Esri International User Conference | San Diego, CA

Technical Workshops | July 12 & 14, 2011

An Introduction to Data Interoperability

Bruce Harold - Esri

Dale Lutz – Safe Software

Background

Why Data Interoperability?

What is the Data Interoperability Extension?

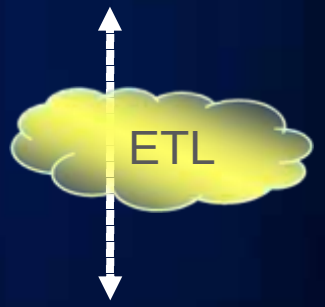
ESRI & SAFE Co-Development based on FME

- **Format Support**
  - Adds support for 110+ data formats
  - Custom Formats
  - Direct use in ArcGIS Desktop
- **Quick Data Translation**
  - Data Interoperability Tools Toolbox
  - Convert between data formats
- **Spatial ETL (Extract, Transform, Load)**
  - Semantic Data Translation
  - Data Restructuring

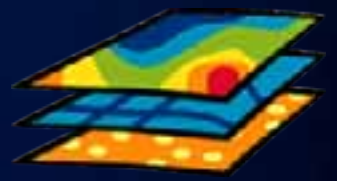
ArcGIS 10.0 Data Interop Strengths

- **Solves the complete range of data interoperability challenges**

- **Use and Share more than 100 spatial and non-spatial data formats!**

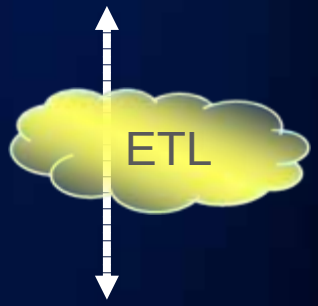


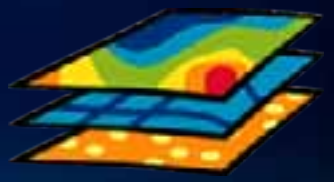
- **Supports many data types**
  - **Vector**
  - **3D including textures, BIM**
  - **Spatial and non-spatial Databases**
  - **CAD**
  - **Web and GeoWeb data sources**
  - **Text Files**
  - **XML, GML**
  - **LIDAR (@10.1)**



ArcGIS 10.0 Data Interop Common Tasks

- **Data Integration**
  - Bring multiple datasets together
- **Data Migration**
  - Process of moving data between systems
- **Data Cleanup / Data Manipulation**
  - Clean up errors in the data and streamline data preparation
- **Data Distribution**
  - Distribute data to different systems
- **Change Detection**
  - Determine changes between two different files
- **Data Validation**
  - Verify and validate *spatial* data
- **Manage Query Layers**
  - Spatial types in a DBMS without SDE





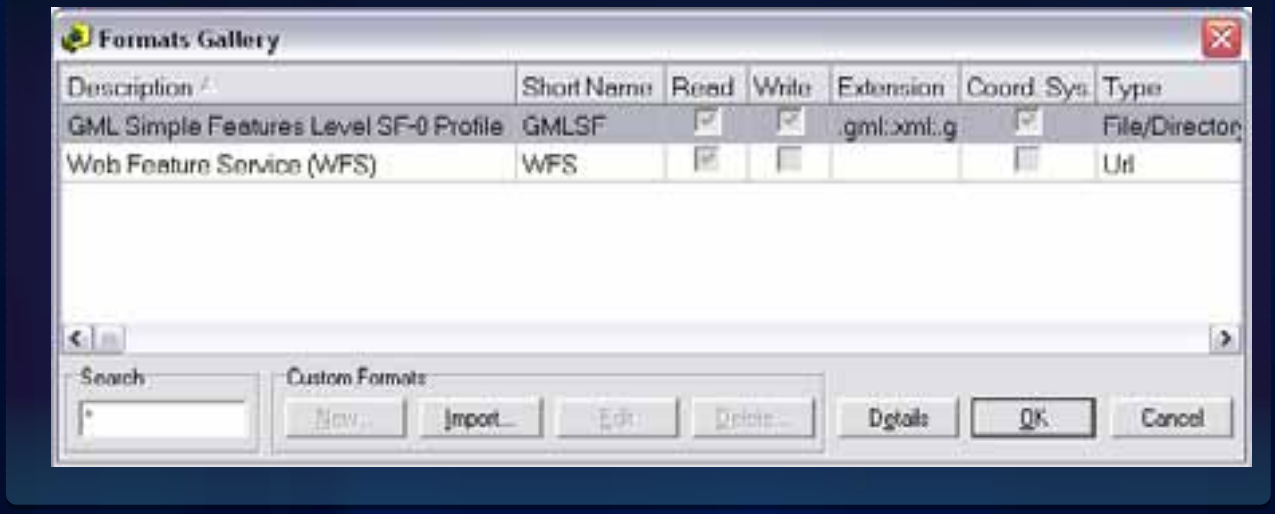
Free Stuff

What you get just by installing

OGC GML Simple Feature Format Support

Free support for GML-SF in ArcGIS Desktop

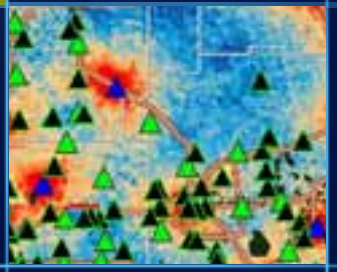
- **GML – simple features**
- **WFS – optionally non-cached for auto refresh**



NOTE: Installation of the Data Interoperability extension is required

Free Stuff Demo: GML & WFS

Bruce Harold



Demo Summary: GML & WFS

- Comes Free
  - But you have to install
  - Simple Features Only
- Better with the extension licensed
  - Non-simple parameters supported
- Direct Read of GML, consume WFS
- Important in many jurisdictions

