

Publishing Data to the Web: Issues to Consider

Distributing spatial and tabular attribute data over a Web-based network is a powerful and effective communication method but public agencies should carefully consider all the business and technical issues before starting out. There is much more at stake than the cost of the software – one must consider the total cost of implementation and ongoing application maintenance over the application life cycle. There is no argument that publishing an agency's data to the Web, whether intranet, extranet, or Internet has value and makes good business sense. By doing so, all persons in the agency can have data access without being a technical expert. This short white paper presents some of the issues that often are overlooked when implementing a Web-based GIS application.

Know the technology - In general, viewing GIS data on the Web involves a three-tiered architecture:

1. A spatial server that can efficiently communicate with a Web server and is capable of sending and receiving requests for different types of data from a Web browser environment.
2. A mapping file format that can be embedded into a Web page.
3. A Web-based application in which maps can be viewed and queried by an end-user/client via a Web browser.

The underlying issue is that developing a Web-based GIS application has many components including viewer and server-side application development. Typically, the level of required technical skills is beyond that of the traditional GIS professional. Thankfully, most Web-based GIS software products provide easy-to-use authoring tools that create the map and data query functionality. The "author" of the Web application adds spatial data (vector and raster), sets scale display properties, sets rendering characteristics like line weights, thematic mapping, object labeling, and defines layer groups for the map legend. The map is then embedded into the Web page.

Utilize intelligent CAD data – All CAD software has the ability to create and maintain spatial objects that have embedded attributes or that link directly to an external database. Also CAD software allows the creation and maintenance of spatial data in a real-world map coordinate system and the ability to classify and group object features. Make sure you can utilize intelligent CAD data in your Web application.

Publish your data in its native format - Publishing your data to the Web should not change your existing data workflow – how the data is created, maintained, and used by desktop applications. For example, many agencies have traditional GIS data for planning and archival purposes in addition to Digital Design Data (aka CAD data) from engineers, surveyors, mappers, and infrastructure managers. Choose the technical platform that allows you to keep GIS data and Digital Design Data in its native format without translation or having to maintain yet another copy of that data. This will allow you to keep your existing data management practices and procedures intact. In addition, be sure that your Web solution allows the linking of external database tables to spatial layers and their objects. This allows for very flexible labeling, tooltips and reporting of the attributes of those objects.

Maintain your data integrity. Spatial data has a stated accuracy and precision. In addition, engineering and survey spatial data is typically defined as 3-D objects in the form of parametric curves and spirals. Choose a Web-publishing solution that preserves your data integrity and supports 3-D objects. It is best not to compromise your data to implement a Web-based mapping application.

Map projections. Often spatial data natively exists in different coordinate systems. An example would be survey data that is in latitude / longitude format and land parcel boundaries that are in UTM or state plane coordinates. Choose a GIS Web-publishing product that supports on-the-fly map projections.

Provide intelligent data to the user - Robust Web data publishing products provide the ability to bytestream spatial objects direct to the browser. This functionality is provided by a browser plug-in - ActiveX for Microsoft Windows Explorer or Java for Netscape. The advantage of providing the spatial objects to the Web versus rendering a bitmap image includes high quality presentation graphics to the computer screen or print output and the ability to display object database content when the user hovers the cursor.

Allow users to add their own data - Invariably it will occur that a user wants to add spatial or attribute data to a Web-based application or change display characteristics. Choose your Web-based GIS software that will allow the user to perform this operation. The alternative is to burden your development staff in customizing the Web application and thus impacting staff productivity.

Select standard and open development technologies - Develop your Web-based applications using standard technologies such as HTML, XML, JavaScript, and COM. In addition, select a Web development platform that supports the Open GIS Consortium (OGC) and the Open Web Services 1.2 initiative that is focused on developing interface specifications in the areas of image handling, sensor Web enablement, service chaining, and feature handling.

Develop for low bandwidth - Successful applications take advantage of networks with high bandwidth while working efficiently to avoid problems with slow networks and low bandwidth. Therefore, when choosing a Web-based GIS, scalability - the ability to take advantage of high bandwidth or compensate processes for low bandwidth - is critical. Always develop for the slowest connection and be mindful of significantly low bandwidth wireless clients.

Data security - You have a considerable investment in your corporate data. Make sure to implement a solution that fully supports industry specifications for Secure Socket Layer (SSL) technology.

Native database connectivity - GIS and Digital Design Data has attributes that can be managed and stored in a Relational Database Management System (RDBMS). Choose a Web-publishing solution that supports a direct connection to the database using OLE DB or ODBC-compliant protocol. If storing your spatial and attribute data in a RDBMS, make sure to implement an SQL-compliant solution that allows direct and open access from the Web application without using middleware.

In summary - Please consider the above factors when choosing a system to publish your GIS, Digital Design Data and tabular data to the Web. When considering your internal data formats focus on rapid deployment and ease of maintenance. Addressing these issues will help you make an intelligent and informed decision when choosing the proper software solution to deploy your data over the Web.

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