

# > Powering an Efficient Geospatial Data Sharing Framework with Spatial ETL

February 2010



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# Overview

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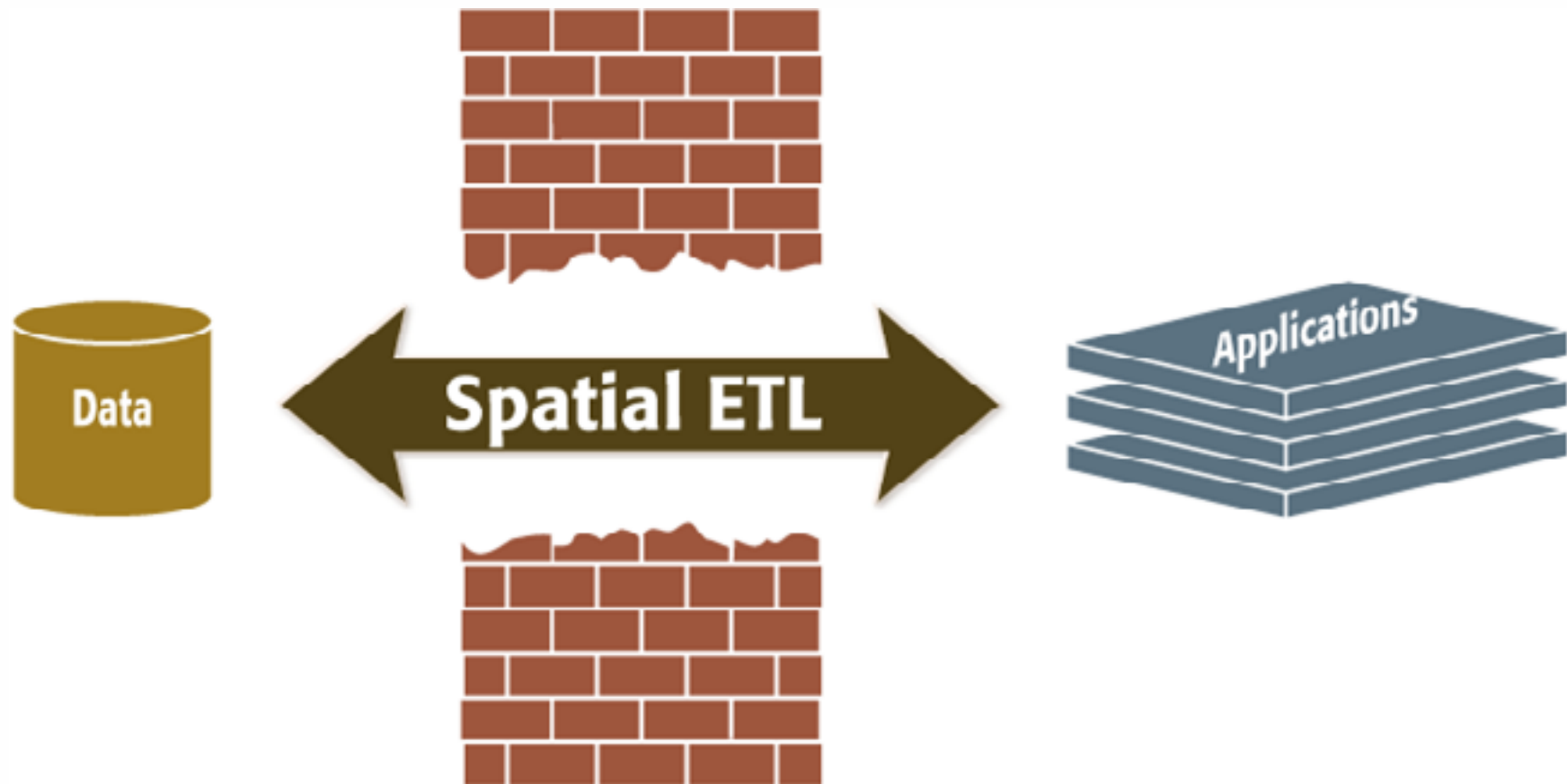
- **Introduction**
- **Case Study #1: Data clearing house**
  - Arkansas- GeoSTOR
- **Case Study #2: Data Harmonization**
  - North Central Region Data Repository
- **Case Study #3: Emergency Response**
  - Indiana Department of Homeland Security
- **Case Study #4: CAD ⇔ GIS Integration**
  - Ohio Department of Transportation
- **Summary**



# Common Theme

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- Spatial ETL used to break barrier between data, applications, and users

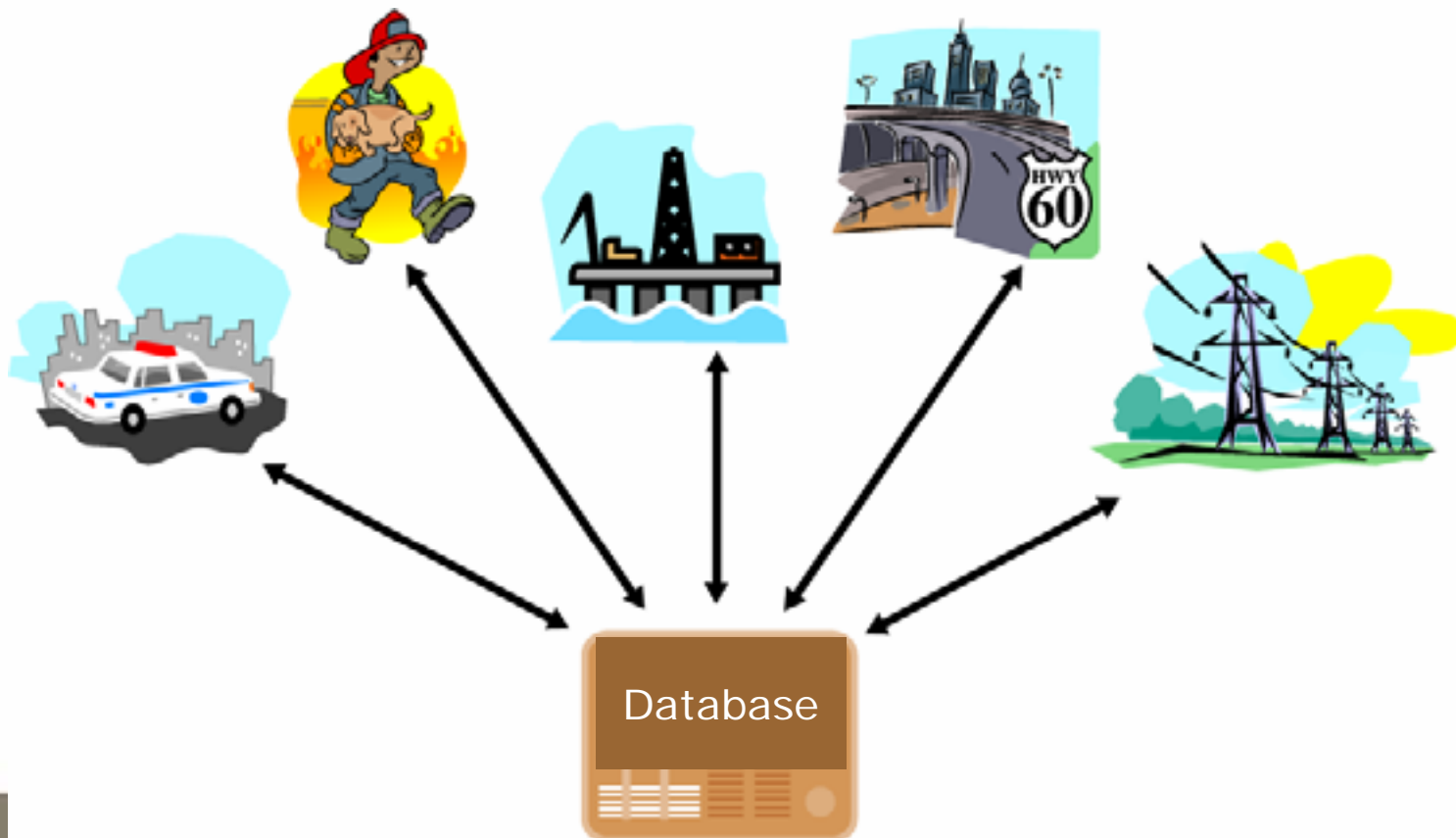


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# Common Theme

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- Different users have and want different things!





