Managing GIS Application-Schema Relationships

ABSTRACT

In local governments, many GIS applications retrieve information from datasets by navigating schema. Applications often call on particular datasets and field names within those datasets by name. Changes to schema and data characteristics may foster discontinuity in availability for multiple GIS applications.

There are at least four approaches to mitigation for this challenge.

First, maintain an inventory of layers and fields that are navigated by applications and the applications that look for those layers and fields.

Second, maintain documentation on business needs, application functionality, schema relationships, and data characteristics.

Third, periodically verify output from applications.

Finally, bundle an emergency copy of an application and a copy of the data it needs. Since the application and data coexist, the bundle may be used in case there is a disruption in application-schema synergy.

BACKGROUND

Many GIS applications retrieve information from datasets by navigating schema. Applications often call on particular datasets and field names within those datasets by name. Sometimes applications query a field for a particular value.

Sometimes schema elements are designed to conform to an application's needs. A field name may need to be in all capital letters so that it may be queried with ArcXML. For query functionality, an application programmer may want an added field with data derived from portions of values or strings in an existing field, such as house numbers aside from full addresses. A particular field may have existed as a string type for a long time before there were any GIS applications; Now an application may need to process that field's contents as numeric data.

THE CHALLENGE

GIS Applications are increasingly calling on live datasets, such as SDE layers that may be updated hourly. Changes to schema and data characteristics may impact applications. If a layer name is changed, applications that call on data by that name may stop. Changes to a field's properties, such as a change from numeric format to text, may also cause application problems. Schema changes may foster discontinuity in availability for multiple GIS applications.

Changes to data characteristics, such as a set of coded values, may impact the integrity of information provided by GIS applications. For example, changing a code to indicate a street segment is "TO BE PAVED" from 3 to 8 would cause a problem if an application queries the streets layer for code 3 to indicate streets to be paved. Maybe a new species has been discovered in a wildlife refuge. Then an application's symbology or query may not include that new species type in its output.

MITIGATION

There are at least four approaches to mitigation for this challenge:

1) Inventory of Application-Schema Relationships
   Maintain an inventory of layers and fields that are navigated by applications and the applications that look for those layers and fields. This will provide a reference that may be checked before changing schema or data characteristics.

2) Well-Documented Applications ("application.doc")
   Maintain documentation on business needs, application functionality, schema relationships, and data characteristics. Document scripts in terms of global variables, arrays, functions, etc. Documentation is very helpful when the application is being worked on. It often reduces or eliminates time-consuming impediments that a programmer may encounter, whether or not she or he is the original author. It may even help someone who is not familiarized with the programming language in which the application was developed to resolve an application problem.

   Also document processes related to managing applications. For example, a written procedure on archiving, editing, and updating an application is helpful and assures that these tasks are

consistently done the same way. A written procedure for updating data that is called on by an application may be very helpful, especially in terms of any special steps, such as concatenating two particular fields for the application's needs.

3) Periodic Data Integrity Checks
Periodically verify output from applications. This task may be regularly scheduled, such as once per quarter.

4) Emergency Stand-Alone Application ("break the glass" disk)
Bundle a copy of an application and a copy of the data it needs. This bundle may be utilized while an application problem is being resolved. Add a component to the application portion of the bundle that informs users of timeliness of the information being provided. Since the application and data coexist, the bundle may be used in case there is a disruption in application-schema synergy. The data portion of the bundle may be periodically updated, perhaps once per quarter. Include instructions on employing the bundle.

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