly or that a user might want to edit. In the military domain, examples would be the locations of friendly forces or the status of a bridge that troops plan to use.

Connector, for example, can be plugged directly into the data feed from an aircraft, to display its position to Google Earth users.

For database management, our challenge was to devise a non-proprietary system that the customer could maintain on his own if he wanted to. For databases containing up to 25 million objects, we decided to use open-source database software called PostgreSQL. For databases larger than that, we use database software called MongoDB.

For many applications, PostgreSQL is the best choice. It can store and update details, such as the real-time positions of friendly forces as they move. Other open-source software built on top of PostgreSQL, called PostGIS, allows users to search for geospatial details within polygons, circles or squares drawn on digital maps.

iSpatial is the user interface for this system and has an optimized data model for managing geospatial information. For example, a user with a computer mouse can draw a circle on a map and order all information about the objects in that circle. PostgreSQL and PostGIS create a package of information that exists in the circle the user drew over Google Earth. Next, iSpatial displays the data back to the user via Google Earth.

Without the automation of iSpatial, a user would have to be a software expert to incorporate data into Google Earth that was not in the KML format. Importantly, iSpatial manages geospatial data on the server side but also in the Web browser that faces the user.

In Haiti, one of our challenges was to display data that did not fit any of the formats in our iSpatial library. Our software engineers were able to review the systems that produced this data and customize our existing connectors. This was accomplished by indexing the geospatial data from the original data source in the iSpatial data model, and then connecting it directly to Google Earth or maps, via a Web browser.

Communications were obviously a challenge in Haiti, and the same challenge is likely to arise for intelligence operatives or military intelligence officials on the tactical edge. Users need a way to keep working when they are not connected to a cellular network. On the back end, iSpatial copes with this problem by indexing geospatial data and storing it in a cloud computing environment. Users who decide to turn off their network access to avoid being detected can take subsets of data with them on their laptops or mobile devices. Or the data can be stored
in local servers. This gives a user the same interface for managing spatial data as when there is a connection to the wider network. A soldier with network access deployed to a humanitarian relief mission could go to a Web page, draw a polygon around Port-au-Prince and export the data onto his laptop computer. If the soldier unexpectedly lost his network connection, he could still view the data, add to it or search it.

In Haiti, Ubiquity gave aid workers a wide range of processing widgets that could be assembled and loaded onto mobile devices. Ubiquity is designed to be compatible with a customer’s own mobile applications, but it also comes with a palette of widgets, such as one for taking photos and pushing them onto the User Defined Operating Picture.

For example, ground-level photos of damage were sent from a variety of mobile devices for incorporation into the Google Earth database. A user could go onto his organization’s intranet and choose widgets that Ubiquity automatically built into an app tailored for a specific problem or mission. These widgets then provided users functionality on their mobile devices even if network access was lost.

In a military context, Ubiquity is the tool that would extend the cloud to the smartphones soldiers are beginning to carry. Users would select capabilities from the Ubiquity palette for their mobile devices like they would from the Army’s Ozone Widget Framework, the service’s equivalent of an app store for Web-based applications. For example,
one Ubiquity widget, called Augmented Reality, displays the positions of other friendly soldiers. Under the Windshear program, which is led by the Army’s G2 intelligence staff, soldiers equipped with Ubiquity software will become human sensors whose data will be corralled into a common picture. The software coordinates data exchange between the cloud computing environment and the user so that imagery from a Google Map or Google Earth server, for example, can be passed directly to a mobile Google Map widget in Ubiquity. Using their widgets, the soldiers would be able to build and share virtual recreations of the battle-space in almost real time.

There are challenges to this concept of operations, which is why Windshear is undergoing rigorous testing. Taking full advantage of a mobile user base in a coordinated fashion requires various activities, such as collection management, mobile application management and security management.

After Haiti, the unclassified requirements to support humanitarian and disaster relief missions prompted the National Geospatial Intelligence Agency to seek to expose its products to a wider user community, which is the goal of the Longview program. The Google cloud provides NGA an environment where thousands of processing cores can be turned on or off using Google’s recently released Earth Builder Software. This avoids significant infrastructure procurement and sustainment costs for NGA.

In short, the power of cloud computing now allows for more imagery, maps, geospatial data, and other mission-critical information to be stored, searched and visualized than ever before. This will be invaluable to personnel out the edge, whether they are equipped with a war fighter’s figurative sword or a humanitarian worker’s plowshare.
Spotlight: Thermopylae Sciences & Technology

Mission: To provide partners with emerging geospatial, cyber, mobile, and information technology solutions to help them achieve overall mission success.

Top Official: A.J. Clark, President and Founder

Established: 2007

Location: Arlington, Va.

Personnel: 120
Force Multiplier

SAN FRANCISCO — A.J. Clark knows how valuable the right intelligence tools can be. While working as an Air Force intelligence analyst from 1998 to 2002, Clark realized that the ability to link satellite imagery and other types of geospatial data with intelligence reports could make a dramatic difference in the amount of time and energy he and his staff devoted to pinpointing training camps in Afghanistan or safe houses in Iraq. “With effective tools, we could be 10 to 100 times more efficient,” Clark said.

In 2007, Clark founded his own company to develop those intelligence tools, naming it Thermopylae Sciences & Technology after the site in ancient Greece where, according to legend, 300 Spartan warriors succeeded in holding off a massive Persian army.

Many of Thermopylae Sciences & Technology’s products are designed to help government and commercial customers fuse various imagery. Shortly after establishing the company, “we realized that people wanted to see imagery in some sort of 3-D environment with lots of other data overlaid on that imagery,” Clark said. “Demand was beginning to grow for this type of product.”

That demand was driven, in part, by the widespread adoption of Google Earth, the popular geographic information program that allows users to visualize information in various formats, including 3-D images shown on a virtual globe. Google Corp. of Mountain View, Calif., released the first version of Google Earth for personal computers in 2005 and a Web-based version of the product in 2008.

