The Importance of Developing a Uniform Basemap for an Enterprise GIS

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Abstract: The concept of enterprise GIS is to provide uniformity and accessibility to geographic information across an entire organization. Uniformity is often the more difficult of the two objectives to achieve. In most enterprise scenarios, end users have differing levels of geographic data needs as they relate to accuracy, precision and overall cartographic appearance. This paper discusses the importance of a uniform base map for an enterprise solution and provides the enterprise GIS manager with the information he/she needs to design a uniform basemap and to meet the expectations of their internal customers – the end user.

Introduction
The concept of enterprise GIS is to provide uniformity and accessibility to geographic information across an entire organization. Uniformity is often the more difficult of the two objectives to achieve and will be the focus of this discussion. In most enterprise scenarios, end users have differing levels of geographic data needs as they relate to accuracy, precision and overall cartographic appearance.

These differences can and must be overcome for the overall good of the organization. Before the solution can be realized, the problem must be understood. After all, what comes first, the chicken or the egg… I’m not really sure either, but I do know that legacy data is often the most difficult obstacle to overcome (actually, it’s second to funding) when implementing an enterprise GIS solution.

Legacy Data
An enterprise GIS isn’t something that springs up overnight. It often takes years of planning, forecasting and selling to internal customers (or users). More often than not, it is the joint ventureship of multiple departments who use GIS. Most enterprise solutions happen when two or more “GIS Champions” within the same organization decide that working together would be more beneficial than not. A “GIS Champion” is someone who sees the value of GIS to his or her department, then promotes or champions the GIS concept to the governing body to secure funding.

Unless that individual is extremely lucky, the funding for GIS usually starts at a very minimal level. This causes the user to look for the “best available” data sources to begin his or her implementation. Most of these low cost (or free) datasets are small-scale maps created for
regional, statewide or national use. A great example of this data type is the DOQQ (Digital Orthophoto Quarter Quadrangle). Most, if not all, of us have used a DOQQ at some point in our GIS professional careers. When compared to higher end orthophoto solutions, they are often inaccurate and have visual characteristics that would not be acceptable for a large-scale orthophoto.

Looking forward, let’s assume that the initial GIS Champion is years into his or her implementation and they have modified or developed many datasets using a DOQQ as a basemap. Let’s also assume that there have become more departments using GIS within the organization. The usual problem is that these other users often have different goals and needs. Those different goals and needs often lead to different procedures for data development.

Maybe these users have created layers using a data source other than the DOQQ’s used by the initial GIS user. Each department’s GIS may have a high level of relative accuracy, but they are most likely spatially incompatible with the other departments’ data layers (i.e. they do not fit or overlay with each other). We’ve all been there and asked the question, “how come this layer doesn’t fit?” This common problem is a direct result of using different source data to develop data layers for their GIS.

When implementing an enterprise GIS, these departments will have difficulties resolving spatial accuracy differences to combine all layers into an organizational GIS solution. Who is going to take the bite and say, “I’ll re-adjust all of my data to fit yours”? Is it going to be the department that has been using GIS the longest; is it going to be the department that has the most spatially accurate data; or is it going to be the department that generates the most revenue using GIS? The answer may just be all three.

**The Basemap**

As someone who has seen many enterprise implementations, I would say that the most important question, outside of funding, to be answered when considering an enterprise GIS is “what is going to be our basemap?” Finding the right answer to that question can be the key to success or failure of an enterprise GIS solution.

The most common answer is a large-scale digital orthophoto solution. A digital orthophoto is a photo-quality digital image of surface features in their geometrically corrected, true map projection. The orthorectification process ties each pixel in a digital image to its true Earth location. The visual and mathematical characteristics of an orthophoto make it an excellent base map. With pixel sizes ranging from 0.10’ to 2.0’ and horizontal accuracies ranging from 6 inches to 10 feet, a large-scale orthophoto solution can offer a myriad of possibilities as a base map.

This poses another chicken and egg proposition. What is more important, the accuracy or the pixel resolution? Simply stated, the answer is always accuracy. It is extremely important to understand the accuracies that are needed to accomplish all organizational goals. The final accuracy may be overkill for some applications but that is part of the give and take of developing an enterprise solution.

There is a direct correlation between accuracy and cost. I once heard Dr. Roger Tomlinson, considered by most to be the “Father of GIS”, say, “90% of the cost comes in achieving the last 10% of accuracy”. I agree.
As Dr. Tomlinson suggests, the relationship between accuracy and cost is not linear. If plotted, the relationship would probably look something like Figure 1 (below).

![Graph showing the relationship between accuracy and cost]

This correlation between accuracy and cost illustrates how important it is to understand the goals of the enterprise GIS solution. Managing functionality and usability against economy can be a very daunting task. There are some simple steps that need to be followed to determine how accurate the basemap can or should be for the enterprise solution. They are:

1. What departments are participating?
2. What applications will they develop or enhance with the enterprise solution?
3. Out of all of the probable applications, what two applications require the greatest degree of accuracy/precision for success?
4. Do they require the same degree of accuracy? If not, re-evaluate the one application that requires the highest accuracy to determine if it can be accomplished using other means.
5. Let the applications dictate the accuracy. Never start with the most commonly used application; although, starting with the application that will generate the most revenue is never a bad idea.
6. Work with a photogrammetrist to design the large-scale orthophoto data specifications for the enterprise solution.

There are many enterprise solutions that miss the mark. Some data solutions are too accurate for the organization’s GIS goals and some are purely inadequate and don’t meet any of its needs. Which will best describe your enterprise GIS?

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