# Common Theme

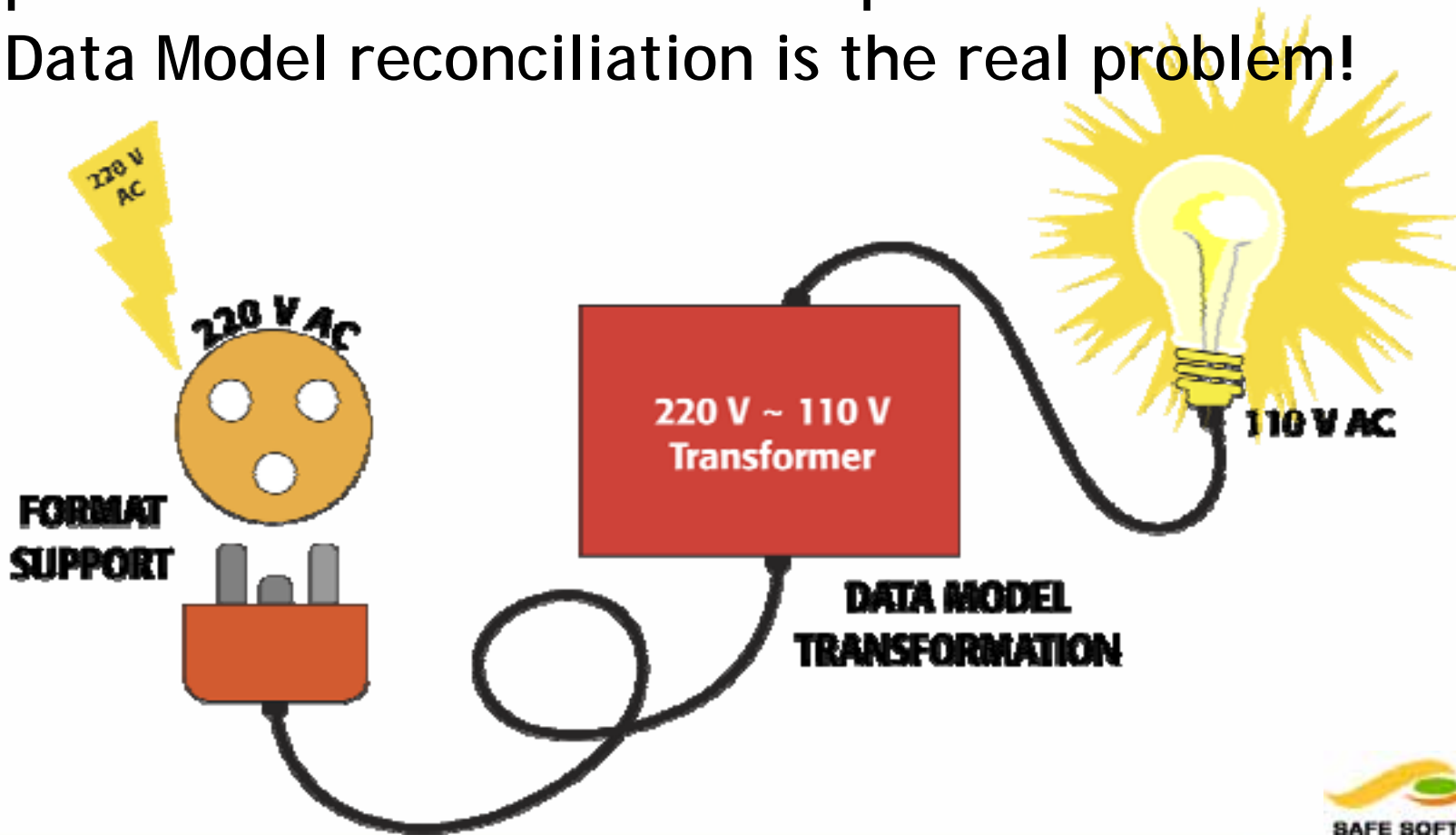
[www.safe.com](http://www.safe.com)

- **Different Systems = different data model**
- **Different organizations = different data model**
- **Different problem focus = different data model**

# Data Model is King

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





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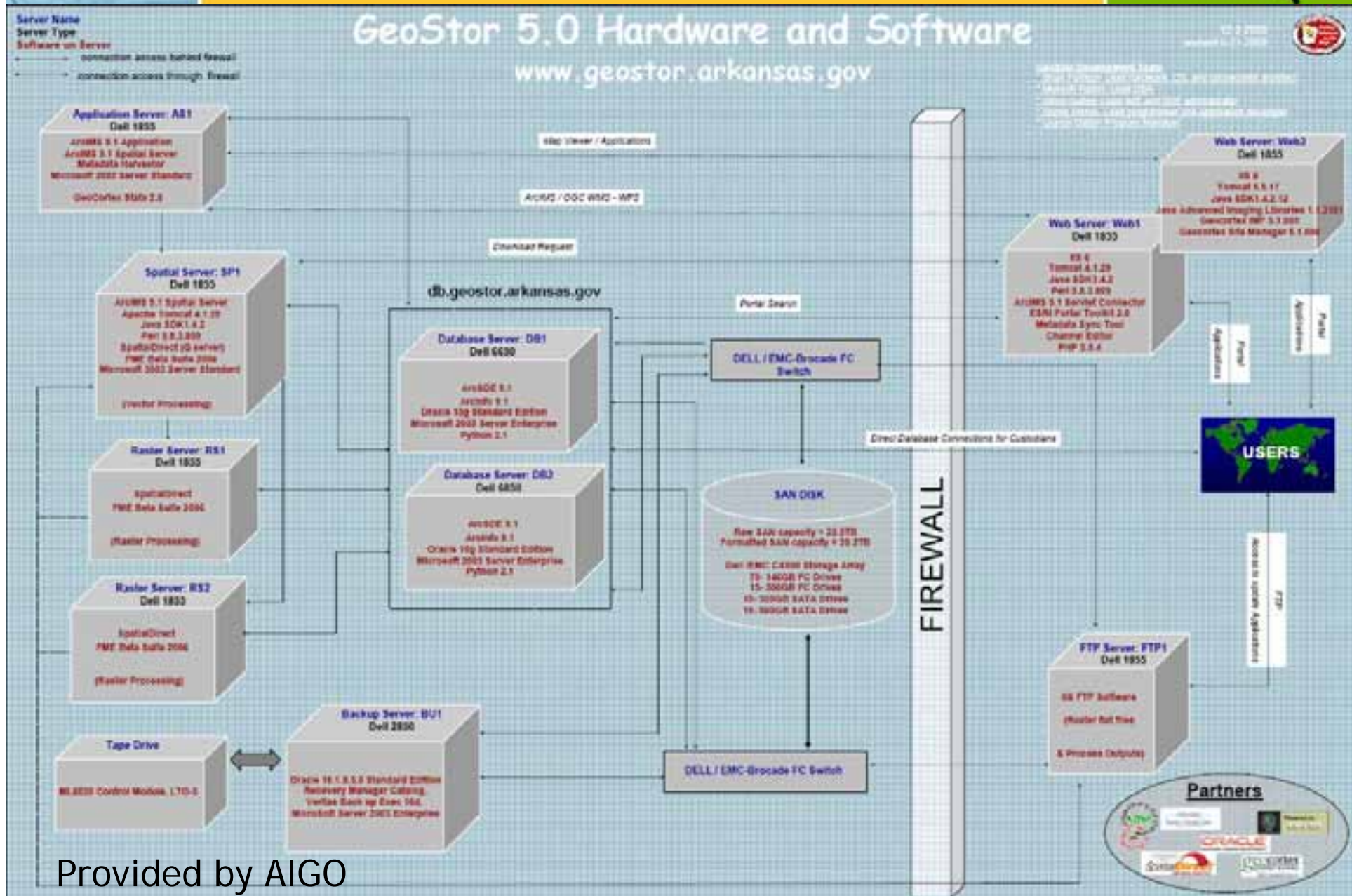
# Challenge

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

# GeoSTOR

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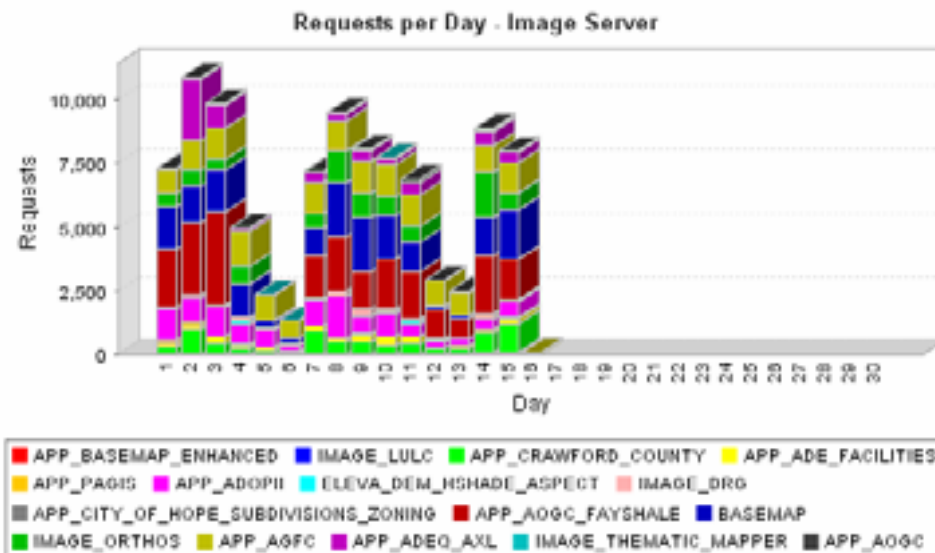