Simple Stuff

Direct Read of any format

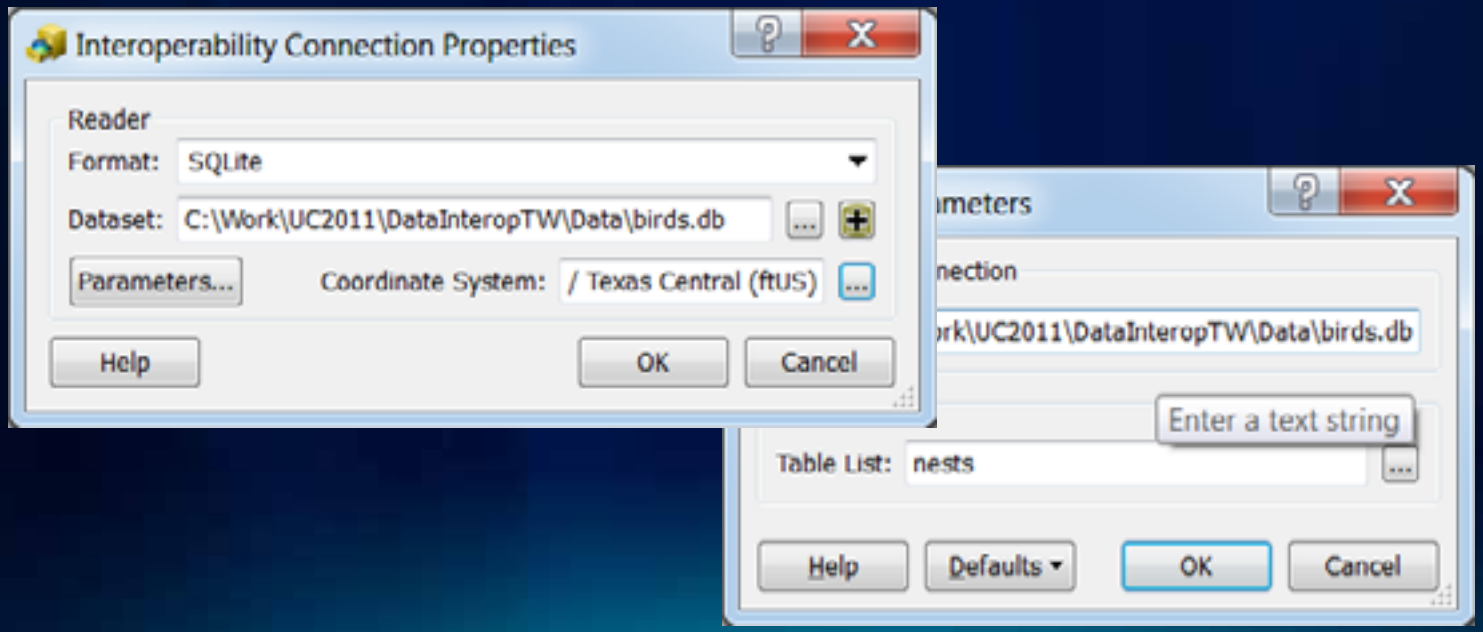
Direct Read of Formats

- Formats automatically recognized by Data Interop.
  - File-based, by extension, like .tab, .mid, .mif, .iff….
  - Visible in Catalog window browse tree
  - May be extended with Custom Formats
- Directly usable in ArcGIS
  - Save time converting data
  - ArcPy Feature Classes, Tables
- Consume 3rd party data
  - Mobile devices
  - Other application formats
  - Web feeds

When to Browse and when to Connect

Direct Read and Reader Parameters

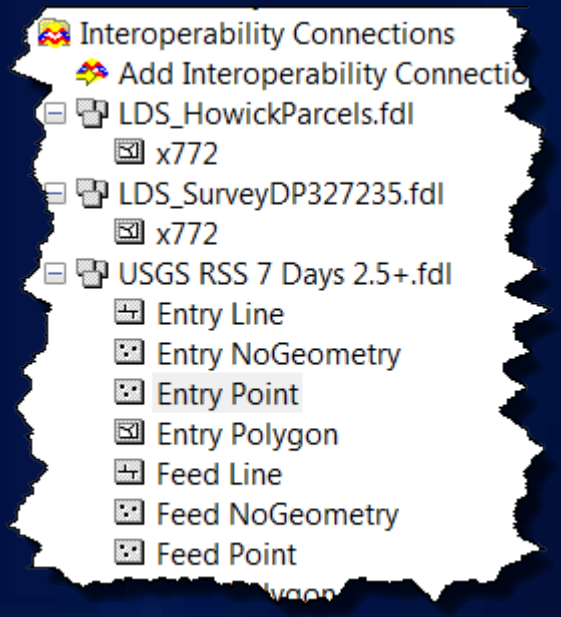
- Many formats have optional parameters
  - Select subsets, set conditions, passwords, filters…
- Create a DI connection to use parameters
- Create a DI connection to apply a default coordsys



Interoperability Connections

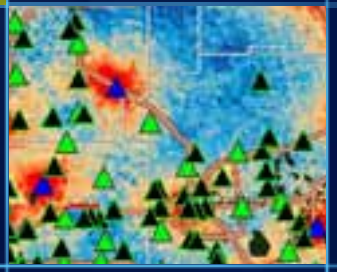
Persist in your application

- Convenient to access in browse tree
- Off-disk data
  - Web feeds
  - DBMS connections
- Share with colleagues
  - .fdl file created per conn.



