Facilities Mapping & Management with GIS at the Shenandoah & Frederick Divisions of Washington Gas

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Who is Washington Gas?
Who is Washington Gas?

Service territory is centered around the Nation’s capital.

- 13 Counties & The District of Columbia
- 1,000,000 customers
- 1,800 employees
- 11,211 miles of main
- 11,200 miles of service
- SmallWorld GIS
Who is Washington Gas?

Service territory is located in the northern Shenandoah Valley.

- 4 Counties
- 15,000 customers
- 33 employees
- 359 miles of main
- 173 miles of service
- *ArcView 3.3 GIS*
Who is Washington Gas?

Service territory is located in Northern Maryland.

- 1 County
- 25,000 customers
- 36 employees
- 437 miles of main
- 314 miles of service
- **ArcView 3.3 GIS** (migrated from SG)
How did our GIS begin?

In the beginning.........

How did you find me?

I had the right software!
What data did we have?

“Vintage” System (@ SG):

- System maps consisted of 219 mylar tax maps and inserts
- 1,900 Mains drawings
  - Approximately 1,300 hand-drawn & 600 AutoCAD DWGs
  - Drawing index system on 3x5 cards
    - Based on Streets and Intersecting Streets
- 11,000 Service work orders
  - Include a service sketch on back of work order
What did we want?

“A seamless, computer-based mapping system with the functionality to trace a pipeline to the nearest shutoff valve(s) and print a list of affected customers.”
How did we begin?

Initial project (1994):

- Contracted GeoSQL Corporation
- AutoCAD & Oracle-based GIS solution
- $30,000 contract:
  - $10,000 for Basemapping, Transmission Pipes & Appurtenances
  - $10,000 for Software
  - $10,000 for Custom Programming Interface
How did we begin?

Why GeoSQL failed:
- The software never functioned as demonstrated and promised for the budgeted amount.

What we gained:
- Basemapping (USGS Quad-based planimetrics – 18 Quads)
- Digitized Transmission Facilities (Pipes, Valves, Insulators, Blowoffs, Gate Stations, etc.)

What we learned:
- Don’t expect “the world”
- “Sequential implementation”
How did we continue?

Next project phase (1997):

- Re-focused our effort
  - Determined to begin the major task of digitizing all of our mains facilities
- MapInfo selected since previous experience with the software
  - Purchased 5 licenses
  - Software worked well!
  - Converted mains, appurtenances & USGS basemapping to MapInfo format
- Contracted support services (programming) @ hourly rate
How did we continue?

Why MapInfo didn’t work for us:

- Business geographics software
- Not as “technical”
  - Coordinate conversion issues (raster registration)
  - No tracing functionality
  - AutoCAD DWG files had to be converted to MapInfo TAB files
  - Consultant’s programmer quit
  - Replacement consultant didn’t deliver as represented
- Made an offer that ESRI didn’t refuse
How did we continue?

What we gained:

- Purchased E-size color scanner
- Scanned 219 mylar tax maps in color
- Obtained digital tax mapping from municipalities
  - Replaced original USGS base
  - Still USGS-rectified
- Began heads-up digitizing of mains
  - populated size, material, pressure designation, length
How did we continue?

What we gained:

- Scanned Mylar Tax Map
- Digital Tax Map
What was the software solution?

Next project phase (1998 - present):

- One-for-one trade with ESRI for each MapInfo license
- Contracted Anderson & Associates to help in the conversion
- First week:
  - Converted data
  - Trained on new software
  - Created a “laundry list” of customization items
What was our land base?

A Potpourri:

- Frederick County / Winchester:
  - Compiled previously obtained data from County E911 data (ArcInfo)
  - Included tax parcels & addresses

- Clarke County:
  - Obtained data from ArclInfo GIS system
  - Included digital ortho photos, tax parcels, street centerlines, & building footprints

- Shenandoah County:
  - No digital County data – Contracted Anderson to digitize a tax map base
  - Included tax parcels

- Warren County:
  - No digital County data – Also included in Anderson contract
How is the land base organized?

Directly in AutoCAD DWG’s:
- ArcView feature (big +)
- No conversion required
- Divided among multiple AutoCAD drawings for optimized regen speed
- Creation & maintenance of data within CAD environment
What is our system premise?

Since our land base is not “survey” accurate, our pipelines & appurtenances are a digital index to record drawings.

- Only map mains and appurtenances
- Primary emphasis that pipes are drawn on the correct side of the street
- No dimensions to facilities are mapped
- “Relative” accuracy
- Drill-down to record drawings
How does it work?
How does it work?
How does it work?
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How does it work?
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How does it work?
How does it work?
How does it work?
How does it work?
How does it work?
What are the applications?

Mapping @ Frederick
What are the applications?

Maintaining Leak Data
What are the applications?

Viewing Leak Work Orders
What are the applications?

Pipeline Trace
What are the applications?
What are the applications?
What are the applications?
What are the applications?

Leak Survey Areas
What are the applications?

Miss Utility Grid Selection
What are the applications?

Digital Photos
What are the applications?

Gate Station Photo
What are the applications?

Hydraulic Analysis
What are the applications?

Hydraulic Analysis
What are the applications?

Printed System Atlas
Who uses our system?

- **Marketing**
  - 2 Laptops

- **Construction**
  - 4 Laptops

- **Pressure & Measurement**
  - 1 Laptop

- **On-Call Personnel**
  - (Laptops from each section)

- **Dispatch**
  - 2 Desktops

- **Contract Locator**
  - 4 Laptops

**Engineering**

“Keepers of the Data”

- 5 Desktops & 2 Laptops
How much has it cost?

From 1994 to the present:

- Original contract ........................................... $30,000
- Obtaining basemapping from others .............. $12,000
- Digitizing facilities & populating data .......... $124,000
- Software .......................................................... $35,000
- Consulting ......................................................... $29,000
- Custom programming ....................................... $57,000
- TOTAL ............................................................... $287,000
- THE BENEFITS ................................................... PRICELESS!

Example: Pulling records each day using mapping has saved an estimated $15,000 per year.
Where do we go from here?

A Complete Solution
What are the benefits?

- A uniform repository of geographical data
- More accurate data entry and editing
- More intuitive data objects
- Features with richer context
- Better maps
- Dynamic map display features
- Better defined shapes of features
- Feature sets are continuous
- Multiple users can edit data simultaneously
What are some challenges?

Spatial discrepancy within Shenandoah data. Continue with index premise or rubbersheet entities?
No spatial discrepancy within Frederick facilities, but no digital tax map entities.
What are some challenges?

Digitize raster tax maps and rubbersheet to orthos?
What are some challenges?

- Remain a non-*Smallworld* shop
- Beginning a 3-year conversion project – what $ and time requirements?
  - Migrating existing systems into the ArcGIS solution
  - Ensuring existing custom functionality migrates
  - Maintaining user-friendliness and deployment within new system
- Internet mapping?
- GPS functionality?
- PDA applications?
What is your experience?

If you have made the conversion from ArcView 3.3 to ArcGIS 9,

I need to talk to you.

Thank you!
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