# Benefits

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





# Overview

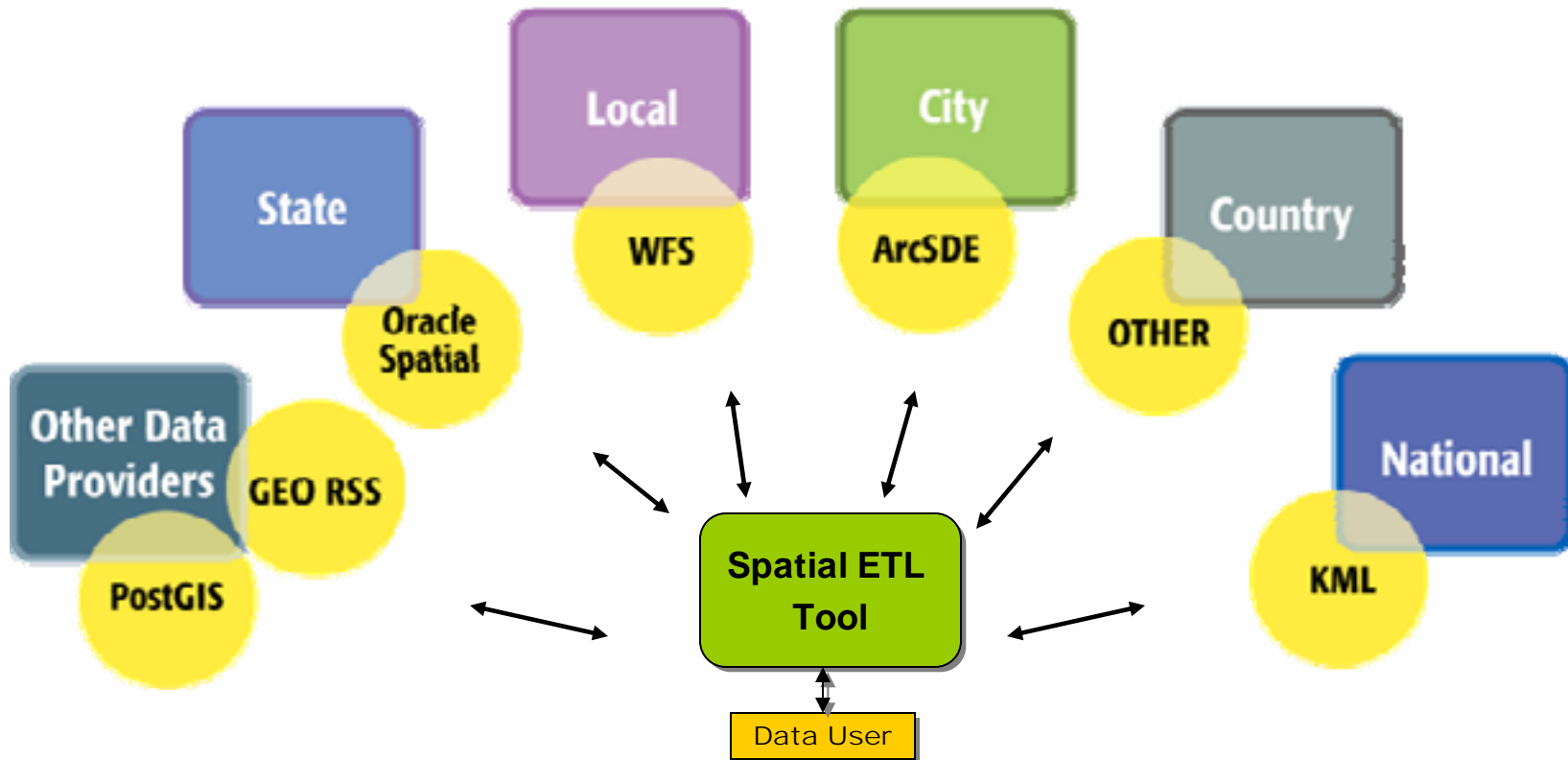
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# Challenge

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## Different systems and data models

# Challenge Data Harmonization

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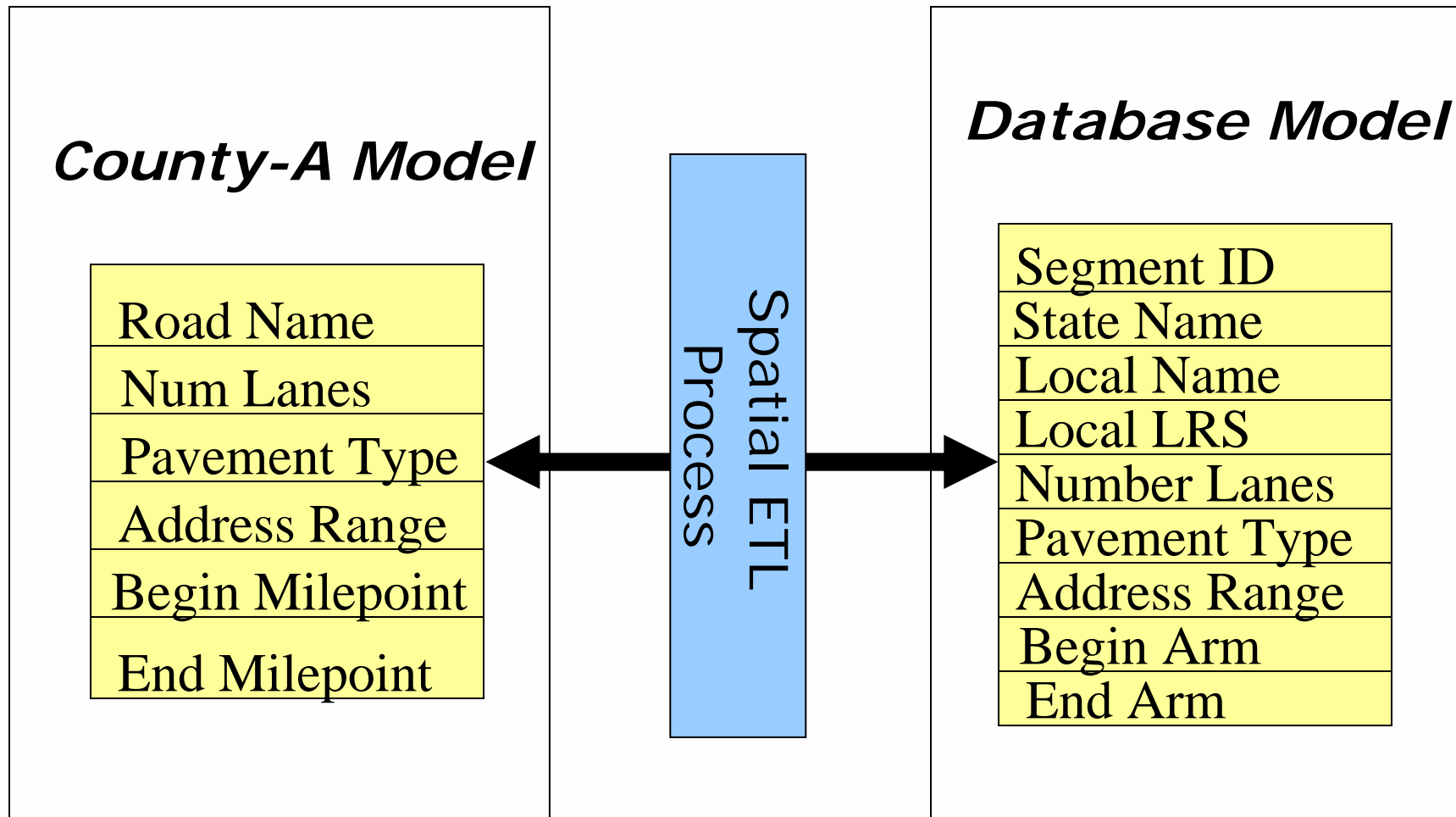
Schema Mapping

Schema Mapping

Database

# Schema Mapping Concept

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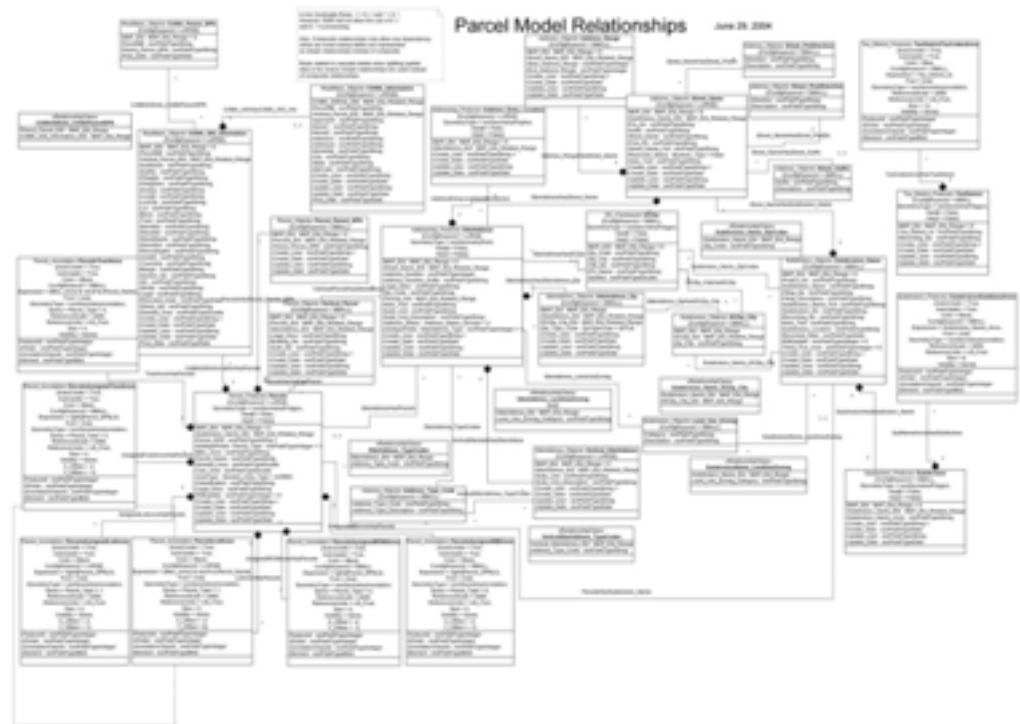