Simple Stuff Demo: Direct Read

Bruce Harold



Demo Summary: Direct Read

- **Direct Read Summary**
  - **Directly read, inspect and browse within ArcGIS**
  - **Works like native ESRI formats**
  - **Access directly in ArcMap, Geoprocessing**
  - **No development or customization required**
    - **Just works!**

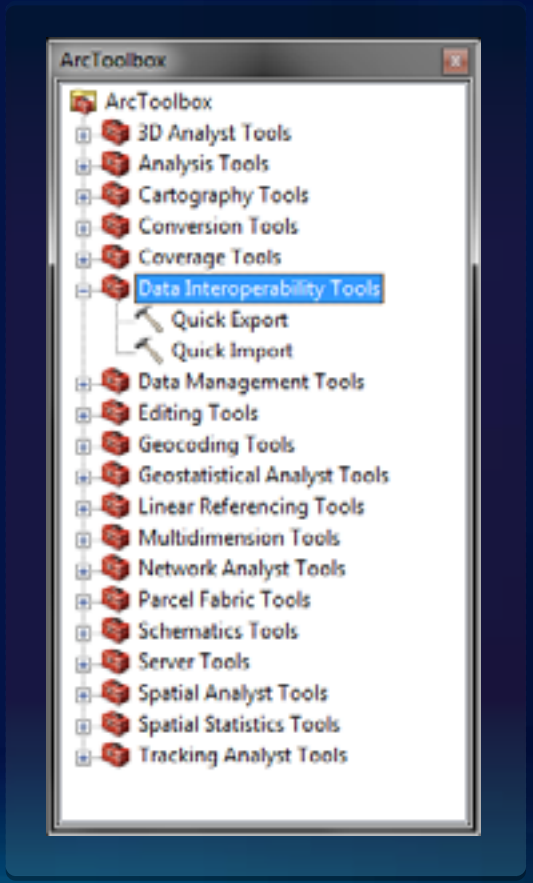
Quick Stuff

Quick Import & Quick Export GP Tools

Quick Data Import/Export

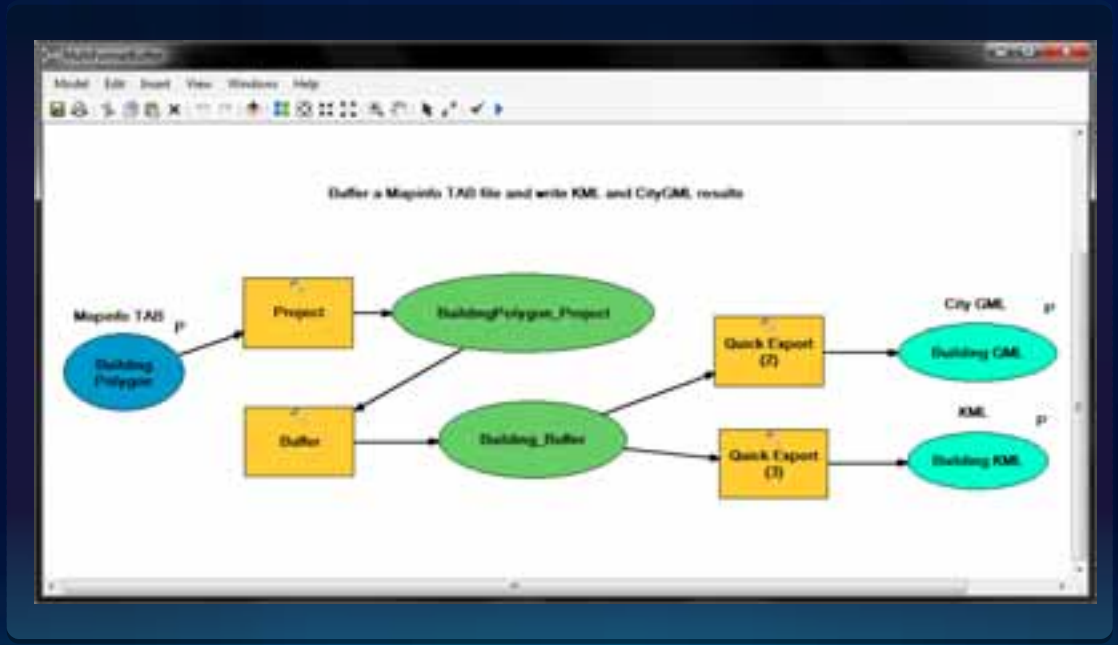
Extension provides Geoprocessing Tools:

- Quick Export
  - To Any Format
- Quick Import
  - To Staging Geodatabase



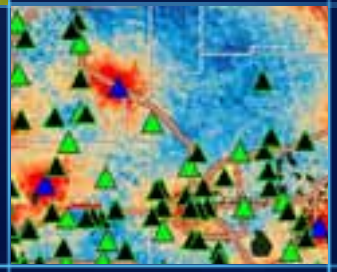
Automation and Quick Translations

- **Use Quick Tools in Modelbuilder**
  - Get any format into a temporary file GDB
  - (Some functions require GDB workspace data)
  - Handle Multiple Formats In/Out



Quick Stuff Demo: GP Tools

Bruce Harold



Demo Summary: Quick Import/Export

- Quick GP Tools
  - Useful in Modelbuilder
  - Also Scriptable in Python
  - Easy interaction with others
    - Departments
    - Contractors
    - 3rd party software users

