Bridging Data Silos in Local Government

Examples from Arlington County, Virginia

September 30, 2016

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Agenda

- Local Government Context
- Data Problem #1: Counting Housing Units
- Data Problem #2: Estimating Employment
- Challenges
- What we’ve learned
- Next Steps
Local Government Context

Arlington County

- 25.8 square miles
- Population: 220,400 (2016)
- Employment: 211,000 (2016)
- Housing Units: 112,300 (2016)
- Daytime Population: 288,000 (2016)
- Total Office Space: 40 Million SF (2016)
- Total Retail Space: 8.4 Million SF (2016)
- 11 Metrorail Stations
Local Government Context
Local Government Context

- Demand for high quality service delivery.
- Limited financial and staff resources.
- Arlington public expects you to have the data.
- American Community Survey is unreliable at small geographic scales and difficult for the public to understand.
- Need to supplement federal data with local administrative data.
Local Government Context

• Local governments are a wealth of data
  – Data is generated primarily for financial transactions. (permits, taxes, billing, grant requirements, $$, etc.)
  – Local governments should have lots of data...

• We’ve solved the easy problems.

• Complicated Policy problems require new research approaches
  – How many housing units are in Arlington County?
  – How many jobs are there in Arlington County?
Problem #1: Counting Housing Units

• Problem #1: School overcrowding
  • Significant increase in Public School students over the last 10 years.
  • Demographic shifts move faster than conventional projection techniques.

PreK thru Grade 12 enrollment over the last 10 years
Overview of enrollment trend by school level
Problem #1: Counting Housing Units

- Need a comprehensive housing unit data set to create new and improved student generation rates.
- Census data limited
- So we had to build it.

### All Grade Levels (K-12)

<table>
<thead>
<tr>
<th>Housing Type</th>
<th>APS K-12 Students</th>
<th>% Students by Housing Type</th>
<th>Housing Units Countywide</th>
<th>% of County Housing Type</th>
<th>Student Generation Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Family Detached</td>
<td>12,912</td>
<td>52.79%</td>
<td>27,564</td>
<td>25.05%</td>
<td>0.468</td>
</tr>
<tr>
<td>Apartment- Garden</td>
<td>5,038</td>
<td>21.76%</td>
<td>15,190</td>
<td>13.81%</td>
<td>0.332</td>
</tr>
<tr>
<td>Apartment- Elevator</td>
<td>2,726</td>
<td>11.67%</td>
<td>34,837</td>
<td>31.66%</td>
<td>0.078</td>
</tr>
<tr>
<td>Duplex</td>
<td>877</td>
<td>3.78%</td>
<td>2,240</td>
<td>2.04%</td>
<td>0.392</td>
</tr>
<tr>
<td>Condo- Garden</td>
<td>1,059</td>
<td>4.53%</td>
<td>12,828</td>
<td>11.66%</td>
<td>0.083</td>
</tr>
<tr>
<td>Condo- Elevator</td>
<td>656</td>
<td>2.73%</td>
<td>13,783</td>
<td>12.53%</td>
<td>0.048</td>
</tr>
<tr>
<td>Townhouse</td>
<td>654</td>
<td>2.74%</td>
<td>3,562</td>
<td>3.26%</td>
<td>0.183</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23,922</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>110,024</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>0.217</strong></td>
</tr>
</tbody>
</table>
Problem #1: Counting Housing Units

- Arlington County has never before constructed a dataset of absolute housing units defined by housing unit type with detailed characteristics.

<table>
<thead>
<tr>
<th></th>
<th>Single Family</th>
<th>Multifamily Condo</th>
<th>Apartments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Estate Assessments</td>
<td>X</td>
<td>X</td>
<td>*</td>
</tr>
<tr>
<td>ATRACK (rental apartment survey)</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Census Bureau</td>
<td></td>
<td>Sample of Housing Units</td>
<td></td>
</tr>
<tr>
<td>Permitting System</td>
<td></td>
<td></td>
<td>Not equipped to reliably count housing units.</td>
</tr>
</tbody>
</table>
Problem #1: Counting Housing Units

Real Estate Assessments: Single Family and Condo
Problem #1: Counting Housing Units

Real Estate Assessments: Apartments

- REA reports 42,948 Units
Problem #1: Counting Housing Units

ATRACK: Apartments

- ATRACK reports 50,312 Units
Problem #1: Counting Housing Units

Housing Unit Type

Geography
- Single Family Detached/Attached
- Residential Condo Buildings
- Rental Apartment Complexes = All Housing Units