# Collecting Information

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

PGDB  
Coverages  
Shapefiles



Source: Arapahoe County

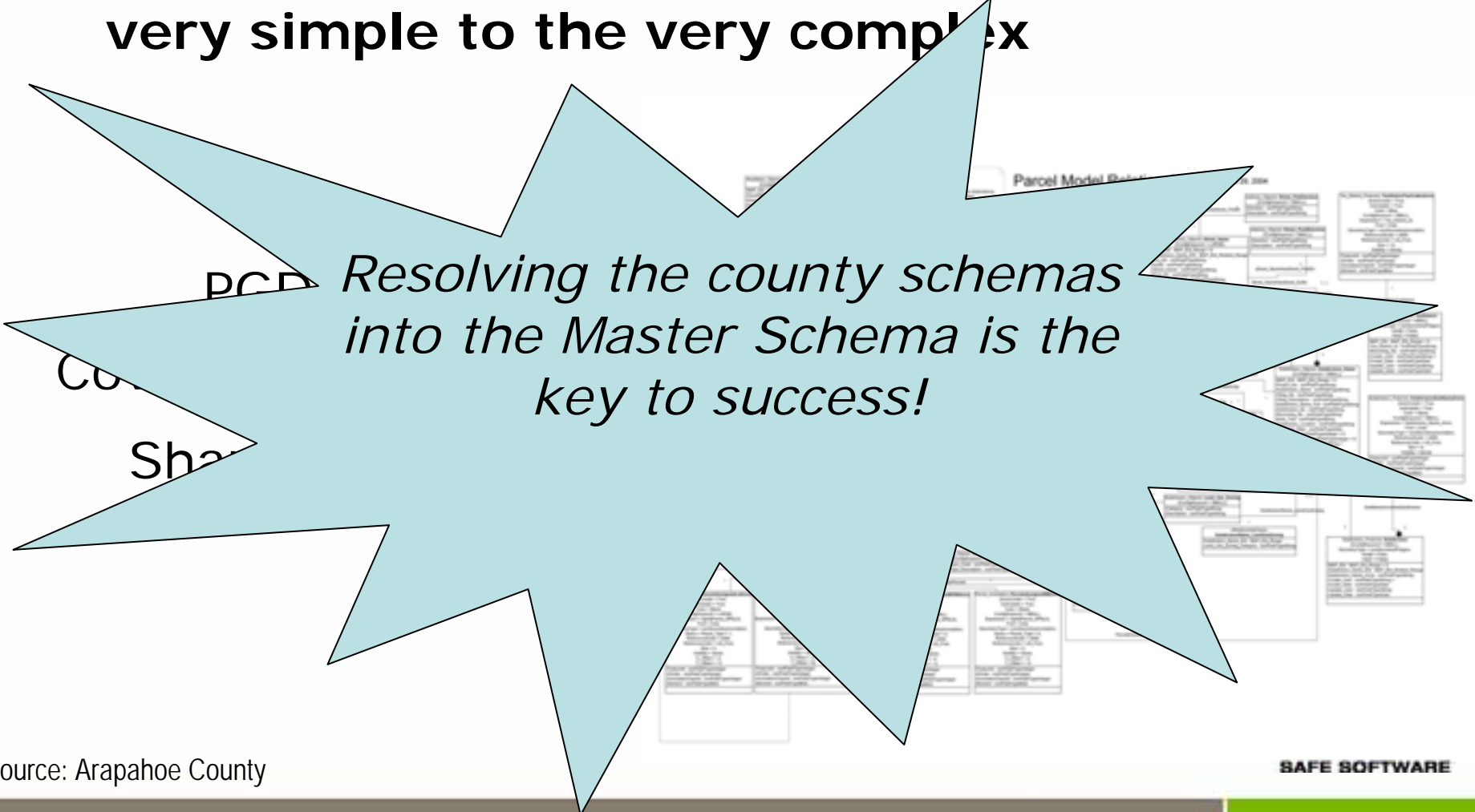
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Presentation Title 16

# Collecting Information

[www.safe.com](http://www.safe.com)

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



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

Source: Arapahoe County

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Presentation Title 17

# Database Schema

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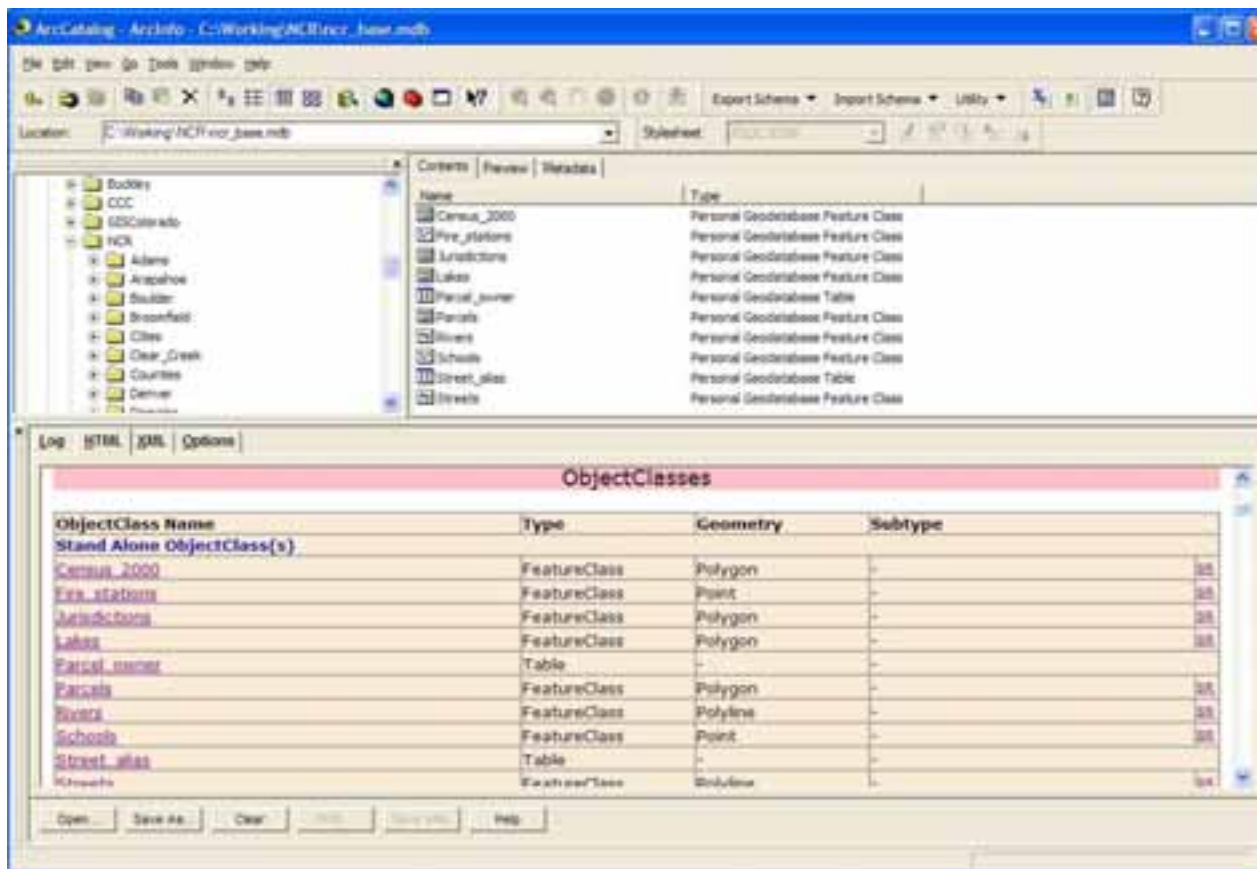
- **Prototype application with 8 spatial data layers**
  - Roads
  - Parcels
  - Census Blocks
  - Municipalities
  - Lakes
  - Streams
  - Fire stations
  - Schools

Plus two non-spatial layers to support one-to-many relationships

# Collecting Information

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- NCR data schema developed to house translated data sets