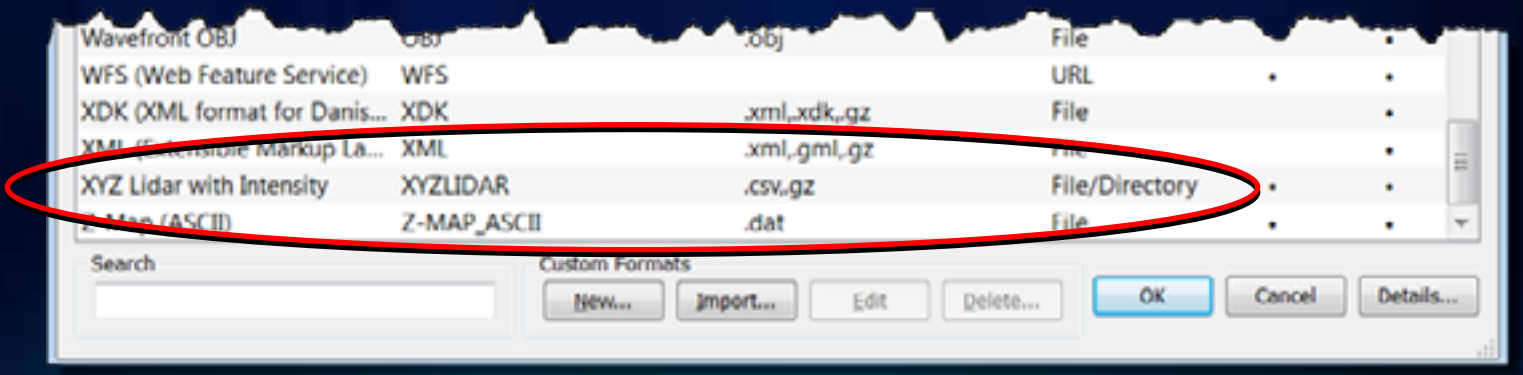
DIY Stuff

Custom Formats

What if you need your own format?

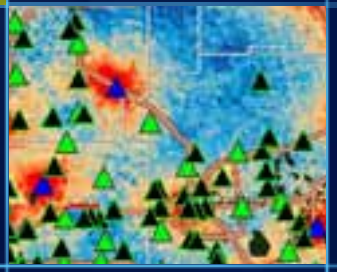
Save time by “canning” a custom format workflow

- Interpreting files as structured information
  - CSV
  - XML
- Build format recognition workflow once
- Re-use the persisted workflow any time
- Lets you develop a file format for sharing



DIY Stuff Demo: Custom Format

Bruce Harold



Demo Summary: Custom Formats

- Based on an existing format
- May be shared
  - .fds file in profile directory for each format
  - C:\Users\<user>\Documents\FME\Formats
- Editable later

Cool Stuff

Spatial ETL

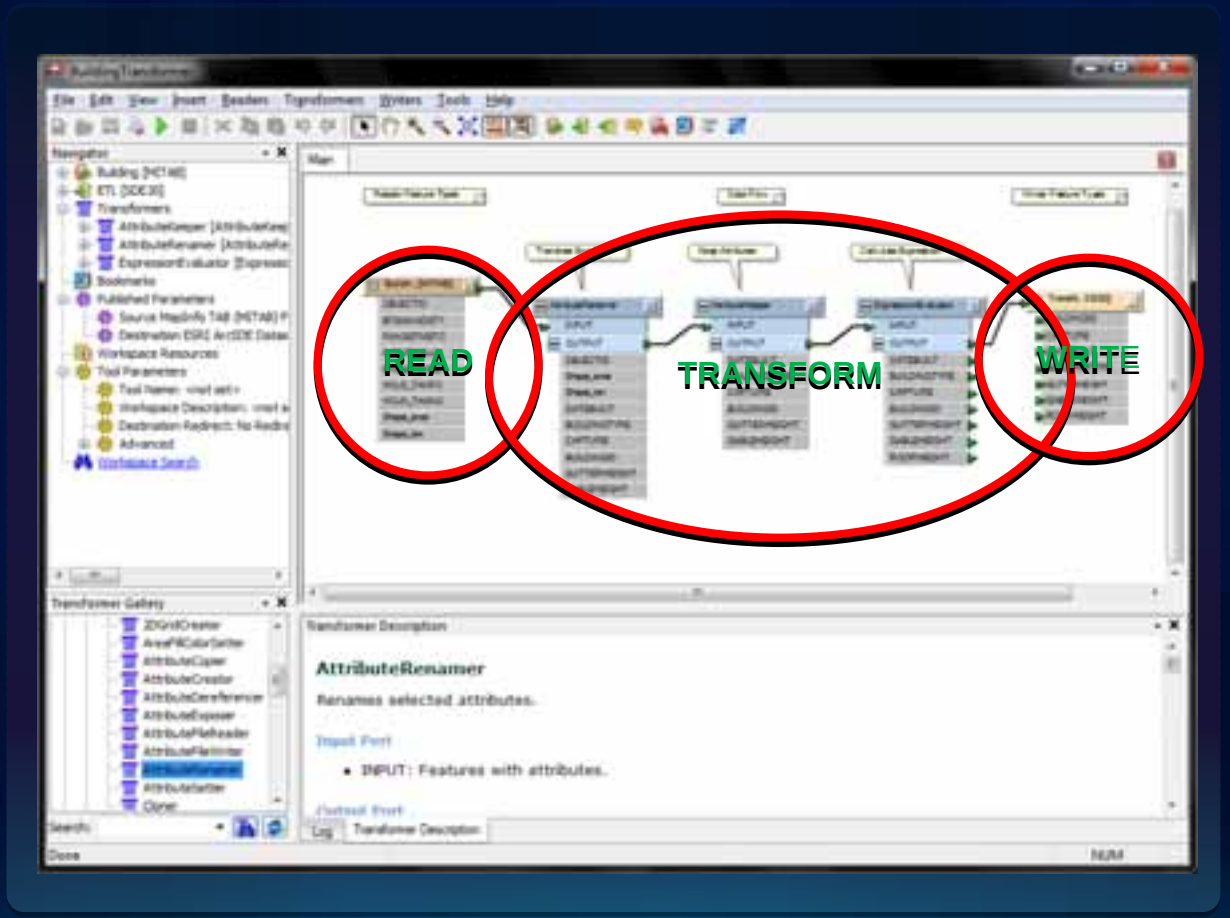
The Full Power of Spatial ETL

- Formats are only part of the story
- Often the format* does not change
  - But the schema does
- Transformation is key
  - Many categories of transformer
  - Feature by Feature or Dataset by Dataset
  - Geometry or Attribute transformations
- Many Inputs Many Outputs is OK

