

MEMPHIS LIGHT GAS & WATER UPGRADE CASE STUDY

Steve Veltman – MLGW Scot Twining – SSP Innovations



Partner Network





Memphis Light Gas & Water

- MLGW was created in 1939
- Memphis is the birthplace of Rock and Roll music, Elvis Presley's Graceland, FedEx World Headquarters, International Paper, Autozone, Ducks Unlimited, and The National Civil Rights Museum
- MLGW is the nation's largest three-service municipal utility
- MLGW is the Tennessee Valley Authority's (TVA) largest customer
- 784 square mile service area
- 421,000 electric customers
 - Nearly 50 electric substations
 - The average MLGW customer uses 14,735 kWH per year
- 320,000 natural gas customers
 - Gas network is 4,650 miles in length
 - Nearly 40 billion cubic feet delivered per year
- 257,000 water customers
 - One of the largest artesian well systems in the world
 - 175 wells
 - 10 water pumping stations



SSP Innovations

Ten-year old GIS and WMS consulting company based in Denver, CO area

- Work exclusively in the United States utility industry
- Includes Electric, Gas, Water, Wastewater / Sewer, and Fiber
- Strong partnerships with ESRI and Schneider Electric
- Certified to implement / integrate / customize entire ESRI & SE GIS suite
- Also do GDB consulting & work management consulting / implementations

Began working with MLGW in late 2009: Enterprise GIS (EGIS) Project

 Have since partnered on several projects (Integrations, SSP Nightly Batch Suite, GDB modeling, ArcGIS / ArcFM Server, ArcGIS / ArcFM 10.1 Upgrade, ArcGIS Online for Smart Meter Data Collection, custom support, and more)

Memphis Light Gas & Water Upgrade Business Needs

MLGW's GIS Department manages:

- 3 utilities, plus
- all of Shelby County's addressing data
- Data is stored in 10 datasets
- ArcFM is implemented in a customized manner
- Designer implementation prompted upgrade

Former MLGW GIS System

ArcGIS 9.3.1 ArcFM 9.3.1 / Feeder Manager 1 Oracle 10G

Custom tools by SSP Innovations:

- Including a myriad of Schneider Electric Auto-Updaters
- See presentation tomorrow at 11:30 AM in Room 201 / 202

Upgraded MLG&W GIS System

ArcGIS 10.1 ArcGIS Image Server ArcFM 10.1 / Feeder Manager 1 Oracle 11G

Custom tools upgraded to C#

New MLGW GIS

- CITRIX desktop environment for end users
- All New Database Servers Oracle 11G
 - Development
 - Test
 - Production
- ArcGIS Desktop on servers (for admin) and CITRIX
- ArcFM on servers (for admin) and CITRIX
- ArcFM Replication implemented for 10 datasets
- ArcGIS Server Web maps
- ArcGIS Online followed closely after upgrade

ArcGIS Image Server

- Image Extension for ArcGIS 10.1 was implemented
- Images are stored on a file server
- Images are referenced from the file server with a mosaic dataset
- Pyramid layers were built
- Overviews were built
- A ArcGIS Server map service was built from the mosaic dataset
- Everything displays beautifully!

ArcFM Auto-Updaters

- Primarily AUs operate on networked feature classes
- Over 60 individual AU processes were updated for the upgrade
- AUs fire during ArcGIS editing processes
- All AUs are now in C#
- AUs have com objects that are all now registered using regex and are referenced using categories
- Built GIS Client installer that puts the AUs on any client machines where editing may be done

ArcGIS Spatial Reference Problem

- Changes made to spatial reference on Electric Distribution data in 9.3.1 using 'Export' geoprocessing tool.
- After test upgrade to 10.1 Oracle SDE a problem was discovered on Electric data with performance with rebuilding indexes.