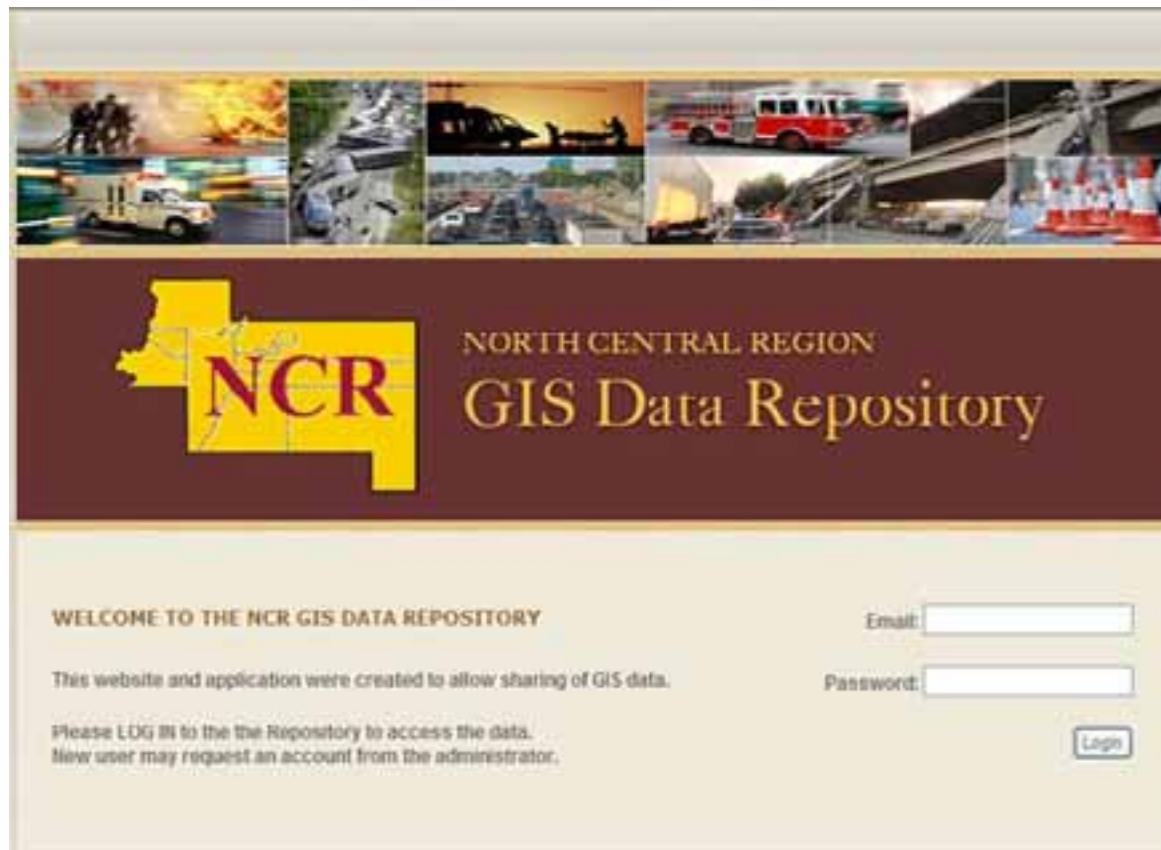
Feature classes, attributes, and domains need to be mapped and translated



# Application Design

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- ArcSDE/Enterprise Geodatabase
- Password-protected web application



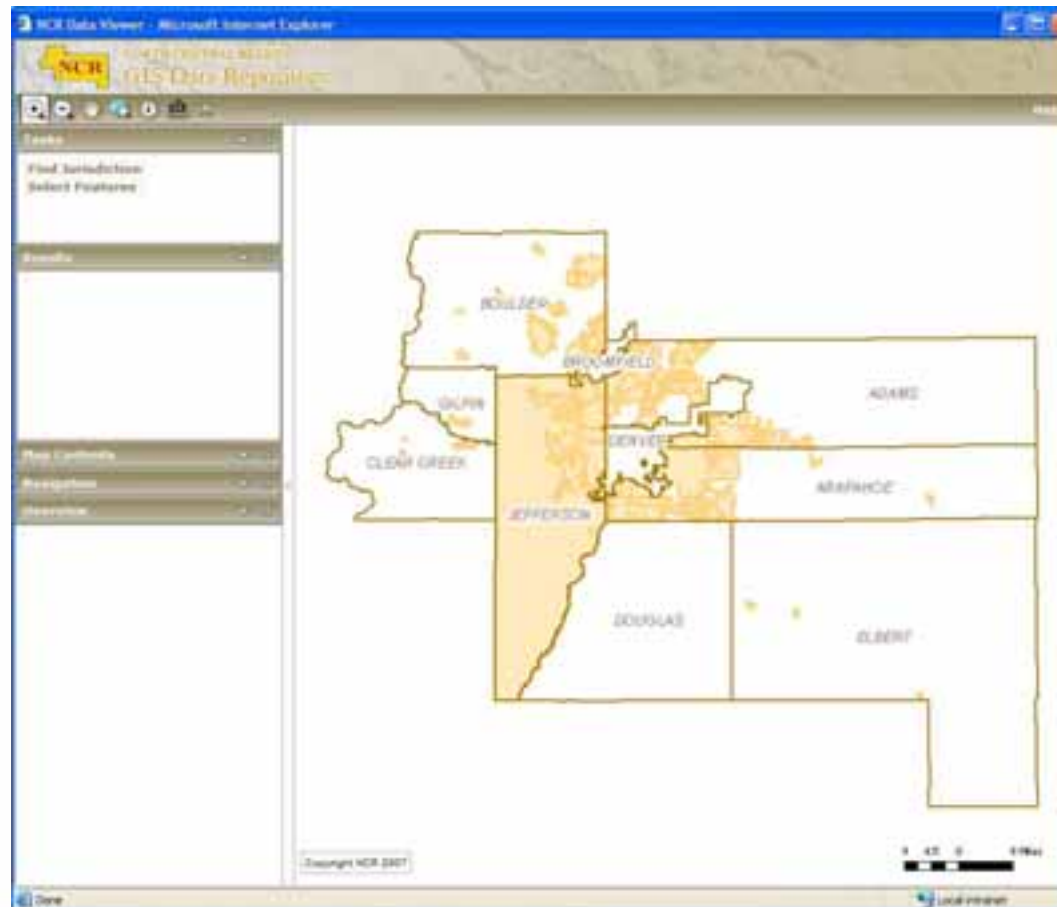
The screenshot shows the login page for the NCR GIS Data Repository. At the top, there is a horizontal strip of six small images depicting various emergency services: a fire truck, a police car, a helicopter, a fire engine, a construction site, and a traffic accident. Below this strip is a dark brown banner with a yellow map of the North Central Region (NCR) on the left, featuring the letters 'NCR' in red. To the right of the map, the text 'NORTH CENTRAL REGION' is written in a small, gold, serif font, and 'GIS Data Repository' is written in a larger, gold, serif font. Below the banner, the page has a light beige background. On the left, the text 'WELCOME TO THE NCR GIS DATA REPOSITORY' is displayed in a small, dark font. Below this, a paragraph states: 'This website and application were created to allow sharing of GIS data. Please LOG IN to the the Repository to access the data. New user may request an account from the administrator.' On the right side, there are two input fields: 'Email:' followed by a text box, and 'Password:' followed by a text box. Below the password field is a small button labeled 'Login'.



# Application Design

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- ESRI ArcGIS Server web-based mapping application



