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Is There Life beyond the X/Y and Z Coordinates?

■ GIS JANET says ...

Yes, there is life beyond coordinates, and it's a wonderful life. As a matter of fact, I believe it's the attributes—the descriptions, or the details, about the object represented by x/y and z—that *bring those coordinates to life*.

That concept, that the attributes are just as important (or more important) than the coordinates, is probably new to most surveyors. From a GIS professional's point of view, surveyors focus on getting a set of highly accurate coordinates so a legal document can be described, written, and recorded. That is great because that is what surveyors are trained and paid to do. Their clients need highly accurate coordinates, especially on property boundaries, so legal disputes are kept to a minimum.

But in the GIS world, our focus is not on the coordinates; it's on the attributes. Why the difference? Because GIS needs the details in the attributes—including the coordinates—in order to be valuable. This is probably much easier to understand if we discuss a few situations that clearly show you the value of the attributes versus the coordinates, so you can see for yourself how the object comes to life.

Typically, a local fire department will collect attributes about its hydrants and share this valuable data with the local water utility so a proactive maintenance program can be accomplished. If the only information the firefighters or the utility have stored in the GIS about each hydrant is the x/y and z coordinates, they will be able to very accurately *locate* each hydrant, but their maintenance program will not contain the necessary data to be effective.

However, if the hydrant GIS database contains coordinates (and these don't need to be exact, as hydrants are usually painted a bright color and stand about three feet high) along with hydrant's make, model, date of installation, fire zone, color, flow test, hose type, etc., then the maintenance program will use all the attribute data (least of which is the coordinates) to keep the water flow ready. And reporting to regulatory agencies is easy and efficient, saving time, money, and possibly lives.

Maybe I should explain in more detail how the GIS uses the attributes so you can see its real value. With the data neatly stored into a GIS, the water utility responsible for the monthly maintenance program can quickly and easily go to the

Without the coordinates, the hydrants could not be displayed, but the attributes really make the hydrants and the maintenance program valuable.

■ SURVEYOR RANDY says ...

Sure, there is life beyond coordinates, but is there life without coordinates? And that includes all three coordinates: x, y, and z. I would say those three coordinates give meaningful life to the attributes. Some of us old-timers can remember when “poor data in equaled poor data out,” making GIS information at best questionable and at worst unreliable. I believe everyone, from surveyors to GIS users to the general public, can appreciate the huge improvement in the accuracy of the x, y, and z coordinates and the increased value of that data.

I will certainly concede that attributes for a located feature are important and that they provide needed information that can be used in numerous ways by many groups of folks, including engineers, fire and rescue departments, emergency management teams, tax departments, property owners, surveyors, and others. And while the attribute information for the various features is a vital component of a GIS, I would contend that the x, y, and z coordinates are the foundation—the critical component that the other GIS components build upon.

Looking at your local county GIS, you will find that the foundation and bottom floors are the accurate survey and mapping information provided by surveyors and photogrammetrists. They provide some of the most widely used layers: the property layer, the orthophotography layer, and, in many counties, a topography layer.

As I see it, the only topic for discussion is the coordinate accuracy that is appropriate for the various components and applications associated with those components. Janet says that clients need highly accurate coordinates, especially on property boundaries. But property boundaries are not the only component of a GIS that can benefit from the acquisition of accurate coordinates. Yes, property boundaries are a very important link in a GIS, and in many locales surveyors are providing this important and accurate survey information directly to county GIS departments to insert into their GIS. This information is used by county employees, attorneys, engineers, surveyors, property owners and others. But accurately locating utilities—such as water, sanitary sewer, storm drains, natural gas, telephone, electric, cablevision, and others—is just as important as accurately locating property boundaries, and the information is invaluable for a multitude of uses. ▶

► GIS and make the following request: “Show me all the hydrants that were manufactured by KENNEDY, installed after 1980, painted YELLOW, with a NATIONAL STANDARD hose type.” Quickly and easily, the GIS will return the results. The map display will highlight all the hydrants that meet your specific criteria.

So where do the coordinates play into the picture? Since the individual coordinates are part of each hydrant record in the GIS database, the software uses the coordinates to show the hydrant location (X marks the spot, literally!) in the final selected set. Without the coordinates, the hydrants could not be displayed, but again, it's the attributes that really make the hydrants and the maintenance program valuable to the fire department.

Knowing what data to collect and how to turn that data into information is really what GIS is all about. The following quote by Dr. Carl Sagan (American astronomer, writer, and scientist) sums up my thoughts on this subject: “Knowing a great deal is not the same as being smart; intelligence is not information alone but also judgment, the manner in which information is collected and used.” ♣



JANET JACKSON, GISP, is certified as a GIS professional and heads McKim & Creed's GIS activities.

► The local fire and utilities departments Janet discusses may very well focus more keenly on the attributes, rather than the coordinates, of the fire hydrant for their maintenance programs. However, the firefighters headed to a fire call need the nearest fire hydrant locations mapped to determine the availability of water to fight the fire. When fighting a fire, knowing the manufacturer or installation date is probably not as important as knowing the exact location of the hydrant. Even the hydrants painted a bright color can be partially obscured by fast-growing vegetation at times, especially when maintenance budgets are stretched thin. And the engineer looking at water capacities and pressures to serve residential, commercial, and industrial customers, as well as fire protection, will need an accurate x and y coordinate and, perhaps more importantly, an accurate z coordinate, particularly when it comes to capacities and pressures.

Surveyors know enough about “x marking the spot” to provide what I propose as being the solid foundation for the attribute data and the varied uses of that data. And we are all about knowing what data to collect and how to transform that data into useful information; GIS doesn't have the corner on that market. ♣



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While Janet and Randy may not see eye-to-eye on all surveying and GIS issues, they do work together on a daily basis, respect each other's perspective and point of view, and attempt to “intersect” their professions whenever possible. Randy and Janet invite you to submit your questions to “Intersect.” Contact them via email at intersect@mckimcreed.com or at 919-233-8091.