That Web-based version of Google Earth did not include many of the features and tools that enabled users of the desktop version to add points of interest draw lines or highlight specific areas. In 2008, Thermopylae began developing its own software to give customers those tools. That software, known as iSpatial, quickly became one of Thermopylae’s most popular products. Customers who use Google Earth to obtain updated 3-D visualization tools featuring terrain and elevation data can use iSpatial to link the Google Earth globe with their existing databases. iSpatial also lets users add layers, including text and imagery, on top of the Google Earth globe.
Initially, Thermopylae marketed iSpatial to military and intelligence agencies. One early customer, U.S. Southern Command, used iSpatial to develop “a geo-visualization and collaboration tool” for military organizations, nonprofit groups and anyone else seeking to offer disaster relief in the wake of 2010 earthquake in Haiti, said Norberto Santiago, knowledge management chief for Southern Command’s intelligence directorate. Southern Command continues to rely on that virtual planning tool, known as 3D User Defined Operating Picture, to enable various groups to update and share information on a virtual globe, Santiago said.

Commercial customers also have adopted iSpatial. TowerCo of Cary, N.C., uses it to map cell phone coverage areas and Select Energy of Houston relies on it to pinpoint the locations of its trucks and keep tabs on work under way at various sites.

Since Thermopylae was founded, company officials have sought to develop products with applications beyond military and intelligence markets. Thermopylae engineers developed tools to assist in vehicle tracking, for example, instead of focusing on software designed to compare imagery and highlight battle damage. The former product could be sold to cargo delivery companies in addition to government customers, while the market for battle damage assessment tools would be far more limited, Clark said.

Nevertheless, iSpatial enables users to view their own battle damage
assessment tools through Google Earth. In February, Thermopylae released iSpatial 2.0. The latest version of the software is designed to make it easy for users to customize iSpatial to meet their own unique requirements. “We wanted to create the interface so you could easily plug that information into iSpatial for a user to visualize,” Clark said.

Increasingly, customers also are seeking access to geospatial data on mobile devices. To address that market, Thermopylae developed Ubiquity, software for Google Android and Apple mobile devices that allows businesses and their customers to create and share information. For example, Las Vegas Motor Speedway visitors can use Ubiquity to find a path from their current location to their seats or view updated schedules and race results.

Ubiquity software also is designed to deliver remote sensing imagery to mobile devices. “Because of our experience with remote sensing capabilities, we know how to handle the data format, we know how to compress data, we know how to move data around the network very effectively,” Clark said. “Ubiquity combines our knowledge of remote sensing with our knowledge of visualizing data and storing data on mobile devices.”
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Thermopylae often works with customers of Google Earth Enterprise, the Google Earth version designed for business application, to create custom services that augment Google Earth, Google spokesman Tim Drinan said in an April 19 email.

Thermopylae and Google also are working on a new product designed to improve the ability of customers to visualize imagery on mobile devices. Clark declined to provide details on that project, saying additional information would be available when the product is released later this year.

He did note, however, that mobile devices present unique challenges for companies seeking to display imagery due to their compact screens, limited network access and processing capabilities. For now, it is extremely difficult to offer 3-D imagery on mobile devices, Clark said. In 18 months or 24 months, however, “we may be able to leverage new technology to offer users the same experience on a mobile device that they are accustomed to on their laptops,” Clark said.
Google Earth Builder

Productizing Server Farms for Storing and Processing Geospatial Data

By: Matteo Luccio

Google Earth Builder (GEB), which Google released last fall, enables private companies and government agencies to store and process their geospatial data on Google Earth, Google Maps, and applications on Android phones. Like a company that buys a building much larger than it needs for its own operations and then leases some of this space, Google is productizing some of its computing capacity by licensing GEB.

Meanwhile, to maximize the benefits of this new product for their clients’ specific needs, more
than a dozen Google Enterprise Partners around the world are developing custom applications that run on top of Google Earth’s public application programming interfaces (APIs). Early adopters of GEB include the U.S. National Geospatial-Intelligence Agency (NGA), the giant Australian utility Ergon Energy, and satellite imagery company GeoEye.

**ACQUIRING AND MANAGING IMAGERY**

Typically, large organizations that deploy GEB have a direct relationship with imagery providers, such as GeoEye or DigitalGlobe, and task them to procure the specific imagery they require to create their own globe, says AJ Clark, the president of Thermopylae Sciences & Technology (TST). “The whole concept of using a private Google Earth Globe is that you have some kind of access to imagery that the rest of the world doesn’t and you want to maintain some degree of control over it.” GEB gives users complete control as to who is allowed to view the imagery that they upload to Google’s cloud. However, licensing Google Earth’s software is not the same as licensing all of Google’s imagery. Often people confuse the software that makes Google Earth’s globe available in a Web browser or on a desktop with the imagery it contains, but those are two separate products.

GEB allows users, who may not have much background in GIS or imagery, to easily upload their raw raster or vector data and create layers that they can open in Google Earth, explains John-Isaac Clark, TST’s Chief Innovation Officer. “You can’t do those things right now really easily as an end user through some of the higher-end GIS tools.”

Another advantage of GEB is that it enables users to import imagery of many different types and then export that imagery to other proprietary software, such as Esri, via OGC services, such as WFS or WMS. To take imagery out of GEB, you draw a polygon around the area that you want to extract and export it to a portable globe. “That’s what nobody else is doing,” says AJ Clark. “They turn imagery into a commodity.”
GOOGLE MAPS FOR BUSINESS

GEB is one of four products in Google Maps for Business that “provides enterprise organizations with the tools they need to bring mapping into their day-to-day decision-making process,” says Dylan Lorimer, GEB’s product manager. The other three are Google Maps API for Business, Google Earth Pro, and Google Earth Enterprise, which enable them to add spatial context to their Web sites and business applications, display some of their own data on top of Google’s basemap and imagery, and build and host their private Google Earth and Google Maps layers, respectively. “Our strategy with Maps for Business is to bring Google’s simple-to-use, intuitive geospatial technology into these business settings, with appropriate enterprise controls and services,” says Lorimer.