# Data Upload

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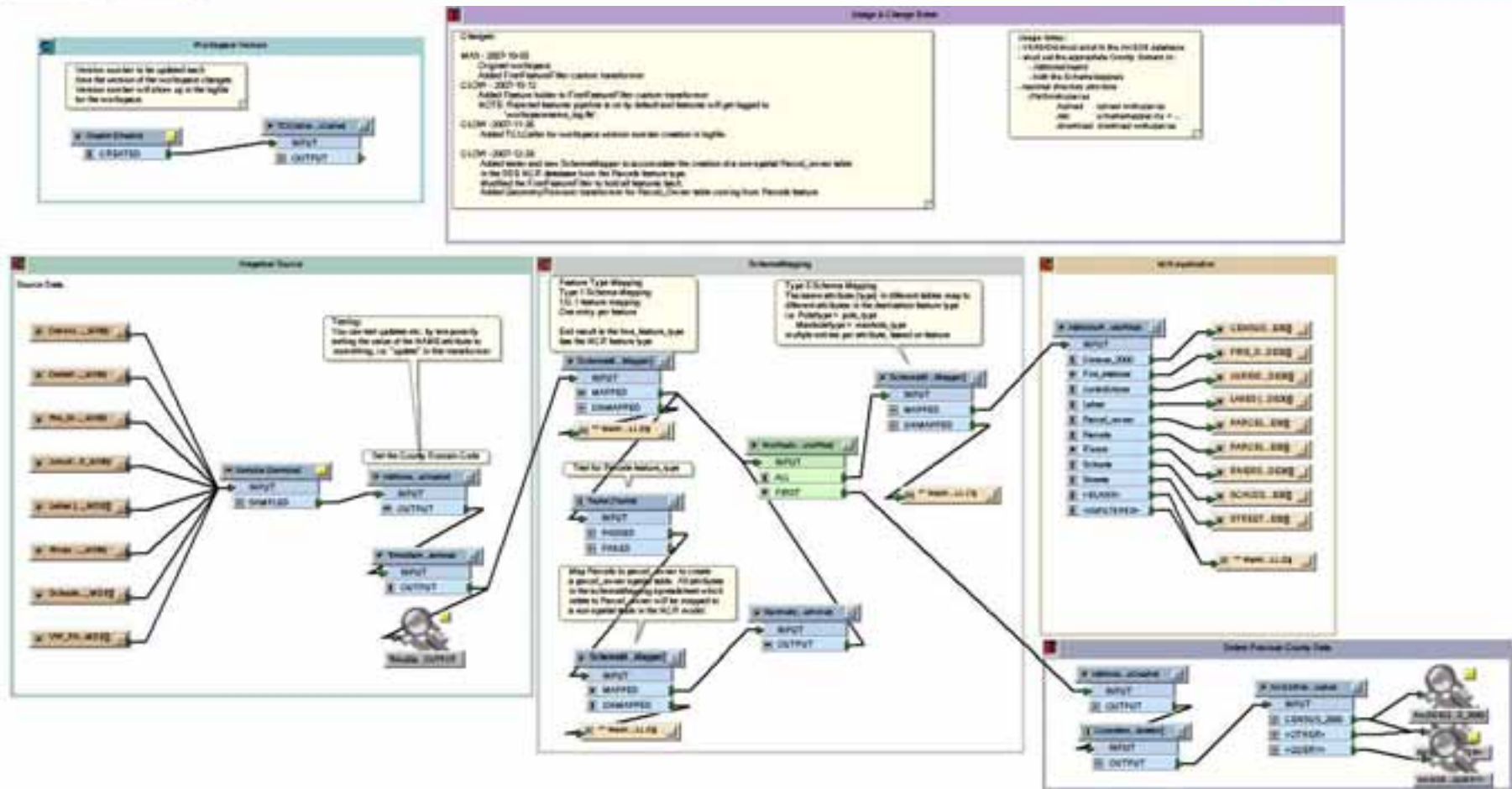


The screenshot displays the 'NORTH CENTRAL REGION GIS Data Repository' website. The header includes the NCR logo and a 'Contact Us | Help' link. A left sidebar contains navigation links: 'NCR News', 'Map Viewer', 'Upload Data', 'Download Data', 'Spatial Direct Administration', and 'Site Administration'. The main content area features a banner with six images of emergency vehicles and scenes. Below the banner, the 'Data Upload' section contains the text 'Upload local file for processing:', a file selection input field with an 'Browse...' button, and a 'Submit' button. At the bottom of this section is a link that says 'Get Last Data Upload Date'.



# Data Upload

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*Data model changed as part of upload process.*

# Data Download

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NCR - GIS Data Repository - Microsoft Internet Explorer

http://gamma.portal2.com/Download.asp?UserID=8888

**NCR** NORTH CAROLINA REGISTER  
GIS Data Repository

Home News Map Viewer Upload Data Download Data Spatial Index Administration Site Administration

**Data Download**

☒ Point  
X-Coordinate:   
Y-Coordinate:   
Radius (ft):   
Define on Map

☐ Event  
Lower Left X-Value:   
Lower Left Y-Value:   
Upper Right X-Value:   
Upper Right Y-Value:   
Define on Map

☐ City  
Choose City:

☐ County  
Choose County:

Choose Layers:

Coordinate System:  UTM, NAD 83, Zone 13 North

Data Schema:  Arapahoe County

Email:

Remote Fetch URL:  Submit

See Last Data Upload Date

Coordinate System: UTM, NAD 83, Zone 13 North

Data Schema: Arapahoe County

Email:



# Data Download

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- **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

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- **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

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- **Integrate multiple county's data**
- **Provide data to first responders for situational awareness**
- **Easily expandable architecture**

# Solution Concept

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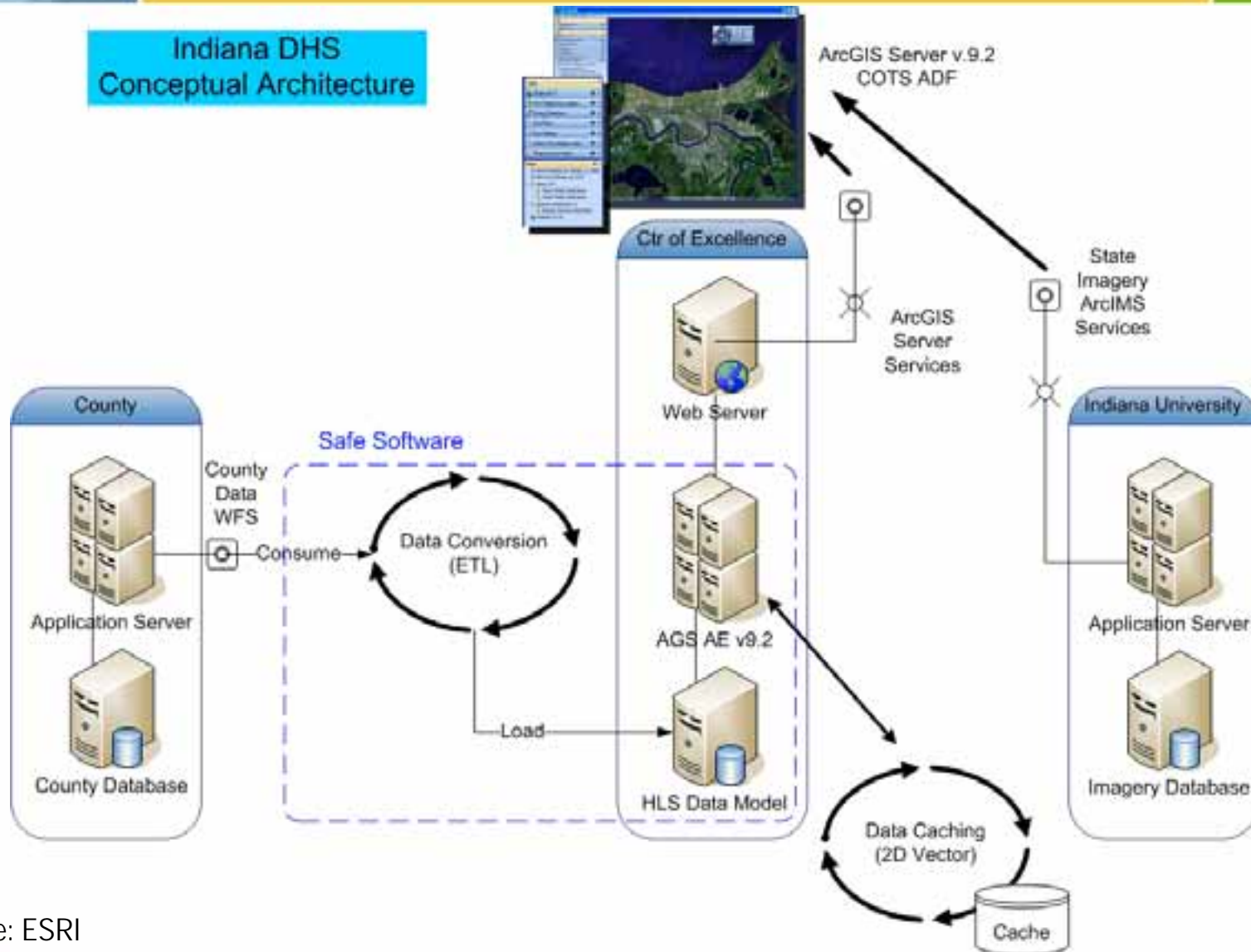
- Each county produces a WFS feed
- WFS data loader to Derive a consistent of Home Sec Model
- Resolving the county schemas into the Master Schema is the key to success!
- need



# Architecture

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## Indiana DHS Conceptual Architecture



Source: ESRI





# Benefits

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- **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

