Powering an Efficient Geospatial Data Sharing Framework with Spatial ETL
Overview

- Introduction

- **Case Study #1: Data clearing house**
  - Arkansas- GeoSTOR

- **Case Study #2: Data Harmonization**
  - North Central Region Data Repository

- **Case Study #3: Emergency Response**
  - Indiana Department of Homeland Security

- **Case Study #4: CAD ↔ GIS Integration**
  - Ohio Department of Transportation

- Summary
Spatial ETL used to break barrier between data, applications, and users
Different users have and want different things!
Common Theme

- Different Systems = different data model
- Different organizations = different data model
- Different problem focus = different data model
Data Model is King

- Data sharing requires solving *both* the format problem and the data model problem
- Data Model reconciliation is the real problem!
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Challenge

- Automate distribution of GIS data
- Vector and Raster Data in Multiple Formats
- Data in different coordinate systems
- FGDC Metadata required
- Over 250 searchable layers
Benefits

- Reduced costs for state
- Reduced wait times for end users
- Metrics on layers and areas interest
- Increased number of formats for data
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Challenge

Different systems and data models
Challenge
Data Harmonization

Schema Mapping

Database

Schema Mapping
**Schema Mapping Concept**

**County-A Model**
- Road Name
- Num Lanes
- Pavement Type
- Address Range
- Begin Milepoint
- End Milepoint

**Database Model**
- Segment ID
- State Name
- Local Name
- Local LRS
- Number Lanes
- Pavement Type
- Address Range
- Begin Arm
- End Arm

**Spatial ETL Process**
Collecting Information

- 10 very different data schemas, from the very simple to the very complex

Source: Arapahoe County
Collecting Information

- 10 very different data schemas, from the very simple to the very complex

Source: Arapahoe County

Resolving the county schemas into the Master Schema is the key to success!
Database Schema

- Prototype application with 8 spatial data layers
  - Roads
  - Parcels
  - Census Blocks
  - Municipalities
  - Lakes
  - Streams
  - Fire stations
  - Schools
  
  Plus two non-spatial layers to support one-to-many relationships
Collecting Information

- NCR data schema developed to house translated data sets

Feature classes, attributes, and domains need to be mapped and translated
Application Design

- ArcSDE/Enterprise Geodatabase
- Password-protected web application
Application Design

- ESRI ArcGIS Server web-based mapping application
Data Upload
Data model changed as part of upload process.
Data Download
Data Download

- **Download Area Options**
  - By Area – Drag a rectangle, define on map
  - By Point and Buffer - Define on map
  - By Municipality – Clip polygon
  - By County – By County field in attribute table

- **Schema Options**
  - 10 different counties plus NCR master schema

- **Coordinate System Options**
  - UTM, 4 different state plane, LL NAD83

- **Layer Options**
  - Select any and all available data layers
Benefits

- Unique planning tool with seamless region-wide dataset
- Dialog between counties promotes better coordination
  - Edge matching
  - Data schema harmonization
- Serve as a model for inter-region and statewide coordination
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Challenge

- Integrate multiple county’s data
- Provide data to first responders for situational awareness
- Easily expandable architecture
Solution Concept

- Each county produces a WFS feed
- WFS data loaded into Department of Homeland Security’s geospatial data model
- ArcGIS Server used to disseminate the needed information

Resolving the county schemas into the Master Schema is the key to success!
Architecture

Source: ESRI
Benefits

- The most current data in the state
- Centralized data available to all partners
- Simple, customizable user interface
- Enables high-level financial analysis of an impacted area
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Challenge

- Integrate CAD and GIS data from different counties
- Build data store which facilitates tool choices for future.
- Conflate data to build unified view.
CAD Unification
Future Projects
Benefits

- Reduced data Redundancy
- Increased Data availability thru web-based interface to all stakeholders
- Reduced cost thru more efficient operations
- Lives saved thru more current information.
- Architecture makes future growth much easier.
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- **Summary**
There are many ways to share spatial data assets using Web Technology

Data Harmonization is key to effective data sharing between groups
  - Requires a common understanding of the data that is being shared.

Spatial ETL is technology focused on resolving data model differences
  - Enabling users to get the data they need to the applications they use.
To learn more, please contact me at
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Thank you!