THE BUSINESS MODEL

Google does not want to be seen as a provider of imagery, but of the capability to manage it. Having invested massively in server farms, it wants more customers to put data onto its servers and pay to access them. “That’s where they see an economy of scale and a competitive advantage in the future,” says AJ Clark. Therefore, Google licenses GEB to its customers as a platform for use with their own mapping data. “Customers pay only for the amount of storage they require and the amount of consumption of their published maps,” says Lorimer. In other cases, data providers such as GeoEye are using the platform to commercially distribute their data.

Will Google further productize its server farms? “With GEB, we are absolutely committed to exposing the entire geospatial infrastructure that we used to build our consumer Google Earth and Google Maps, where it makes sense,” says Lorimer. “We process all kinds of data — imagery, vector data, 3D models from liDAR, terrain models, and so forth. I think you’ll see that, as customers request it and it makes business sense, we’ll certainly expose more and more of that functionality within GEB.”
Google extends its reach through its partners. For example, in the Asia-Pacific Region, Dialogue Information Technology has about 30 account executives that operate across more than 2,800 Australian organizations, says Glenn Irvine, the company’s National Practice Manager for Google Enterprise. “So, we provide them with sales reach and we talk daily with the Google team here in Australia about current opportunities.”

**CUSTOM APPLICATIONS**

While Google software developers wrote all of the code for all of Google’s Maps for Business products and continue to write updates, many Google partners work with Google Enterprise customers to build custom services on top of those products. They listen to their needs, decide whether a Google product exactly supports those needs, and then build value-added products, Lorimer explains. Therefore, Google gave its partners access to GEB a few weeks before launching it commercially, “because we wanted them to be able to port some of their applications to our APIs,” he says. Several of these applications were on display at the annual Google Earth Federal users Conference in early March. Organizations that buy these applications also benefit from the power of Google’s cloud, says Lorimer. “It’s all the folks who typically would use geospatial data and who invest in GIS. GEB is an enterprise product, so its success is certainly tied to the success of our customers.”

“We have written a number of applications that integrate directly with the Google platform, whether it is the security and authentication service or visualizing the maps and Earth layers or other data pieces or a custom search,” says Chris Powell, director of geospatial programs at NT Concepts.
Navagis, which has been a Google Enterprise Partner since 2008, works solely with Google’s Geo products, primarily with federal government agencies, large engineering firms, utilities, oil and gas companies, and telecommunications companies. “We work a lot with GEB as well as Google Earth Enterprise,” says David Moore, the company’s founder and president. “We focus on creating custom products for customers around GEB. We also do support and services for GEB for companies that are setting up a GEB account for themselves. We’ll come in, we’ll help them out and teach them how to use it, load all their data, all that.”

“We also have a product that we’ve developed called Mobile Recon, which allows you to collect data in the field and synch it up with GEB.” Two years ago, Navagis gave tablet devices loaded with Mobile Recon to contractors who were responding to a huge oil spill in Michigan. They used it to collect the locations of the oil and synch them back up to a Google account in real time, so that the data could be analyzed and used to direct the response.

Dialogue Information Technology, too, integrates GEB into existing systems. For example, says Irvine, a utility that manages all of its assets in its enterprise resource planning (ERPs) system may want to be able to present that asset information through Google Earth. Additionally, the company provides initial implementation and training, and assists its clients with their licensing requirements.

NGIS became a Google Earth Enterprise partner about 15 months ago, when it was assisting several of its clients with their GIS requirements. “All had a common theme, which was to find a tool that enabled the wider community of stakeholders, both internal and external, to view the GIS data,” says Chris Erikson, the company’s director of sales and marketing. “The heavy lifting is still done in Esri, MapInfo, SmallWorld, Oracle Spatial, those types of systems. We weren’t looking to replace them, clearly, but we saw an opportunity for Google to provide the internal and external users of our clients’ data with a way to view their GIS layers. Google Earth
Builder is getting GIS data out of the GIS department and into the hands of all stakeholders and employees."

"We run a help desk that acts as a liaison between our clients and Google," Erikson says. "We resolves most troubleshooting internally but Google certainly provides a vast amount of support resources also, so our role depends on each client’s support requirements. We find that, in most cases, once Google Earth Builder is deployed, it is almost plug-and-play."

TST, launched in 2007 by a group of former government employees, military personnel, and Silicon Valley software developers, focused on challenges around the defense and intelligence community. "We saw an appetite within those customer bases for the same kind of commercial technology that they had access to when they went home and planned their night out or traveled to a different city," says AJ Clark. "So, we would look at a capability like Google Earth and ask, what are the obstacles to a customer using this more predominantly in their mission?"

In 2008, he recalls, the U.S. State Department’s Bureau of Diplomatic Security asked TST to develop for it a capability to better visualize all of its security vehicles and personnel who were moving around in a high-threat area, such as Iraq, Afghanistan, or Yemen. While TST’s initial project was focused on using the Google Earth desktop product, soon the company recommended creating a system that would enable many people to see all of the data in Google Earth through a Web Browser.

Within Google Earth, AJ Clark explains, a piece of software called Google Earth Fusion allows an organization to fuse to a basic Google Earth globe — Google calls it a Blue Marble — all of its latest imagery, which can then be displayed either in a Web browser or on the Google Earth desktop software. "IT is very good at fusing terrain, imagery, and data that don’t change very often," he says. However, some data — such as the location of a moving vehicle — is not well suited to be fused to that globe. "You need some other means of dealing
with dynamic data like that. We ended up building an entire product, called iSpatial, around that concept.” It was then adopted by other government agencies, he says, including the Social Security Administration, the Air Force, the Army, and the Defense Intelligence Agency.