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

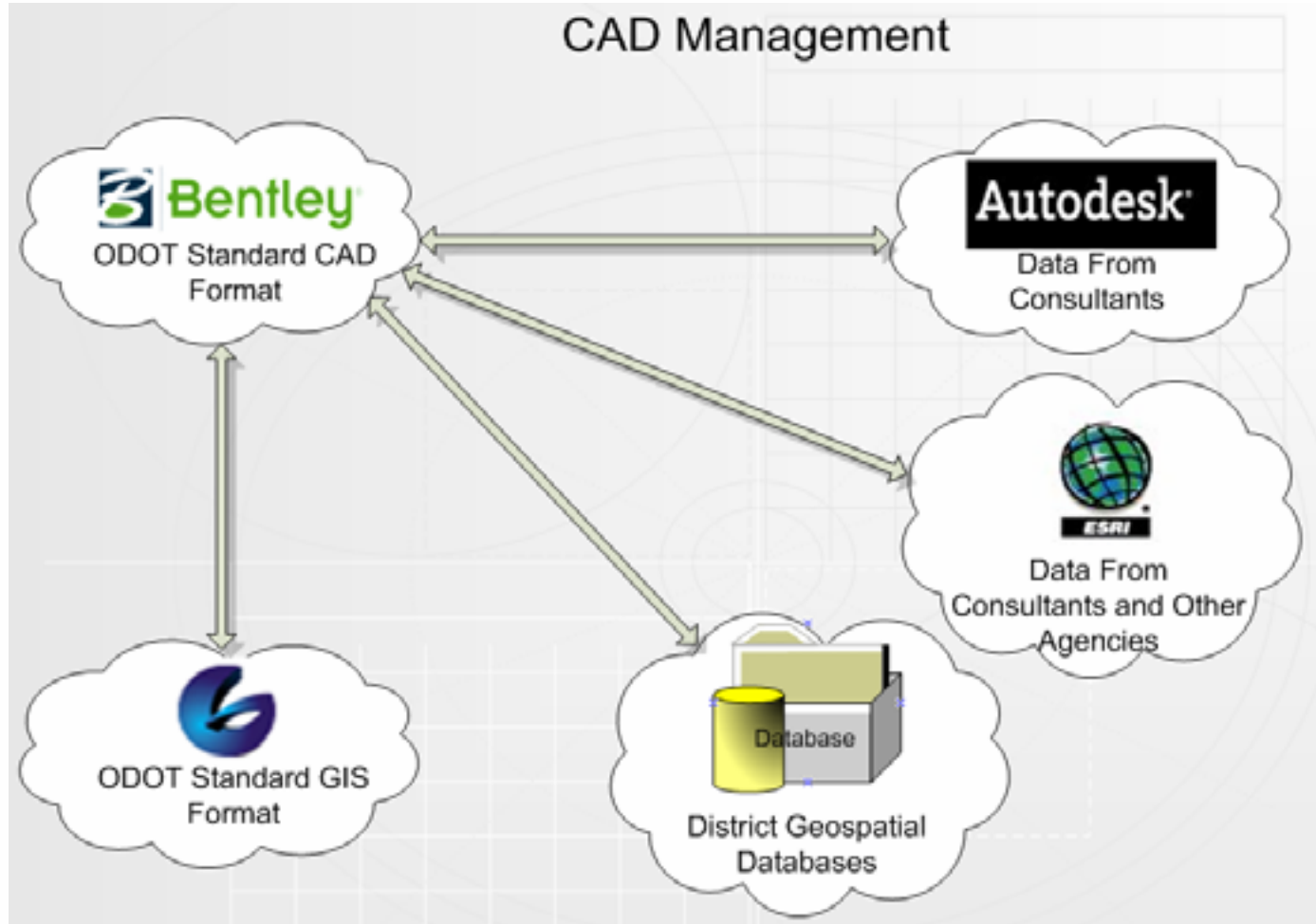
# Ohio District 2

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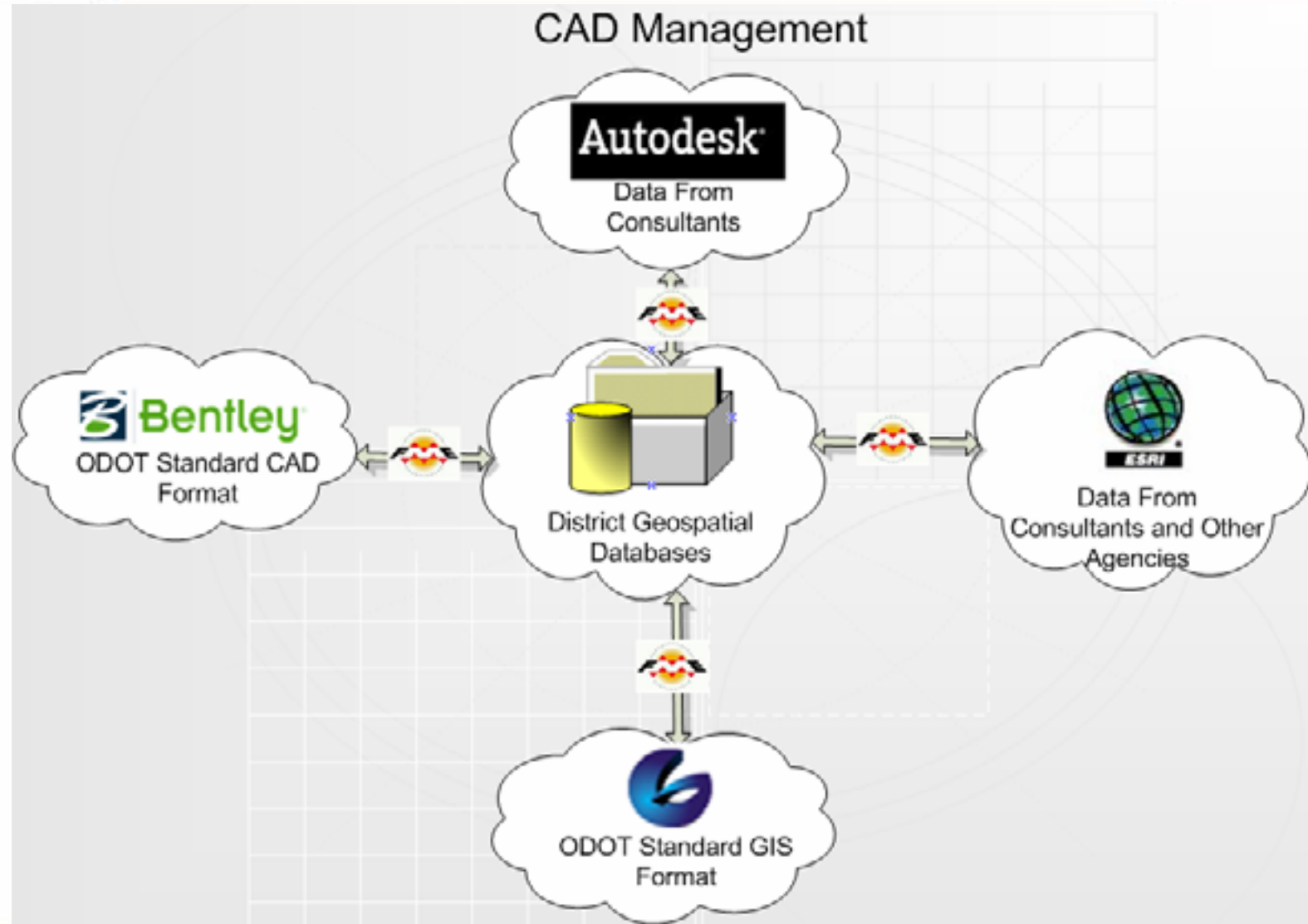
# CAD Management

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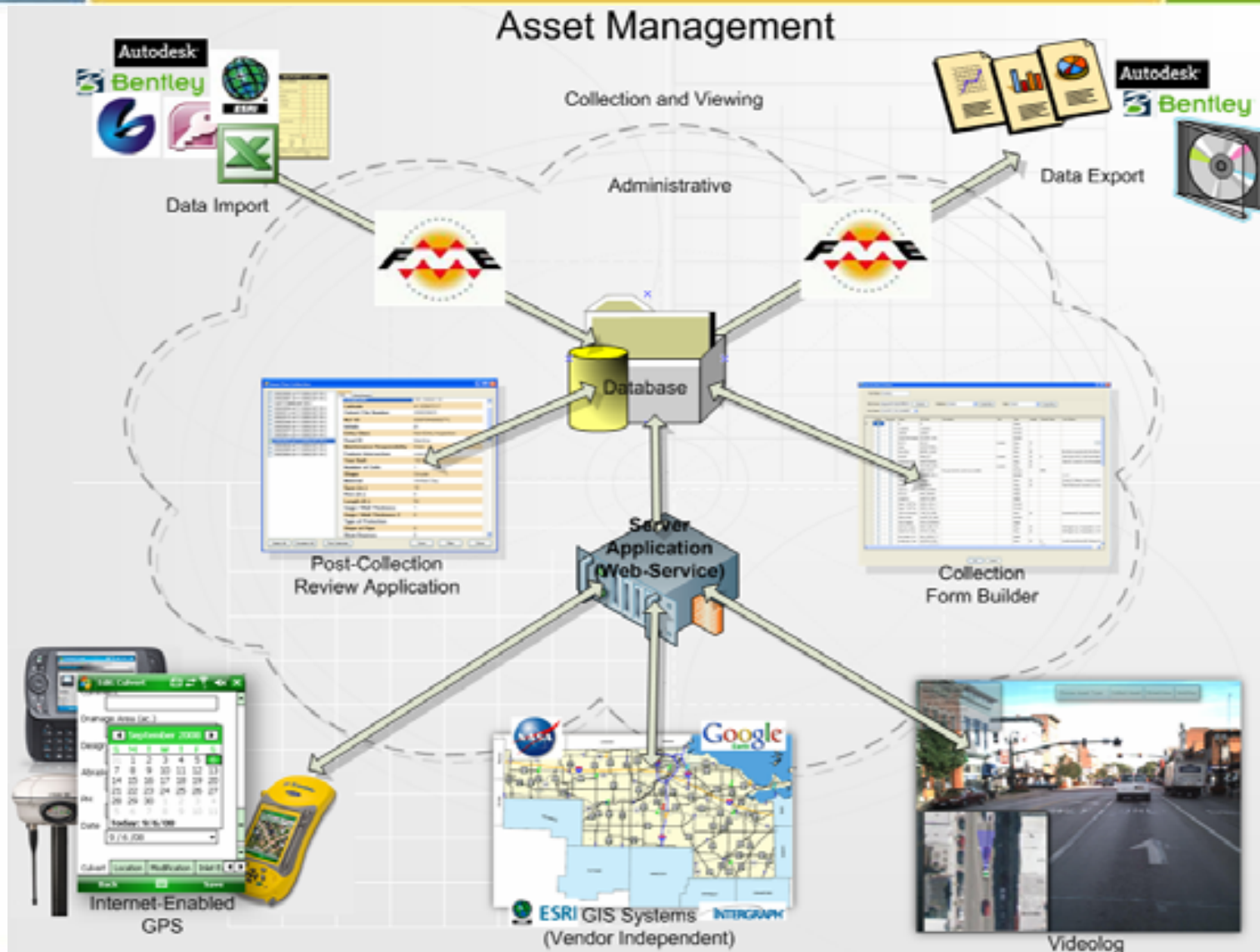
# CAD Unification