**like shapefile to shapefile*

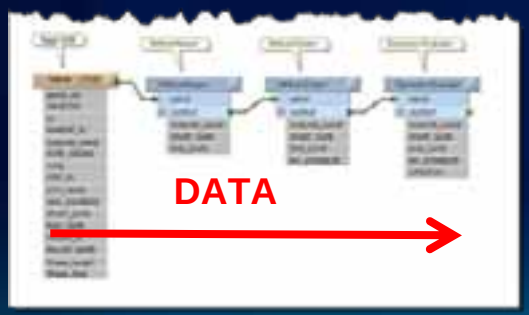
Workbench Application

Graphically Design Data Flows



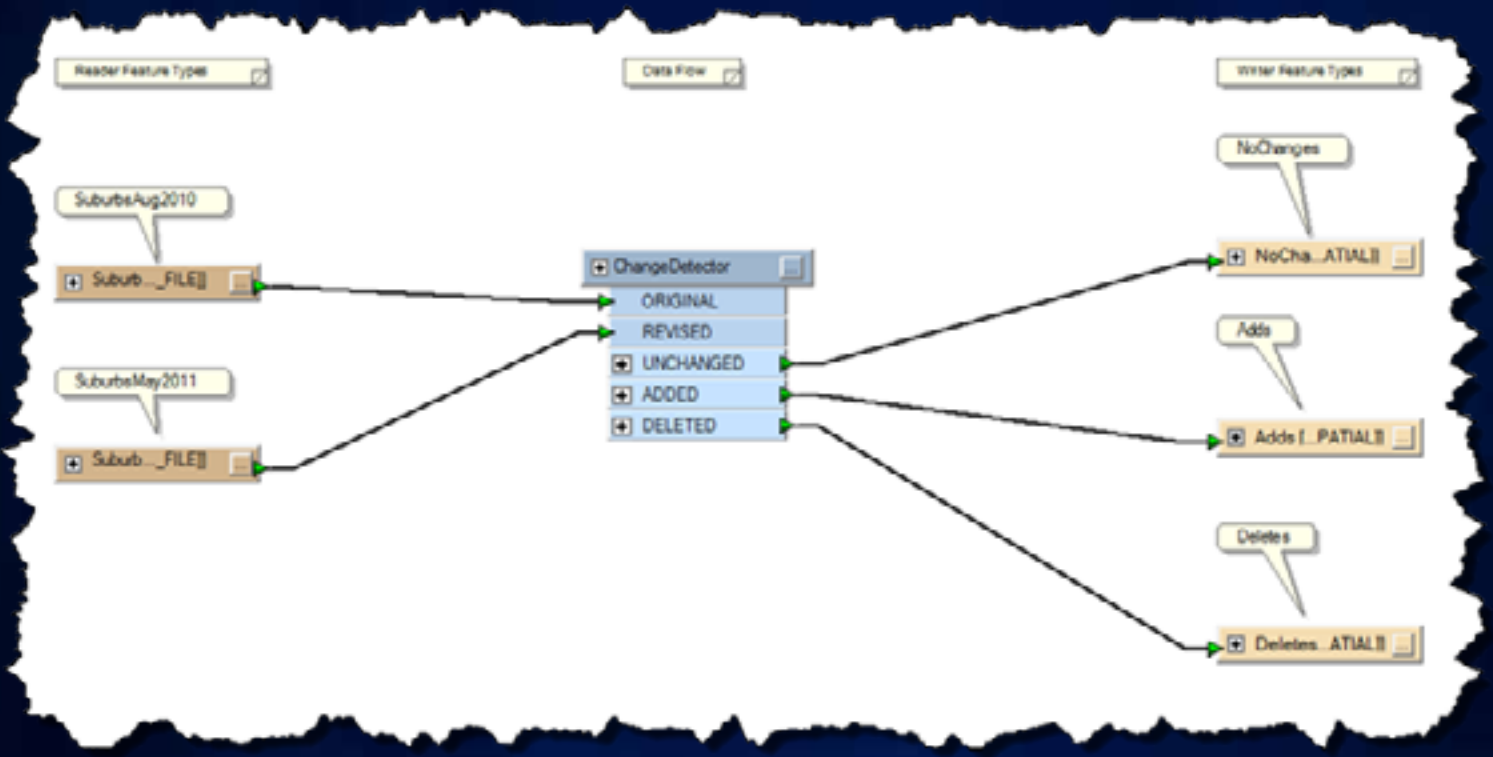
It’s a Pipeline

- Readers send features into the workspace
  - Geometry – X:Y:Z:M
  - Attributes – with a schema
- Transformers “do something’
  - May operate “per feature” and pass it immediately
  - May block if transformation requires a set of features
- Writers send features to the destination