Primary Data
- Real Estate Assessments Data on SFA/SFD
- Real Estate Assessments Data on Residential Condos
- Atrack (Housing Division’s Annual Survey of Rent and Vacancy)

Related Data
- Sales (REA)
- Alterations and Additions (Permitting System)
- Atrack Affordability Data
Problem #1: Counting Housing Units

- Almost a year to completion.
- Coordination with the Mapping Center, IT staff, and CPHD’s Housing Division.
- Significant data cleaning, creation of new geographic data, and an overhaul of Atrack.
- GIS (Geographic Information Systems) was the way to link databases together.
Problem #1: Counting Housing Units

Results: Housing Unit Type Dataset

- GIS layer that can provide analysis at the smallest level of geography.
  - parcel and
  - complex level.

Single Family Parcel

Rental Apartment Complex
Problem #1: Counting Housing Units

Results: Housing Unit Type Dataset

- New Features
  - Number of bedrooms
  - Affordability Status
  - Sales Activity
  - Renovation Activity
  - Year Built.
Problem #1: Counting Housing Units

Results: Housing Unit Type Dataset

• When joined with student data enables exploration of highly detailed student generation rates
  – Improves student projection accuracy
  – Allows for study of the housing supply and student growth over time

• Measure neighborhood change and turnover

• Combine with commission of revenue data on vehicle registrations to explore parking demand
Problem #2: Estimating Employment

- Problem #2: How many jobs are in Arlington?
  - Impacts transportation funding sources
  - Conventional Employment Data Sources cover only some types of employees and have wide disparities in their estimates.
    - 20,000 job difference between county estimates and conventional estimates. $$$$$$
  - Arlington is unique: It has a large federal presence.
Problem #2: Estimating Employment

- Arlington employment primarily comes from office buildings.
- Significant federal presence in leased or federally owned sites.
- Numerous military facilities and contractors.
- Problems:
  - Inaccurate reporting of employees to worksites.
  - Inaccurate reporting of the number of employees.
  - Inaccurate or missing address information.
  - Inaccurate reporting of federal employees.
Problem #2: Estimating Employment

- Ongoing efforts with Virginia Tech to:
  - **Analyze** Quarterly Census for Employment and Wages (QCEW) data.
    - Document and try to resolve inaccuracies.
  - **Supplement** the employment data with other County, Private, or Federal data sources.
  - **Find a surrogate** for employment data. Evaluate whether building measurements such as water usage data or cell phone data can be used as proxies for employees in occupied buildings.
Problem #2: Estimating Employment
Proof of Concept: Building Water Usage

• Building water usage has many components.

• Assumptions: office only, no laundry; no landscaping; constant cooling

• Estimation Steps:
  – 1. Model water usage as a function of cooling degree days.
  – 2. Using the model to calculate the min/max water usage due to cooling and subtract from total water usage.
Problem #2: Estimating Employment

Proof of Concept: Building Water Usage

3. Using water usage tables which estimate the water usage per male/female employee and visitor, estimate the mean, min., and max. occupancy.

Example:
QCEW=135, Mean Water Estimate=124 (30, 218).
Problem #2: Estimating Employment

Next Steps

- Refine the water usage model to account for additional sources of variability and extend to different commercial building types.
  - Evaluate other proxies for building occupancy such as cell phone usage.
  - Build a data set with the building as the experimental unit and for each building collect three variables, QCEW employment number, water usage, and date.
Challenges

• Data, like departments, can operate in silos.
• Financially related datasets were set up for a specific purpose. It takes staff and political capital to use it for a secondary purpose.
• Finding the cross-connection
• Inconsistent address formatting.
• Cleaning data required staff time.
• Level of GIS skill varies, many databases not set up for GIS.
What We’ve Learned

• GIS is the key platform for linking data across departments.

• Most of the work is data cleaning.

• Start with the small victories:
  – Address formatting

• Build relationships
  – Address privacy concerns
  – Find automated solutions
  – Have a data sharing agreement.

• You won’t know it works until you try

• Testing the limits of public information
Next Steps

• Review and inventory county data sources.
  – Identify potential uses, cross connections, and relationships between users.

• Connect data analysts (end users) with data input staff.

• Figure out who’s in charge.

• County Data Steering Committee to engage in this kind of data driven approach to policymaking and find sample projects for VT SDAL Community Learning Initiative.
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Examples from Arlington County, Virginia

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