TST, which released iSpatial about three years ago, is now making it available as a hosted solution. This allows people who may not be GIS experts — such as county officials responding to a tornado or a flood — to create content, such as lines, geometries, or features, and then upload them to GEB, share them with others, or add them to a collection, explains John-Isaac Clark. “It’s making it a lot more accessible to the everyday user who is already used to interfacing with Google Maps and Google Earth.”

NT Concepts, Navagis, Dialogue Information Technology, TST, and other value-added resellers of Google’s products also act as geospatial subject matter experts for their customers and troubleshoot technical and administrative issues with Google on their behalf. “The APIs on a weekly basis with respect to several projects where we are using GEB and leveraging those APIs,” says Powell. “There are new features and functionality each day that we are trying to incorporate into custom applications. One that we’ve implemented is a single sign-on service, which would allow somebody from within their corporate environment to use their active directory or their security and authentication mechanisms to authenticate with the Google authentication system.” Similarly, Irvine says: “There is a lot of liaison from a technical point of view, where our engineers will be talking to Google engineers around specific requirements or a unique case that a client might have.”

**ERGON ENERGY AND GEOEYE**

Ergon Energy, Lorimer says, is “a good example of how energy and utilities companies see the benefit of using our cloud for...
all of their data to build common operational maps that they can share out with their users” — both in the field, using mobile devices, and at the office, using the Google Earth client from their desktops.

GeoEye is working closely with Google to make it possible for someone who wants imagery of an area to simply draw a square around it and ask for it. The message would go through GEB to GeoEye and the customer would receive a response through the Web browser with the price and quality of the image and the option to buy it, explains AJ Clark. “GEB will be great for customers because it allows them to build a subscription imagery service using it, where they can push-button publish their processed imagery in to the hands of their users and just as easily revoked access,” says Lorimer. “So, they built an annuity term-based subscription model, where in the past they’ve provided data via FTP or on DVD.”

OTHER USES OF GEB
Other users include many national, state and local governments. A company that sells a software package that can be used for a “call before you dig” underground infrastructure applications is using GEB behind the scenes to store all the data in the cloud and then expose it through an API within their application, Lorimer says.
GEB can be used to provide a common operating picture for disaster management. It has been used in the past ten natural disasters, says Lorimer. For example, during Hurricane Irene, one of Google’s government customers used GEB to display imagery taken over the coast of North Carolina on a public map that was used for disaster response. In Australia, which has had significant floods, cyclones, and brush fires in recent years, some state agencies are also looking to Google Earth Enterprise and/or GEB environments to manage that common operating visualization picture for managing disaster declarations and claims and organizing communities’ responses, says Irvine.

**FROM GOOGLE EARTH ENTERPRISE TO GEB**

Google Earth Enterprise, which Google released with the original acquisition of Keyhole well before GEB, allows organizations to build globes and maps on their own networks, behind their firewalls, and, if needed, disconnected from the Internet. This is one reason it is still used by many government organizations, especially defense and intelligence agencies, which are reluctant to expose their networks to the Internet or are prohibited by law from doing so.

However, deploying Google Earth Enterprise requires a much greater investment and background knowledge in IT
Many of the organizations with which we work may spend $500,000 just on hardware, where if you use GEB you don’t have to spend any money on hardware, because Google provides all that,” says Moore. “To use a Google Earth Enterprise model, you have to be familiar with its servers, hardware platforms, and Linux,” Powell says. “In some cases, to be proficient, you also need to have a pretty good understanding of geospatial processing, geospatial data formats, pixel size, resolution, and data projections — because these are all areas in which common errors can occur in importing, hosting, and styling data.”

By contrast, he explains, with GEB you can upload files into Google’s cloud-based environment much more easily and process them much more quickly. A Google Earth Enterprise deployment also requires a huge amount of storage. “Some of our clients have well more than 100 terabytes of storage online within their Google Earth Enterprise environment, managing their globes and maps, on a protected client environment.”

Additionally, Google Earth Enterprise’s license caps the number of users who may hit a server to 1,000 per year. By contrast, GEB, which resides on Google’s cloud like Google Earth and Google Maps, has no such limit. It allows multiple levels of users to access the data, while still enabling the organization to protect it at the appropriate level. “You could envision an organization like the Department of Homeland Security or FEMA using GEB to share geospatial information with thousands of relief workers or humanitarian assistance or disaster recovery folks,” says Powell.

NT Concepts became a Google Earth Enterprise partner in
2006 and was the first one to contract with the U.S. federal government, says Powell. It has been deploying Google Earth Enterprise solutions to support many federal government clients, including the Army, the Air Force, and the Fire and Aviation Management group of the U.S. Forest Service. This last service to maintain a globe and overlay on it dynamic information on forest fires and the aircraft that are responding to them, he says. NT Concepts is not investigating how their client might port this application to GEB. “This currently is a hybrid project, where we are still relying on our underlying Google Earth Enterprise system to manage and visualize the data, but we are now experimenting with how we can bring in additional layers from GEB,” Powell concludes.

Google Earth, launched in June 2005, expanded by orders of magnitude the number of people who view aerial and satellite imagery and who use basic GIS functions, such as turning layers on and off and measuring distances. GEB expands that reach further, by making it much cheaper and easier to organizations to share with internal and external users their investment in GIS data and in dynamic data feeds from sensors.
A.J. Clark, 32, served in the U.S. Air Force from 1998 to 2002 and worked as a military intelligence analyst at Guantanamo Bay after 9/11. Five years ago, he founded Thermopylae Sciences & Technology, and Arlington-based software development, cybersecurity and geospatial engineering firm — and Google Earth partner. Today, Thermopylae has grown to 120 employees, grossing over $20 million annually. Clark earned his undergraduate degree from Florida’s Saint Leo University, majoring in business management with a minor
in computer science. He also completed St. Leo’s MBA program in 2005. Clark splits his time between his home in Miami and Thermopylae headquarters in Arlington.