Some Transformers Are All You Need

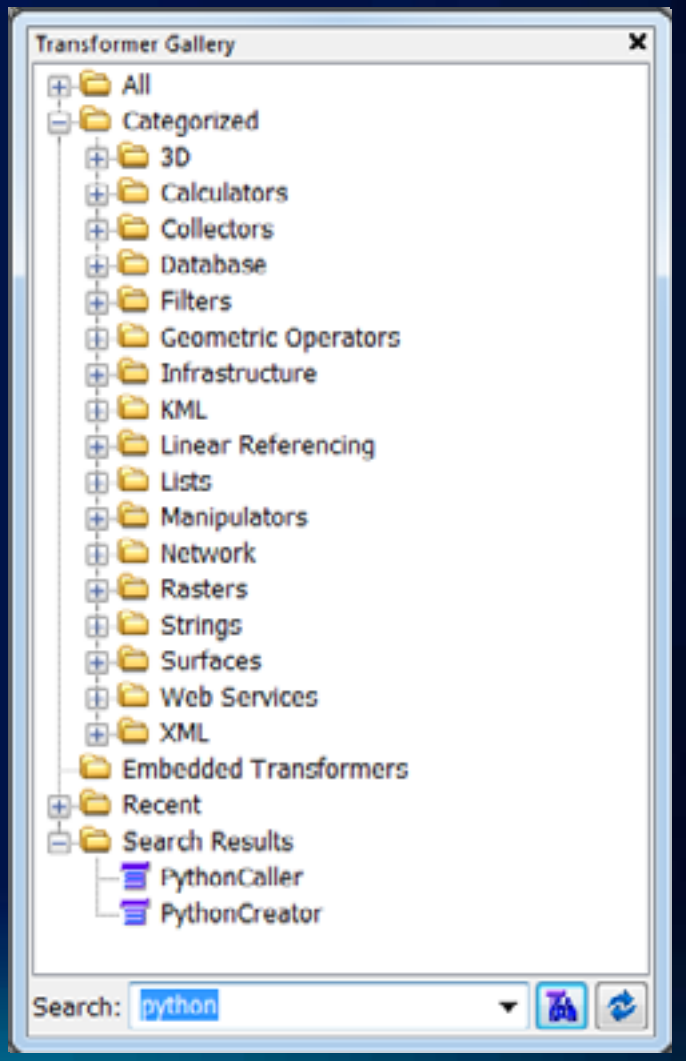
This example derives Adds, Deletes and NoChanges in one step



The Power of Transformation

Using Spatial ETL

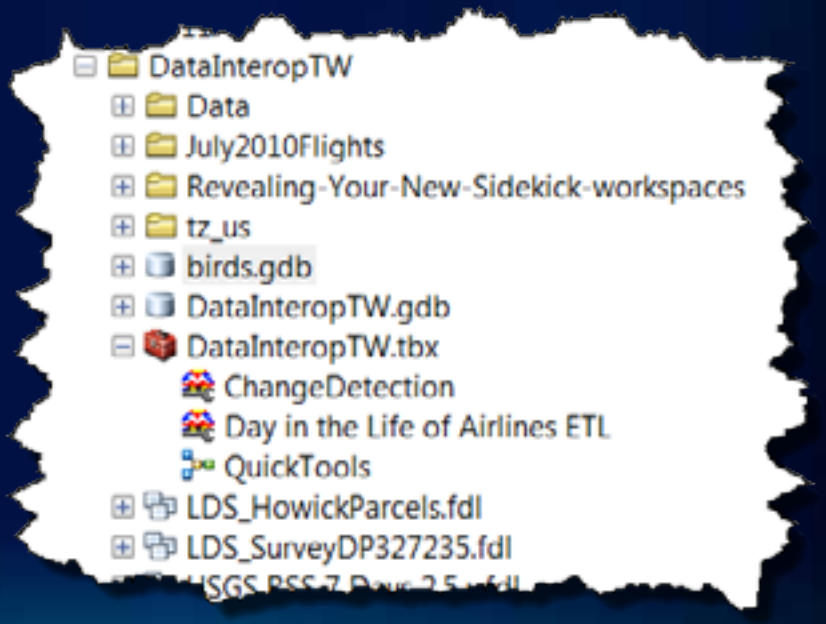
- 100’s of Transformers
  - Categorized
- Browse
- Search
- Popup in Workbench
- Navigate to in Workbench
- Don’t see what you need?
  - Ask for it!



Authoring Workbenches

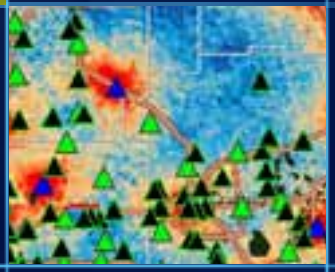
Readers, Transformers, Visualizers, Writers

- Add Spatial ETL tools into a ToolBox
  - Right Click context menu
- Wizard to stub out your Workbench
- Refine the workspace
- Publish Parameters
  - Inputs are automatic
- Run the workspace
  - In Workbench
  - As a GP Tool



Cool Stuff Demo: Full ETL

Bruce Harold



Demo Summary: Spatial ETL

- Complements core Geoprocessing
- Schema manipulation on the fly
- Analogous to Modelbuilder, except…
  - Feature by Feature granularity
  - Feature geometry manipulable
  - Understands web data

