IMPLEMENTING THE LOCAL GOVERNMENT INFORMATION MODEL IN A SMALL CITY: A FEASIBILITY STUDY

Jeffrey M. Ruben

Master of Science in Geographic Information Science (MSGISci)

Department of Geography, California State University, Long Beach

Introduction

Local government agencies collect and store data in order to inform decisions and better serve citizens. The storage method of spatial data affects the efficiency of tasks such as performing analyses and sharing data with outside organizations. Esri's recently developed Local Government Information Model (LGIM) is a spatial data structure that can provide added value to a GIS. The LGIM is an XML schema containing 315 feature classes housed in 27 feature datasets, with 59 tables, 44 relationship classes, and designations for 5 rasters. Many of these objects utilize and share 304 domains. Small cities typically are not early adopters of the LGIM due to a lack of resources and/or familiarity with geospatial data management best practices. This study was performed for the City of Lakewood, California with six frequently used shapefiles to illustrate the process of implementing the model (Figure 1). This project consisted of two facets: a workflow involving the Spatial ETL tool to populate the LGIM, and interviews with GIS professionals in Lakewood gauging perceptions of the benefits of and concerns about the workflow and the data model.

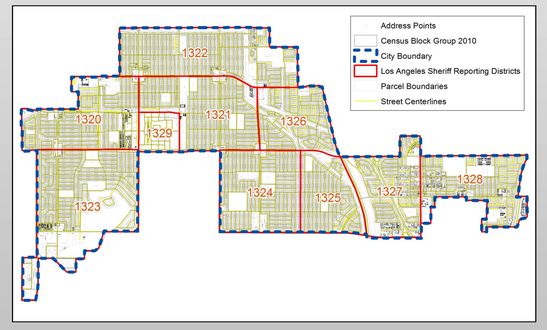

Figure 1. *City of Lakewood, California displaying the six datasets used in this project*

Data and Data Sources

There were two types of data acquired for this project: spatial and experiential data. There were six datasets in the form of shapefiles used in this project. These shapefiles were chosen based on the accuracy of the data, and frequency of use. The spatial data was sourced from the City of Lakewood, the United States Census, and the Los Angeles Region Imagery Acquisition Consortium (LARIAC) (all shown in Figure 1 and listed in Table 1). The experiential data is comprised qualitative data coming from in-person interviews.

Table 1. *Datasets and Data Sources*

Dataset	Source
Street Centerlines	City of Lakewood, California
Address Points	City of Lakewood, California
Parcel Outlines	City of Lakewood, California
Block Groups	US Census
City Boundaries	US Census
Los Angeles County Sheriff Reporting Districts	LARIAC

Methodology

To inform the interview portion of this project, a workflow using the Spatial ETL (extraction, transformation, and loading) tool (Figure 4) of Esri's Data Interoperability (DI) extension was tested and documented. To begin this workflow, the LGIM schema was loaded into a new file geodatabase along with the proper spatial projection. Then, the data in the shapefiles was examined to find the most appropriate corresponding feature classes in the LGIM. Finally, the initial spatial data was extracted from the shapefiles, transformed (where needed), and loaded into the LGIM.

Once the data were populated in the new database, the geospatial professionals were asked a series of questions regarding their existing spatial data organizational system to ensure the distinctions to the LGIM are apparent. After a walkthrough of the workflow and resulting data model, geospatial professionals working at the City of Lakewood were asked a series of questions regarding the perceived benefits and challenges of this workflow and resulting data model to cities in general, as well as to the City of Lakewood specifically (Figure 5).