**Q: How did you get into information systems and intelligence work?**

In the military, my focus was in intelligence in Saudi Arabia and various places in the Middle East. We had very limited systems for managing information, and I gravitated toward working with our vendors. I thought we could do better, and I took an interest in that.

**Q: What was your work like at Guantanamo Bay?**

I went to Guantanamo Bay as a civilian IT guy. A lot of intelligence was generated down there, and I was working with new technology for analyzing data, trying to create the capability to get it integrated. Analysts had to go through each individual file repeatedly when they were looking for a gap in a story, for example. But you can take an automated analysis and have it help analysts going through someone’s story. It can find links and similarities — or differences — to other people’s stories.

**Q: You’ve gone out of your way to create a unique, casual culture at your company. Why?**

I went home to Miami after I left Guantanamo Bay and worked for some large companies. I felt they were very rigid in how they performed and should’ve been more agile, creative and focused on defense industry is conservative. I wanted really smart guys to solve problems and enjoy their jobs and enjoy building better machines.

**Q: How did the partnership with Google start?**

In 2008, we started building some geospatial capability and reached out to Google Earth. We had created a tool, to be a component of Google Earth, that didn’t run the program on a Web browser, and we had some enterprise customers, private companies and government clients that wanted geospatial technology to run on a closed system.
Q: What change is coming in information technology?

The way we’ll interact with technology and information will change with the explosion of mobile devices and smartphones. The location element of the smartphone hasn’t fully caught on, yet. Applications are going to become much more location dependent, through the lens of marketing. You’ll be hit with ads about stores in your area. It’ll be the same phone, but it’ll know where you are. If you’re in Canada, it’ll feed your information on where the salt trucks are when it snows; in Miami, where to buy sunscreen.
The CEO of Thermopylae Sciences & Technology (TST), A.J. Clark, was described as “not your typical defense/Intel contractor. In his early thirties, Clark wears a ponytail and rides a motorcycle, but he has also served in the Air Force and worked at Guantanamo Bay after 9/11 as a Military Intelligence analyst.”

GeoWorld Editor Todd Danielson was intrigued about the man and the company, so he interviewed Mr. Clark for his insights into a new way to do business on the “D.C. Beltway.”
**GeoWorld:** TST is a Google Earth partner, what does that mean? Can you describe more specifics of the partnership?

**Clark:** Being a Google Enterprise partner means that we are provided with advanced training on Google products, access to their product teams and the opportunity to act as the representative for Google in selling the software to government customers. Google does not deal directly with the government, but uses their partners to handle sale of software, licensing and payment logistics.

When a government entity contacts Google, we oftentimes are called on to go and talk to the customer along with Google. We provide examples of how Google Software has been used on secure government networks and provide a technical roadmap for how to make it happen. If a customer wanted to put their imagery on a secure Google Earth globe, for example, we install the software, integrate it with the government information systems, and oftentimes enhance the Web-based user interface with the one of our products like iSpatial.

Being a Google partner has provided us with insight into the product direction that Google has. Oftentimes, a government customer will go to Google and ask them for a specific feature addition to a tool, like the Google Earth user interface on the desktop client or in the web browser plug-in. Google has to prioritize what new features are developed, and due to the unique mission the government has, their features may not always make it to the top of the list. Sometimes, the features they desire are not on the development plan for quite a ways into the future.

What we do is identify the features Google is not working on and find ways to bring them to the government through the iSpatial product. This gives the government the capabilities they need today, while still leveraging the familiar technology of the Google Earth product.
GeoWorld: TST is consulting on the next version of Google Earth. Can you describe the extent of the consulting, what that consists of, and what are the results of the consulting?

Clark: TST has multiple projects we do for Google, and some of them require a degree of more confidentiality that others. However, one that we can talk about is the Google Earth Builder project that we support. We work directly for Google to assist in developing software in Google Earth Builder, which allows users to leverage Google’s cloud-computing infrastructure with their own private Google Earth globe. We work on developing capabilities that allow Google Earth users to easily connect and display their enterprise data with Google Earth.

In addition to Google Earth builder, TST provides support to Google onsite in Mountain View, Calif. We augment the Google Earth product team and support development of upcoming features that will be released in future Google Earth versions. There are other emerging capabilities that TST is supporting Google on that will soon make the mobile Android experience even more effective for government customers in areas where disadvantaged communications present a challenge. Examples of this will be coming in 2012.

GeoWorld: Can you describe some new things we’ll see in the next version of Google Earth, whether a direct contribution from TST or not?

Clark: TST is directly involved in a building a variety of cool new functionality in Google Earth’s products as part of the Google product team. A few examples of that are listed below:

+ Building Open Geospatial Consortium (OGC) compliance services into Google Earth to allow other tools to access the data using open-standards methods. This will give geospatial tools outside of Google’s tools the ability to access
Google Earth Server data.
  + Building Web-interfaces to allow users to contribute, collaborate, and improve the quality of underlying imagery and vector data within Earth Builder.
  + Working on new Android-based geotechnologies that will significantly enhance the mobile user’s ability to leverage a variety of information that is delivered from new cloud-computing environments. More details on this will be coming in 2012, so stay tuned for public release of the specific capabilities we are developing with Google.

**GeoWorld:** Can you summarize what iSpatial 2.0 does and how it works with Google Earth?

**Clark:** iSpatial consists of two capabilities. The first is a front end Web-framework that wraps around the Google Earth Web API. iSpatial provides a Web-based user interface for Google maps and Earth right out of the box. This interface allows for users to create geospatial features such as polygons, icons and other items on top of Earth or Maps. It also allows users to display their organizations existing data in Google Earth or Maps and edit it.

