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## Sunrise at the Summit

**W**hen the folks at ESRI asked me to be the keynote speaker for the Survey and GIS Summit,

I protested that, while I can appreciate its broad applicability, I am only mildly proficient with the technology and do not take full advantage of it. That's what they said they wanted: a surveyor who can see the capabilities and promise of the technology but not necessarily a GIS specialist. And so I found myself on the dais behind a podium in an unusual position, giving a speech (a very different experience from leading a seminar). Later, I was surprised and pleased that a number of people came up to me to thank me for my comments. Most memorable of these were the ones thanking me for reminding the mixed audience that GIS specialists are not the enemy and that they actively seek the accuracy of the data that surveyors provide.

This meeting is an unusual one, in that it draws about equally from the GIS and survey fields. Rarely have I experienced such willingness to share and learn from each other as at this venue. But it is both much needed and long awaited. The markets for accurate GIS spatial data grow every year with the increasing public demand for more accountability and reliability for data. We can see it perhaps most readily with the streamlining of government, with E-Gov and various portals to digital information.

About ten years ago I was one of eleven panel members participating in a study by the National Academy of Public Administration (NAPA). The outcome of a year of work was a volume entitled *Geographic Information for the 21st Century*



– *Building a Strategy for the Nation*, which analyzed various governmental needs for geospatial data and the overlaps in data collection efforts between several federal agencies. In its recommendations on how to streamline government and reduce those overlaps, NAPA identified a long list of geospatial data needs, all of which, incidentally, provide opportunities for surveyors to expand their usual work into the GIS arena:

- Property rights and voting rights
- Government revenues from property (taxation and permit processes)
- Transportation, navigation, commerce
- Public land and marine sanctuary management, agricultural and natural resource development

- Environmental protection and ecosystem management
- Community and economic development
- Emergency management
- Public Service delivery
- National defense
- Earth system sciences and geospatial information technologies

Several of the categories of data in this list are linked; those links are related to location. Location work demands surveying services. Why wouldn't a surveyor want to keep GIS at least on the back burner for the times when a firm's more traditional revenue streams are running more slowly? At the Summit, I met a number of surveyors who have leaped beyond the back burner stage to front and center, promoting the

accuracy that only a survey can provide to GIS data analysts eager to utilize their services.

Remembering that GIS goes far beyond the imagery and extends into the description of that data (called attributes) and its documentation (called metadata), it is clear just how wide an opportunity GIS offers to surveyors. Because of relatively recent emphasis on temporal aspects of data, repeated work to track changes in conditions provides yet another venue to serve. But in fact, that venue has always existed. I can think of one such example immediately.

When the new courthouse was built in Philadelphia in the 1970s, the firm I worked for measured the settlement of the columns several times per month, down to the millimeter. As in many colonial cities, much of Philadelphia used to be marshland or crisscrossed with streams, as the original settlement was close by the shores of the Delaware River. Filling in the soft areas to rescue otherwise “wasted” land was common, and in modern times, replacing an old building with a new one merely means that the original soil problems are inherited by the new structure. Our frequent measurements of the first floor settlement from the basement beneath it were reported via tables of our findings.

But just imagine how much more useful that information would have been, and how much more quickly understood by the structural engineers who were tracking building movement to predict where cracking would occur and to what extent, if the data had been entered into a GIS of the building. Each point could be monitored directly and graphs produced to show rise or fall. The surveying would not be eliminated, and might even have been expanded as the engineers more quickly would see where additional data was needed. Wetlands and water boundaries and seismic activity are just a few other examples of the ongoing need for temporal tracking by survey.

All this shared use of data raises the question “When is it GIS and when is it surveying?” While the exact division line between the two fields is still the subject of heated debate, let’s take a look at some history.

Early GIS utilized whatever data was available in digital form. This included hand digitizing and manual input that could be affected by human dexterity,



skill, and computer knowledge – or the lack of such traits. Precision and accuracy were not keystones of the trade during the scramble to populate data tables so GIS software could query them in a way that would generate visual answers or “maps” (note the quotation marks). A lack of GIS standards regarding data or training made most surveyors ignore GIS in the belief that it would fade away as the world came to recognize that only surveying accuracy could provide appropriate answers to locational questions.