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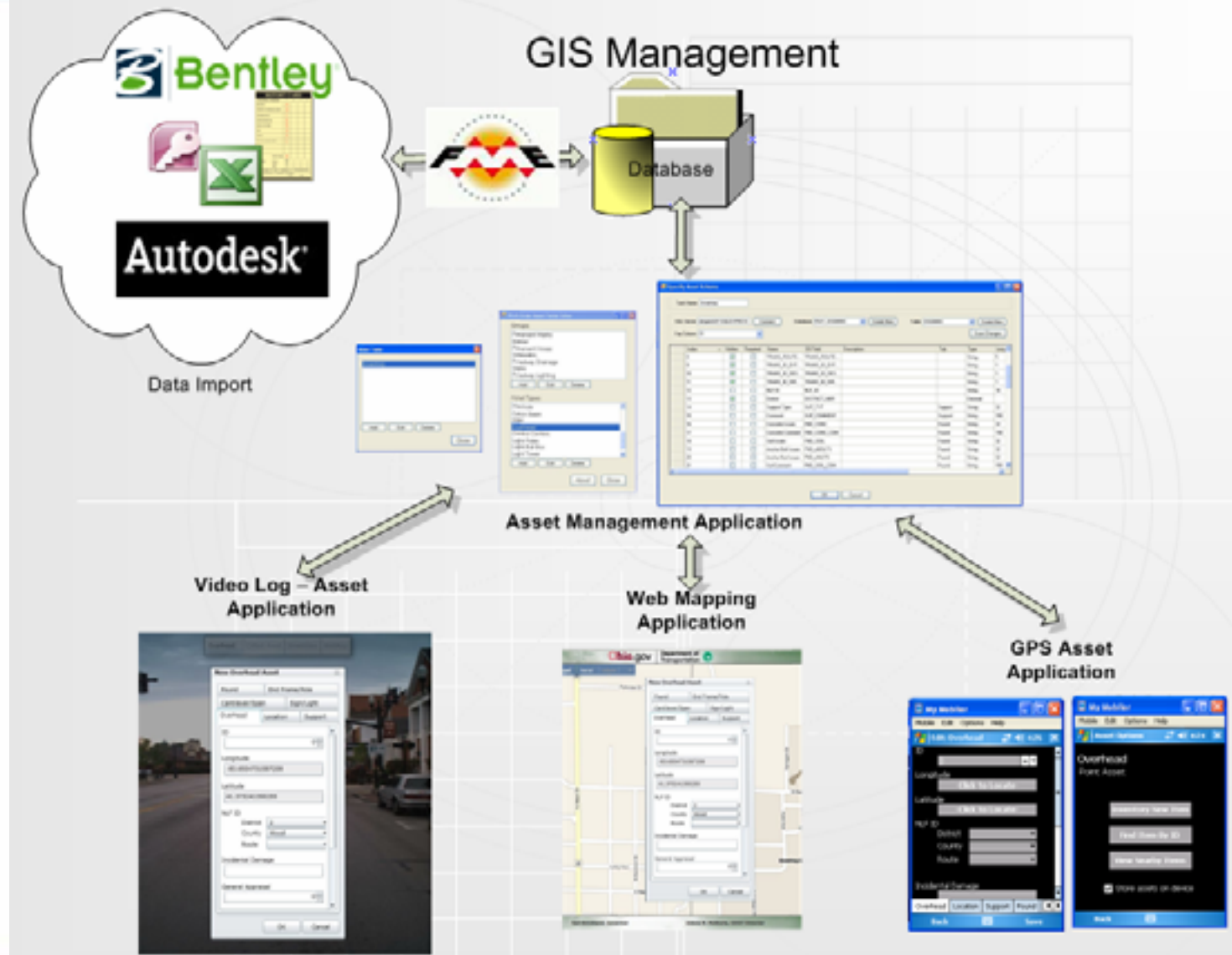
# Asset Management

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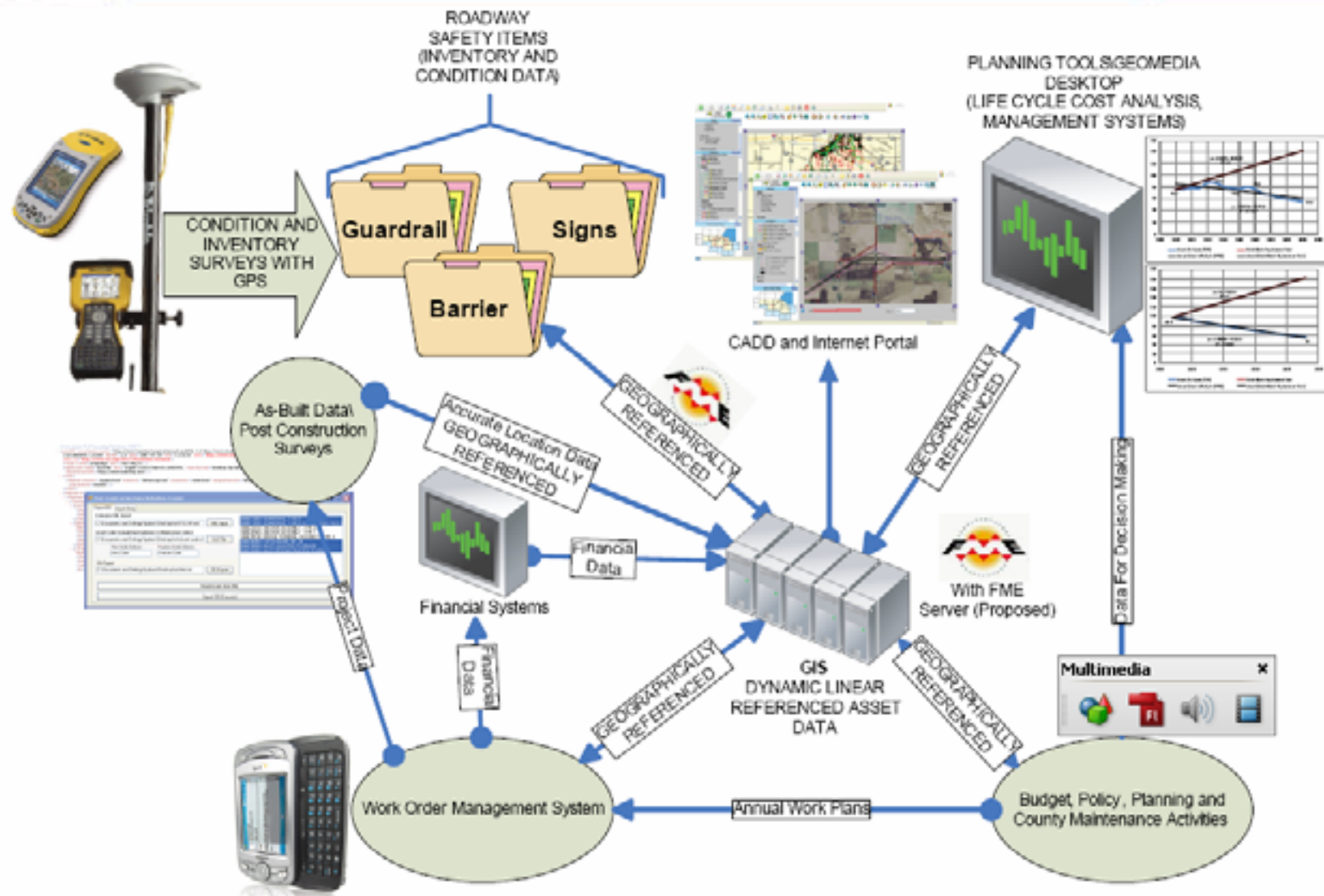
# GIS Management

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# Future Projects

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# Benefits

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- 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

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- **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.





# Summary

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To learn more, please contact me at

[Don.Murray@safe.com](mailto:Don.Murray@safe.com)

Thank you!