The second element of iSpatial is the back-end data model that manages the dynamic data a user wants to push to their user interface. Streaming real-time geolocation data is an example of what is stored on this backend of iSpatial. The data can reside in PostGres, MongoDB or Oracle, and iSptaial’s backend data services handles the connection.

iSpatial can be used in a plethora of ways for different customers. The backend can handle tens of thousands of simultaneous updates and project them through the web interface on top of Google Earth in the accurate location on the ground. This is valuable for organizations that are interested in tracking anything that is on the move or at rest.

The iSpatial interface has been customized to provide security personnel in combat zones with a high-tech 3-D Web interface for planning missions, monitoring missions and conducting
after-action reviews of missions when they are complete. The 3-D interface gives full terrain, building and foliage data for highly populated areas that can be difficult to navigate when providing security in an urban environment.

iSpatial was a very effective in providing a collaborative environment for analysts, aid workers and military personnel that were supporting the Haiti relief efforts in 2010. The early versions of the software were put into use, and thousands of relief personnel were able to create, share and view data in one environment. The underlying imagery was updated in eight-hour increments through a Google Earth fusion server and globe that was getting direct feeds from the Intelligence Surveillance and Reconnaissance (ISR) assets flying over Haiti. Google Earth managed the heavy imagery and terrain data, while iSpatial managed the rapidly changing content on top of the imagery.

**GeoWorld:** What can iSpatial do that Google Earth can’t do alone?

**Clark:** iSpatial provides a data store that manages dynamic data — data that updates in seconds and then can be displayed over Google Earth or Maps. Additionally, it provides all the user interfaces mentioned above on top of Google Earth in the Web. Otherwise, the user would have a Google Earth globe but no ability to manage their data on top of it.

iSpatial also provides the ability to create smooth animation on top of Google Earth through the simulator component. Simulator allows a user to draw routes for ground or aerial objects that are moving around the globe. Multiple routes can be drawn in seconds right in Google Earth by using iSpatial.

You could plot a movement of five Humvees into an area of Kabul, navigating them around buildings, down alleyways and
over bridges. You could have dismounted individual leave the vehicles and move in through a narrow walkway to take places around a building. All the while, you could have a helicopter flying overhead that starts a circle pattern once it arrives at the same location. A Cessna and predator could be orbiting above as well. All of this can be played out with detailed 3-D models for all the objects that fly, drive or walk the selected routes in a coordinated fashion.

The simulator function of iSpatial is a great example of how it manages backend data and then projects it through the browser onto the Google Earth plug-in. It literally looks like a video game scenario playing out in front of you. Missions can be saved or shared with others for their feedback.

iSpatial also has the capability to act as an interface to mobile devices that are operating in an area that a user might be watching. If the mobile devices have a piece of software like Ubiquity, then the iSpatial API can receive the location data of the phone, and the phone can send and receive images, sound clips, video, files or even reports from iSpatial. Chat messages can be sent back and forth, so the iSpatial user is looking at an icon of the mobile device moving around in
their Google Earth Globe while they are chatting with the person carrying that device.

**GeoWorld: What are some of the client applications of iSpatial that you’re most proud of/pleased to be a part of?**

**Clark:** The iSpatial implementation in support of the Haiti earthquake in 2010 was one of the most fulfilling applications of this product. The capability is still in use today to support coordination and planning for humanitarian assistance or disaster-relief support in the Caribbean and Latin America.

Another application of the software is an implementation on an Army program that is bringing the data in their information cloud and extending it to the furthest tactical edge. The synergy between iSpatial and Ubiquity is leveraged for this program, and iSpatial provides a common geo interface as well as an enterprise geodata store.

Information that is collected from the mobile devices is passed back up to the cloud, and iSpatial indexes each piece of information that has a geospatial element. This allows for a vast amount of data from pictures to reports to the current location of all the phones in an area to be displayed, queried against and organized through one interface. It’s a groundbreaking effort to leverage the power of a computing cloud and expose that down to mobile devices. We are excited to be part of it and encouraged by the innovation that the senior Army leadership showed in their strategic vision with the project.

**GeoWorld: What is the difference between iSpatial and Ubiquity? Which types of clients are using which?**

**Clark:** Ubiquity is a mobile application container that runs on iPhone and Android operating systems. Users can go to a Web site, and drag-and-drop widgets into their Ubiquity container. They then process it, and, in minues, it is available for use on a mobile device through the Ubiquity application container.
So the difference between iSpatial Ubiquity is that iSpatial is designed for use as a Web application on geospatial data. Ubiquity handles a much wider variety of data and is designed to run on a mobile device. The two software products are connected, though. Ubiquity uses iSpatial’s geodata management back-end to display data for Augmented Reality and projecting geospatial features on the Ubiquity maps widget.

We have found that the combination of geo feature management/visualization and mobile device application frameworks have many synergistic elements. When our clients approach us to solve a mobile challenge and then see iSpatial, they usually get very excited that another part of their information-management challenge has a solution. This works in reverse as well when clients come looking for geo solutions and see that so much work has been done on the mobile side of the house.
Because Ubiquity and iSpatial have so many capabilities on the server and user side, there may be features that aren’t immediately needed for all of our clients. The flexible nature of the software lends itself to be easily customized, however, and unnecessary features are dropped from users view, and the priority ones are left to function as the usually would.

**GeoWorld:** Are mobile devices the future of spatial technology? Or do you always see a need for more traditional interfaces?

**Clark:** I believe that it will be important to combine both traditional interfaces and mobile interfaces. Because the way that people interact with the Web is changing, and more mobile devices are used to access the Web, we will see new opportunities of a geospatial nature.

For example, on traditional computing devices, people generally are not highly mobile. However, with mobile devices, it changes the paradigm, and location matters. Geospatially visualizing all of this data that comes from a mobile device can be done on another mobile device, but the screen space, computing power and storage are all limiting factors. Traditional computing allows for displaying more data and there should always be a place for that.

**GeoWorld:** How has the “dot com mentality” worked in the Beltway? Are there difficulties in merging the two? And is that mentality really the source of the successful partnership with Google?