ArcGIS Spatial Reference Problem

Feature Class Properties X Fields Indexes Subtypes Feature Extent Relationships Representations General Editor Tracking XY Coordinate System Domain, Resolution and Tolerance Name: ELECTRIC.ePole Alias: ELECTRIC.ePole Type Type Type class:	Research showed that SRID values did not match among system and data tables only within Electric data.
Feature	Class Properties
Fields Geometry type of features stored in this feature class: Point Features	s Indexes Subtypes Feature Extent Relationships Representations eral Editor Tracking XY Coordinate System Domain, Resolution and Tolerance Type here to search S & & & & & * *
Geometry Properties ☐ Coordinates include M values. Used to store route data. ☐ Coordinates include Z values. Used to store 3D data. Storage: High Precision using ST_Geometry spatial type (SRID 3)	 NAD 1983 StatePlane Pennsylvania North FIPS 3701 NAD 1983 StatePlane Pennsylvania South FIPS 3702 NAD 1983 StatePlane Puerto Rico Virgin Isl FIPS 5200 NAD 1983 StatePlane Rhode Island FIPS 3800 (US File) NAD 1983 StatePlane South Carolina FIPS 3900 (US File) NAD 1983 StatePlane South Carolina FIPS 3900 (US File)
Submitting issue to ESRI revealed a bug in Export tool against Oracle SDE.	NAD 1983 StatePlane South Dakota N FIPS 4001 (US NAD 1983 StatePlane South Dakota S FIPS 4002 (US NAD 1983 StatePlane Tennessee FIPS 4100 (US Fee NAD 1983 StatePlane Terror Control FIPS 4202 (US Fee NAD 1983 StatePlane Terror Control FIPS 4202 (US Fee NAD 1983 StatePlane Terror Control FIPS 4202 (US Fee NAD 1983 StatePlane Terror Control Field 4202 (US Fee WKID: 2274 Authority: EPSG

ArcGIS Spatial Reference Solution

Parallel conversion project

- Spatial reference XY tolerance fix and 10.1 upgrade applied to data in file geodatabase and transferred into Oracle SDE did not have out of synch SRID values.
- Testing showed that transferring problem Electric data from 10.1 Oracle SDE to fgdb and back into Oracle SDE synchronized SRID values.
- Production workflow:
 - Upgrade to Oracle 11g/SDE 10.1
 - transfer electric data out to fgdb and delete data from Oracle
 - transfer electric data back into Oracle 10.1 SDE

ArcGIS Spatial Reference Solution

Feature Class properties after work-around

Feature Class Properties	
Fields Indexes Subtypes Feature Extent Relationships General Editor Tracking XY Coordinate System Domain, Resolution	Representations ution and Tolerance
Alias: ELECTRIC.ePole	Feature Class Properties
Type Type of features <u>s</u> tored in this feature class:	Fields Indexes Subtypes Feature Extent Relationships Representations General Editor Tracking XY Coordinate System Domain, Resolution and Tolerance
Geometry type of features stored in this feature class:	Type here to search
Geometry Properties	NAD 1983 StatePlane Pennsylvania North PIPS 3701 NAD 1983 StatePlane Pennsylvania South FIPS 3702 NAD 1983 StatePlane Puerto Rico Virgin Isl FIPS 520(NAD 1983 StatePlane Rhode Island FIPS 3800 (US File) NAD 1983 StatePlane South Carolina FIPS 3900 (US NAD 1983 StatePlane South Delete N FIPS 4881 (US
 ☐ Coordinates include M values. Used to store route data. ☐ Coordinates include Z values. Used to store 3D data. Storage: High Precision using ST_Geometry spatial type (SRID 2274) 	NAD 1983 StatePlane South Dakota N PIPS 4001 (05 NAD 1983 StatePlane South Dakota S FIPS 4002 (US NAD 1983 StatePlane Tennessee FIPS 4100 (US Fee NAD 1983 StatePlane Terres Control FIPS 4202 (US F
	Current coordinate system:

WKID: 2274 Authority: EPSG

Application Lock-up Problems

- ArcMap would lock-up after placing features successfully.
- Number of placements before lock-up was random
- Lock-ups happened when placing features belonging to different data owners (not specific to ELECTRIC data).
- Unassigning ArcFM AUs would stop lock-ups.

Application Lock-up Solution

Solutions investigated :

- Reinstall GIS applications (ArcGIS, ArcFM, MLGW client)
- Recompile MLGW client
- Revert to old version of MLGW client
- Lock-up did not occur on Windows 7
- Testing with ArcMap on Server 2008 resulted in no lock-ups.
- Testing with XenApp on Server 2008 also resulted in no lock-up.
- Implemented XenApp on Server 2008





MLG&W UPGRADE BENEFITS

- All the newest ArcGIS and ArcFM tools
- Ability to do new Designer implementation
- Improved performance with ESRI QIP
- ArcGIS Online for field data collection activities
- ESRI attachments for use in the MLGW smart meter installation project
- ESRI attachments for gas regulatory compliance field data collection activities







Steve Veltman – Memphis Light Gas & Water Scot Twining – SSP Innovations