Timeline

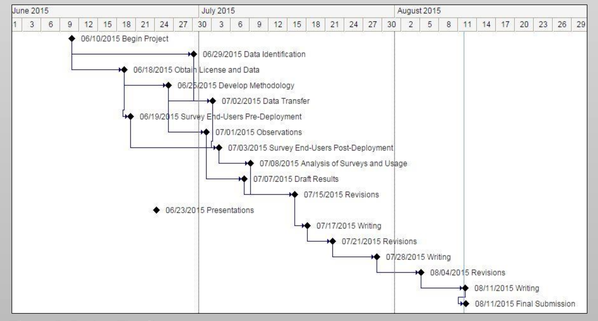

Figure 3. *Project Timeline*

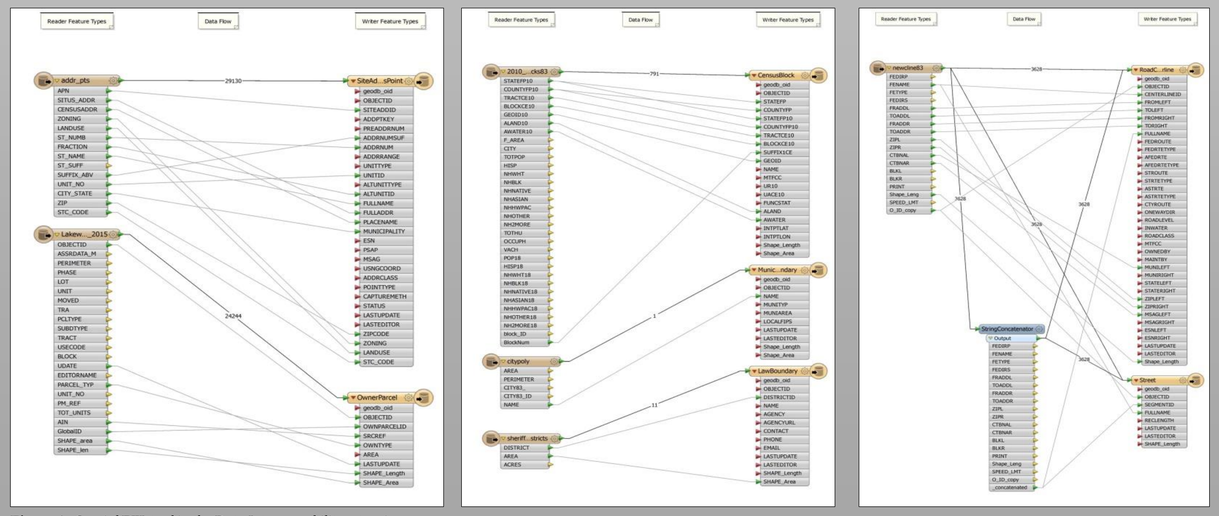

Figure 4. *Spatial ETL tool in the Data Interoperability extension*

Results

The interviews displayed a strong correlation between interest in/openness to the transition and the level of familiarity with its process. Responses suggest that the initial impression of the DI extension tended to color it as a "cumbersome" process, and that its interface is similar to ModelBuilder, which is perceived as difficult to use. After walking individuals through the process, without exception, their impressions of the DI were changed to "intuitive" or "powerful."

The resulting file geodatabase populated with the LGIM schema and spatial data worked well and provided ample material to cover in the interviews.

Two difficulties experienced with the methods were in setting the spatial reference and in the loading of data into one feature class. For the former, the XML Import Tool used to import the LGIM schema has a setting for the projection of the resulting geodatabase. While the schema was imported into the geodatabase, the projection was not set. This was corrected by manually setting the projection for each feature dataset in the file geodatabase after the tool was used. For the latter, when attempting to populate the Streets feature class with data from the newcline83 shapefile, an error occurred many times. The error suggested that this feature class could not be edited, yet the settings were no different for this feature class than any other and this was the one feature class that had an issue.

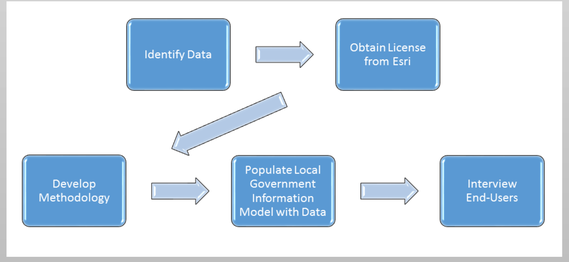

Figure 5. *Steps taken in project*

Discussion

From the reported perceptions of end-users, this workflow appears to be viewed favorably. There were other noteworthy observations regarding challenges that were incurred throughout the process.

The use of the DI extension, specifically the Spatial ETL tool, was overkill for a project using only six datasets which required no transformations. This was tool was used to establish a workflow that would be scalable to a full city's spatial database, even those that are contained in a series of files in Microsoft File Explorer. A quicker workflow option for similarly small scale processes is attribute mapping, the functionality of which is limited. If the data transfer will be using multiple data formats, however, the DI would be the more practical option.

Cost is, and was, the most frequent concern voiced about this workflow. Indeed, cost is most often the limitation to getting work done. The DI extension costs $2,500 per year for a single license on top of the annual cost of an Esri license. For a floating DI license, Esri asks that the user contacts their Customer Service Representative (the floating price will probably not be less than the single).

The data dictionary provided by Esri for the LGIM is difficult for two reasons: lack of readability and specificity. The data dictionary is posted online in the from of an HTML webpage which links to sections within itself for reference. To make sense of this information, the entire document was pasted and formatted into an Excel workbook. Only through this activity were the datasets, feature classes, fields, and domains digestible for ready for investigation.

Many of the datasets in the LGIM were to be populated with data that is not readily stored or important to the City of Lakewood. This is expected as the data model was created to be functional for all local government agencies. One surprise, though, was that some of the shapefiles from Lakewood contained data that did not have a place in the LGIM. Fortunately the Spatial ETL has the ability to add fields in feature classes.

Conclusion

In the future, supplying a number of small government agencies with this workflow and asking them the same questions would provide for a more comprehensive assessment of the perception. Another avenue to explore would be the incorporation of the ArcGIS for Local Government solution, which is built on the data model as a platform, and has preconfigured applications for many of the functions of local government. One especially interesting detail to investigate would be the ease of incorporating any changes made to the data model into the solution, or if these changes could be incorporated at all.

Submitted in partial fulfillment of the requirements of the Masters of Science in Geographic Information Science(MSGISci), August 15, 2015.

For additional information please contact:

Jeffrey M. Ruben | JeffreyMRuben@gmail.com

Special thanks:

Ms. Haley Boyan, Mr. Michael Jenkins, Ms. Josi Jenneskens, Ms. Shannon Julius, Mr. Daniel Richards, Mr. Michael Shensky, and Dr. Suzanne Wechsler.