But GIS did not fade away, and as it proliferated, the fear of “losing turf” inspired surveyors in some states to seek legislation preserving portions of the creation of base mapping over which a GIS is draped as being the practice of professional land surveying. While selfish in origin, ultimately this was good for GIS, because a strong and accurate surveyed base increases the credibility and reliability of such data systems.

Now we move to the present day, when such questions as the relationship of infrastructure to property lines can be queried on a GIS. Is this an appropriate use of the software? Or is this more properly a surveying matter?

The present climate allows GIS and survey personnel to work together, rather than consigning tasks to separate far-flung departments. This allows the surveyor to identify proper application of datasets and take responsible charge for determinations relating to boundaries, in a relationship similar to that with CAD operators. While those attending the Summit were comfortable with this professional interaction, the debate will likely continue for some time in other circles.

As we move into data integration and system interoperability, definitions and standards must be worked out between surveyors and GIS practitioners. We are no longer in the age when trying to open a file created with different software guaranteed that either we would be denied access or the result would be some kind of gibberish. We have moved off our own individual software islands with integrative tools that allow us at least to view the contents of some files, even if not in original format. Once data changes hands, however, the need for complete and clear metadata documenting the data’s creation becomes ever more crucial, adding clarity to arguments about “is it GIS or is it surveying?”

Currently, geospatial standards for data content, metadata, and transfer help to promote coordinated development, use, sharing and distribution of geographic information resources. The Federal Geographic Data Committee ([www.fgdc.gov](http://www.fgdc.gov)), with representatives from private businesses, academia, and federal, state, local, and tribal agencies, provides access to standards free of charge through its website, including (among others) for geospatial positioning accuracy, cadastral data content, and nautical charting hydrographic surveys.

As times change, so must our focus. While surveyors might have found GIS folks difficult to work with in the early days, we all have grown. Modern experienced GIS practitioners are very different from their forebears, now a sophisticated group of professionals from whom we can learn and to whom we can provide our own expertise while talking in similar language. GIS may be the Esperanto that allows us to communicate about location because of the combination of visual and descriptive data it incorporates.

At the Summit, it was exciting to talk with people from varying backgrounds, sharing the creativity and courage to imagine new applications for this increasingly sophisticated technology. Finally we are reaching the point where integration and interoperability can combine with data distribution through the Internet in a manner that allows each component of the combined system to achieve more than it could alone. The concept has always made sense, and current technical sophistication has flung open wide new avenues for both business expansion and business management. It was encouraging and exciting to meet surveyors utilizing GIS to track where they have performed different kinds of survey work, which of course helps them in researching new projects and in responding to RFPs rapidly: here is a topography job in NAVD 88 only two miles from the proposal site, and here is a boundary survey tied to NAD 83 in the same block.

### **Eager to Know More?**

For those inspired to peek into the GIS world and test the market waters, start with an investigation of local resources. There are most likely GIS user group meetings somewhere in

your region, through organizations such as URISA or GITA or through a government agency or forum. These are wonderful places to meet people and ask all the questions you have trouble putting down on paper. With live feedback like this, it is a short step to the classroom, either through a local educational facility or online through ESRI. Software is much more intuitive and straightforward than it used to be, and although your first try may not result in a perfect fit for your dream application, experience and growing confidence will lead you to the tools best suited to that new reality. Read, learn, talk with others, expand beyond your usual circle of surveying colleagues to include GIS practitioners. Venues like the ESRI Summit provide a chance to learn from people on both sides of the data.

This surveyor's view of the expanding GIS picture is that broadening our horizons beyond traditional surveying applications can translate into a wider client base. Broader expertise means a greater demand for our services. And a broader range of offerings means better opportunity for financial stability and growth. Despite its great value in managing our business workflow, not all of us currently are adept with manipulating spatial data in a GIS. However, we can at the very least supply clients with GIS-compatible data. Of course, this means we must understand the content and format standards, but surveyors are used to constantly adapting to such requirements and specifications in our work. Part of what makes us professionals is our life-long learning, well beyond meeting the minimum requirements for licensure at testing time. But beyond the financial opportunities and reward of GIS, surveyors can make the world a better place by facilitating better planning for environmental protection, emergency response, and distribution of resources ranging from troops to food.

As the Summit progressed, one thing became ever clearer: more people are realizing that the world is not flat and finite. Geodesy matters, and GIS users are embracing it. Those who believe that the surveying profession is dying have not paid attention to the growing demand for quality data. It's a big world out there, and somebody has to measure it – accurately. 