Wrapping Up

More on use cases…

A Word on XML

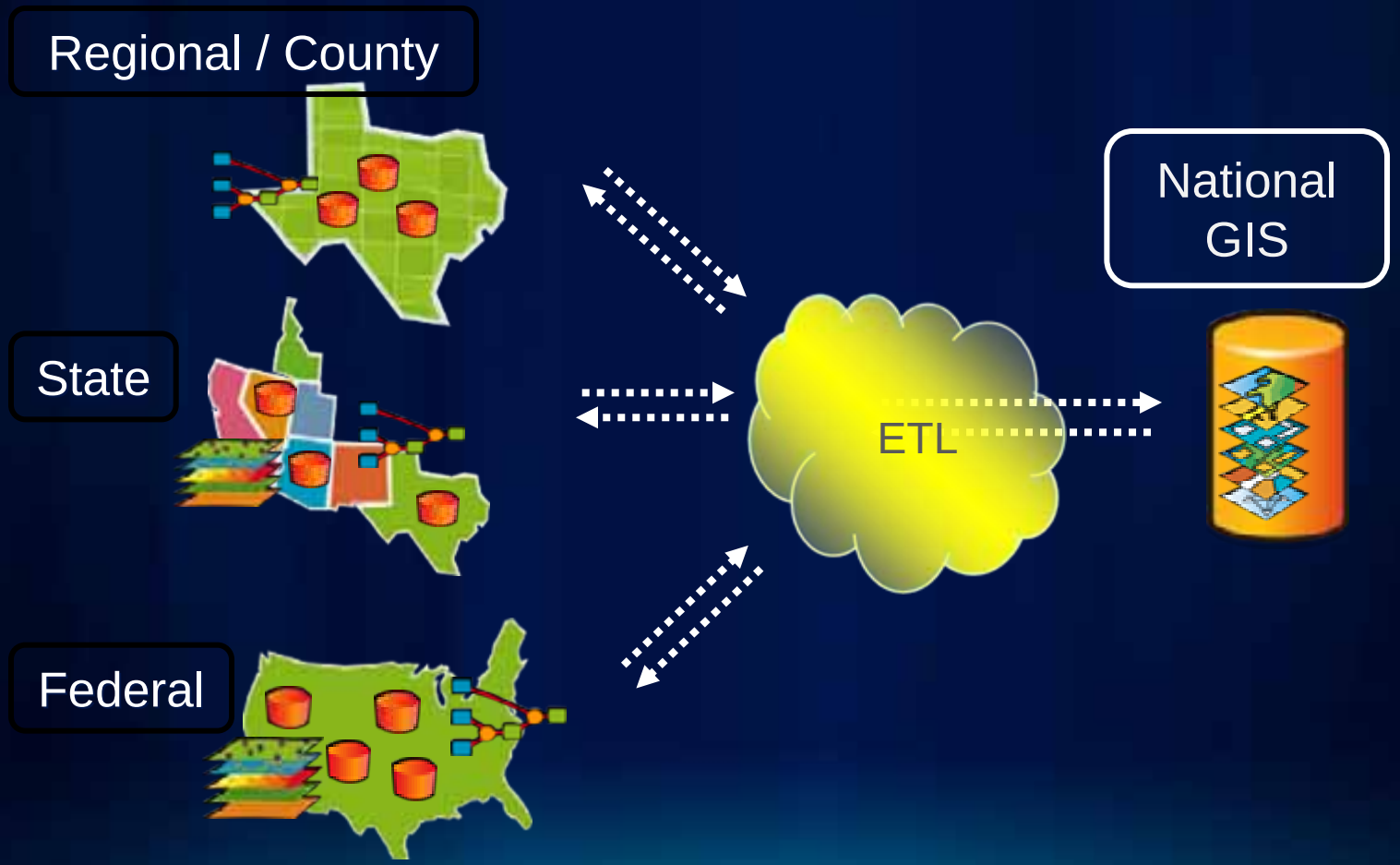
Structured Data – not a Format – “Human Readable” is a sick joke

- **XMLTemplater**
  - **Easily use an XML file to stub out XML**
  - **Populate attributes with XQuery expressions**
- **XQuery Extract, Update, Explode**

```
<feederObject objectID="{fme:get-attribute("objectID")}">
  <feederName>{fme:get-attribute("feederName")}</feederName>
  <feederNo>{fme:get-attribute("feederNo")}</feederNo>
  <eaLoc>{fme:get-attribute("eaLoc")}</eaLoc>
</feederObject>
```

Data Integration Example

Share data through a common data model



ArcGIS Server Supports Data Interoperability

- **Use Any Geographic Content:**
  - Map Services
  - Geoprocessing Services
- **Client to OGC services**
  - WFS Cached, or
  - WFS Non Cached

Coming in 10.1

- Based on latest FME platform – FME 2012
  - Improved performance
  - Improved FME Workbench user experience
- New Formats
  - Windows Azure
  - SQL Azure
  - OGDI
  - Google Spreadsheets

- New Transformers
  - FeatureReader – spatial and aspatial queries
  - SQLCreator – create feature per result row
  - Stylers – output symbology in DWG, DGN, KML, PDF

Resources: Learn More

- How do I try it?
  - Request software evaluation (60 days)
  - Read more at the software evaluation site:
  - http://www.esri.com/software/arcgis/eval-help/index.html
- How do I learn it?
  - Two free courses:
  - http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=947
  - http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=939
- Discuss your Data Interop questions at the UC
  - Visit the Spatial Analysis island or the SAFE Software booth #1206 (not Thursday!)

Session Evaluations Reminder

- **Session Attendees:**
  - **Please complete your session evaluations**
  - **www.esri.com/sessionevals**

Questions??

esri

Color Guidelines

Color Swatches

Use Esri 2011 as theme colors

(see presenter's notes for the instruction of how to add the Esri theme and theme colors)

Projector Color Guidelines

Use the sRGB video mode on the projector. Most projectors have this setting.

Additional ESRI presentation resources available on ArcZone
http://arczone/resources/presentations.cfm

.75”

Title Safe Area — Please Read

1”

1”

This area is the **title safe area** (10% in from each slide edge).
All text and graphics should be contained within this area to prevent loss during transmission and reproduction.

Any information outside the title safe area runs the risk of being cropped off when captured to video.

Please note the adjusted title and body template styles adhering to the title safe area. Presenters will need to adjust their slides accordingly as needed to reposition text and graphics.