**Clark:** The innovative culture at TST is undoubtedly one of the strongest things that ties us to Google. We are in lock step with the way we approach problems and the type of culture that we promote.
We have a really nice conference table that looks very professional that turns into a ping pong table that one of our associates at Google was able to coordinate getting for us. Google has a variety of these out in their headquarters, and it’s nice to have unique similarities like that.

We are challenged by having a dot com mentality in the Beltway. It goes counter to many of our peers, and it takes a lot of communication to ensure that internally we are bridging the gap between management of government projects with innovative developers that are allowed to be creative and innovate.

One of our unspoken core competencies is the way that we bring the “right brain and left brain” sides of TST together — that takes a lot of skill, and it’s not easily replicated at all. Having spent five years cultivating a culture that encourages everyone to speak up on ideas, that allows everyone’s opinion to be voiced, and that focuses on employees as our most important asset. We have a strong competitive advantage in the agility we provide our customers.

**GeoWorld:** Why has the company been able to grow from 5 employees to 120 in such a short time? Is it the technology? The “working environment” attracting employees? Or a combination? Since “combination” is the likely answer, what are the percentages as far as importance?

**Clark:** The company has been able to grow so quickly in such a short time due to the uniqueness of our products and services as well as the breadth of the market they support. I like to say that whenever we build a product or specialize in a service, we try to hit a common denominator that lots of customers need.

Our mobile product, Ubiquity, and geospatial product, iSpatial, can easily support a race track like Las Vegas Motor Speedway or U.S. Army soldiers in training and combat. Because we remain committed to innovation and constant
improvement, we find that we are able to attract highly skilled employees.

I think that the working environment counts for about 30 percent of our growth, the technology about 50 percent and the benefits about 20 percent. We ensure that company profits are redistributed through profit-sharing plans to all employees, and we also heavily invest in internal research and development to keep making out existing products better and come up with new ones.
Thermopylae Sciences & Technology is “Silicon Valley in the Beltway”

By: Adena Schutzberg

Thermopylae Sciences & Technology (TST) may not be a geospatial company you hear about every day, but its unique culture and work with partners like Google means it’s a company worth knowing. Directions Magazine interviewed President A.J. Clark, who focuses on team development, product awareness, and delivering quality and innovation for the company and its customers.
**Directions Magazine (DM):** Thermopylae Sciences & Technology serves the defense and intelligence communities, but has a unique culture. How would you describe it? How does management maintain or redirect the culture, if necessary?

**A.J. Clark (AJC):** The Thermopylae culture can be described as “silicon valley in the beltway.” One cultural rule is that the organization is built around the technical team members. They are the ones who differentiate us from other companies in the D.C. area and their input is encouraged. The team concept is strong at Thermopylae and the common theme is that we can accomplish more collectively than we could individually.

We draw a variety of analogies to the Battle of Thermopylae within our organization and the concept of interlocking shields keeping a team strong is one of them. If a strong team has to carry the weight of one person who is not at their skill level it could bring the entire group down. Keeping disciplined as an organization to ensure the right new team members are applied in the right positions is critical in maintaining our culture.

**DM:** Federal defense cuts are likely to cut into TST’s bottom line in the coming year(s). Which technologies can the company take to the other sectors?

**AJC:** Federal defense cuts will likely compress the growth of the defense industry. We do believe that it is prudent to take advantage of the common denominator technologies we’ve focused on over the last five years and expand the customer base that uses them. Our strategy when we formed in 2007 was not to cater to the lucrative contracting positions in Iraq or Afghanistan, but to come up with ways to use emerging technology to solve problems for a soldier or a CEO. Geospatial and mobile technology naturally bubbled to the top and every time we spent a dollar on independent research development (IR&D) we asked ourselves, “How would this technology be useful in the government or commercial sector?”
Our Technologies are in use with racetracks, baseball stadiums, tennis opens, energy companies, media companies and universities. We just acquired mobile software development company that had a significant customer base in the commercial sector, which not only strengthens what we can offer the government but significantly increases our commercial footprint and potential.

DM: iSpatial, your “wrapper” for the Google Earth Browser API (plug-in), enhances the core tools available in Google Earth. Why do your customers prefer a browser-based experience? Will plug-ins be around for long? Many are fading such as Flash, Silverlight, etc.

AJC: Sometimes I wish that plug-ins would fade faster, to be honest, but I’ll get to that in a minute. There are a couple key points to make, though. Our iSpatial software works with the Google Maps interface or the Google Earth plug-in, so we try to avoid a lock-in situation with plug-in technology. That is a unique element of the software because it allows users who connect to enterprise Google products to toggle back and forth between the two options while seeing their exact same data over both views. Our customers prefer a browser-based experience because of the collaborative elements Web-based experiences provide. A user seeing a map is great, but a user looking at a map that everyone else in their organization or a collection of organizations is looking at has more power. It has even more power when all of the users looking at the map can start drawing on it and immediately sharing their collective intelligence about an area.

I do think plug-ins will be around for a while for a certain community. That community is the government and commercial enterprise customers (large companies). These customers run on large firewalled internal networks and strict security rules are put in place for what goes on those networks. It is not uncommon to find a government customer
running a version of Internet Explorer that is three full version releases behind what is standard on open networks.

**DM:** A lot of your company’s work requires a quick deployment (days!). What are the limiting factors to rolling out a new customization of iSpatial even faster?

**AJC:** The main limiting factor for rolling out iSpatial even faster was really having a cloud-based instance of the software with adequate user rules and permissions and a B2B model (or even B2C if the consumer is a real nut for spatial data display or management) that supported instantaneous transactions to keep up with net speed demand.

**DM:** Ubiquity 2.0 allows users to build their own mobile “apps” from a series of widgets. This sounds like it follows the lead of other “programming without programming” efforts such as Yahoo! Pipes or today’s Ifttt (“If this, then that”). While those (and others) were nice tools and were heavily used by specific communities, can that vision be more broadly
applied? Can, and perhaps, should, the soldier in the field be building his or her own situational awareness tool?

**AJC:** I think we have to look at the mobile domain with a very broad and open perspective. I think we are often times shortsighted in the field of IT and let the past cloud our vision of what the future will look like. For example, a tool like Yahoo! Pipes was a very cool concept but it has not had mass appeal. However, the concept of downloading lots of applications onto a phone has been heavily adopted by the masses. I think the point is that it is very hard to predict how the commercial and the enterprise space will fully leverage the mobile domain.

I think that mobile application management at an enterprise level has the potential to really gain adoption in the next 12-24 months. Understanding where organizations will place value in their mobile domain, though, is a hot question that we’ll all learn the answer to over the next few years.
I am sitting in a basement office in Rosslyn, staring at Google Earth satellite images on a giant flat-screen monitor as computer geeks show me how a SEAL team would take out a drug factory—which in this exercise happens to be my home in suburban Maryland.

So we pretend.

Several “Special Ops” teams surround the block, some gathering at staging areas around the corner to determine the best way to storm
my center-hall Colonial and annihilate the no-goodniks inside.

“Don’t hurt my trees,” I tell the T-shirted geek next to me.

What’s going on here is a visit to Thermopylae Sciences & Technology, a 105-employee company that is the creation of A.J. Clark, 32, a burly, ponytailed motorcyclist who hardly fits my image of a guy who helped track bad guys for the Air Force.

The culture at Thermopylae’s Rosslyn offices, where 60 employees work, is as informal as its founder, who schedules his day in 10-to-30-minute increments so he doesn’t waste time in long meetings. It’s a world of T-shirts, long hair, feet up on the desk. The halls are decorated with plaques featuring people and their inspirational sayings, such as the one with Jody Williams, The Nobel Peace Prize-winning anti-land-mine crusader, that reads: “Success breeds success. People want to be involved with things that are successful.”

Thermopylae offers three big products to clients, which range from the federal government to the Cleveland Cavaliers.

The first helps clients such as the State Department track overseas employees on Google Earth, whether they’re at a café in Kabul or on a highway in Egypt.

The second is a mobile app that, for example, allows a spectator at the Las Vegas Motor Speedway to find directions to the nearest restroom.
The third product is a kind of search engine for the intelligence community.

Clark used his military experience and contacts to build a start-up that has $23.5 million in revenue. About $18 million comes from services for the government. Those operations have a relatively low profit margin, 7 percent. The rest of the revenue comes from software sales, which have a much higher profit margin.

The annual payroll is around $10.5 million, and after other expenses, ranging from rent and travel to new computers, the profit is around $2 million. Clark takes a low-six-figure-salary.

Clark owns more than half the company, while a couple unnamed investors own the rest.

Interesting back story

There’s a lot of start-ups like Thermopylae around Washington, but the interesting part of this story is Clark’s career path before going into business for himself, parts of which sound like something straight out of a Tom Clancy novel.

After joining the Air Force in 1998, Clark was assigned to a unit that reviewed satellite images. Intelligence gathered from the images was used to enforce a no-fly zone in southern Iraq. But the unit also helped direct forces to drug labs, terrorist safe houses and training camps in Afghanistan.

“That’s what I got to do for a living,” said the native of Dayton, Ohio. “If it was a training camp, we would say, okay, what building is bin Laden most probably going to be in? We analyzed images... people coming and going, trying to identify what targets to hit.”
After he left the Air Force in 2002, Clark went to Guantanamo Bay to work for a private contractor analyzing transcripts from detainee interrogations.

“My job was to take all of the intelligence out of the detainees in the camps and take advanced technology to process it and [find] where were the gaps in their stories.

“The interrogator walks out, gives me his report…and I enter it digitally and take different words and look for one detainee who says ‘I was with John at Kabul in January’ and another detainee who says ‘I was with John in Moscow in January.’ Well, John can’t be in both places.”

Clark can’t say much more about it, except that he thinks his analysis contributed to some successful anti-terrorist operations. But he was earning only $60,000 a year, and “I started to learn very quickly that I needed to change my career trajectory.”

He left Guantanamo in 2004 and moved to Miami, where he worked for a company that was acquired by professional services and technology giant Science Applications International, which is now based in McLean. He was running several highly classified programs for the military that included a signal intelligence and overhead imagery that brought in around $100 million a year.

But Clark ached to start his own company, so he quit his $130,000-a-year job in June 2007 to launch Thermopylae.

He initially ran his company out of his Miami home using just a laptop computer. He quickly brought on his brother, who is a computer jock.

Clark invested hundreds of thousands of dollars of his own money into the company, much of which was saved from his years working overseas.
He incorporated the company in Delaware but located it in the Washington area to be near his military contacts, which soon paid off with a deal to build a prototype system for the State Department that allows analysts to track subjects’ movements.

The $30,000 contract was a hit, quickly growing to $1 million. Thermopylae took off from there.

Now, says Clark, “the objective of the company is to build ourselves to a point where we are around $50 [million] to $75 million in revenue and entrenched in our industry. At that point... I hope to start getting a return on my capital and sweat-equity investment without having to sell the company.”

Lessons learned

I asked Clark about what he’s learned. Some answers:

+ “One mistake was underestimating how hard it would be to start the company. If I had it to do over again, I would have spent a longer time planning the specifics.”

+ “I would have brought on an advisory board earlier than I did. Having an advisory board is very effective, and some of the strategic guidance they provide could have added value earlier on in the company. We brought them on in our fourth year.”

+ “I would have picked a banking partner that was more in tune with my business needs. I chose Citibank initially, and they didn’t have the desire to give a small business a line of credit like PNC did. We ended up moving everything to PNC when we went with them for our line of credit.”

By the way, my house is still standing.