Right-click and select Grid and Guides
Check "Display drawing guides on screen”

.75”

Successful Presentation Guidelines

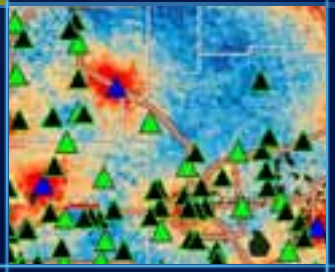
- **Know your target audience**
- **Use slides to lead not read**
  - **Use a key phrase or a few words**
  - **Avoid more than two levels of bullet points**
- **Use title slides for each section**
  - **Make it clear where you are going**
- **Avoid too much animation—Keep it simple!**

Additional ESRI presentation resources available on ArcZone
http://arczone/resources/presentations.cfm

Migrating to the New Template

This template was rebuilt from scratch and fixes problems found in previous versions.

- **Download the instructions and support files from** http://arczone/resources/presentations.cfm



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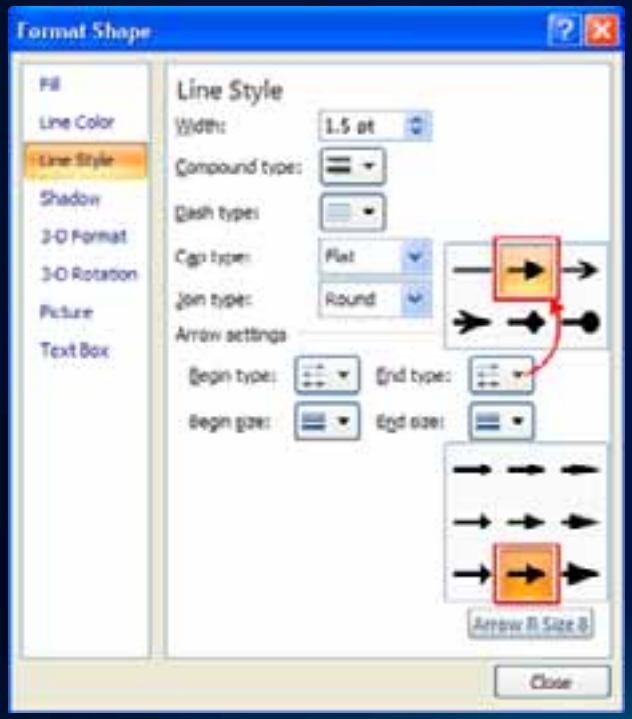
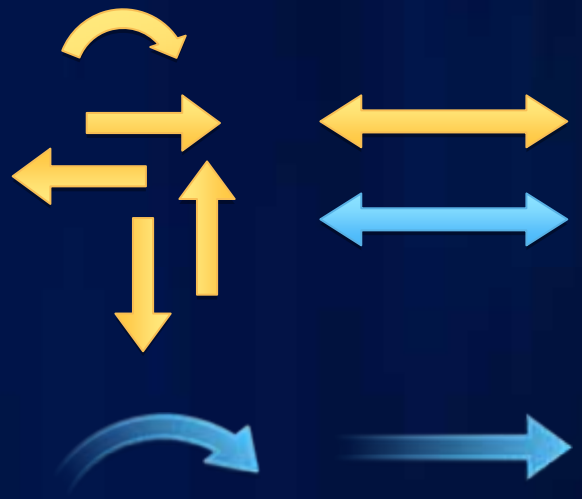
Diagrams/Icons

Arrows

Arrows for Connecting Items



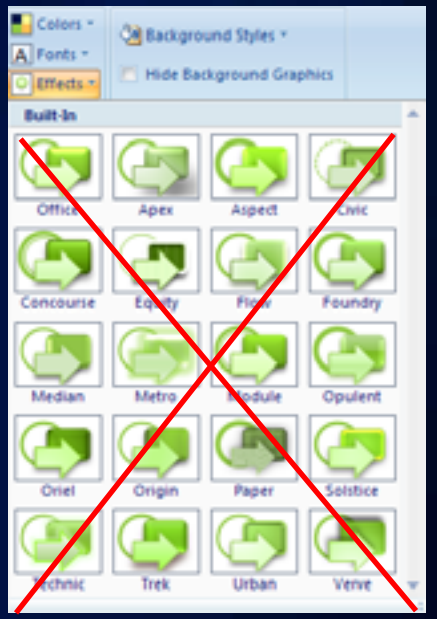
Arrows for Connecting Large Concepts



Shapes for Diagrams

Quick Style: Subtle Effect	Quick Style: Moderate Effect
ArcGIS	ArcGIS
ArcGIS	ArcGIS
ArcGIS	ArcGIS
ArcGIS	ArcGIS
ArcGIS	ArcGIS
ArcGIS	ArcGIS

DON'T APPLY EFFECTS from the Design tab

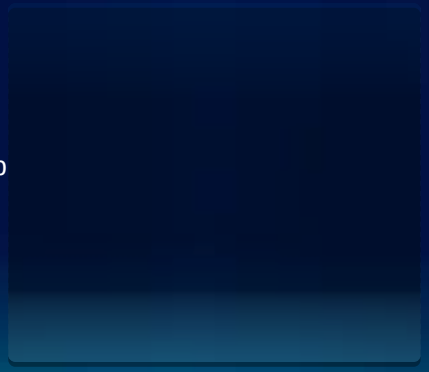


Shapes for Diagrams *(continued)*

Cloud optimized for use behind diagrams

Cloud for general diagram

Circle behind a group of objects



Content box for each tier (see sample diagrams)

Optional: Use as a frame around showcased screenshots

Sample Diagrams

ArcGIS Implementations

Desktop

Individuals

- Ad Hoc Projects
- Analysis/Modeling
- Mapping

Server

Workgroups

- Shared Database
- Fixed Applications
- Transactions

Enterprise

Organizations

- Shared Services
- Integration
- Collaboration

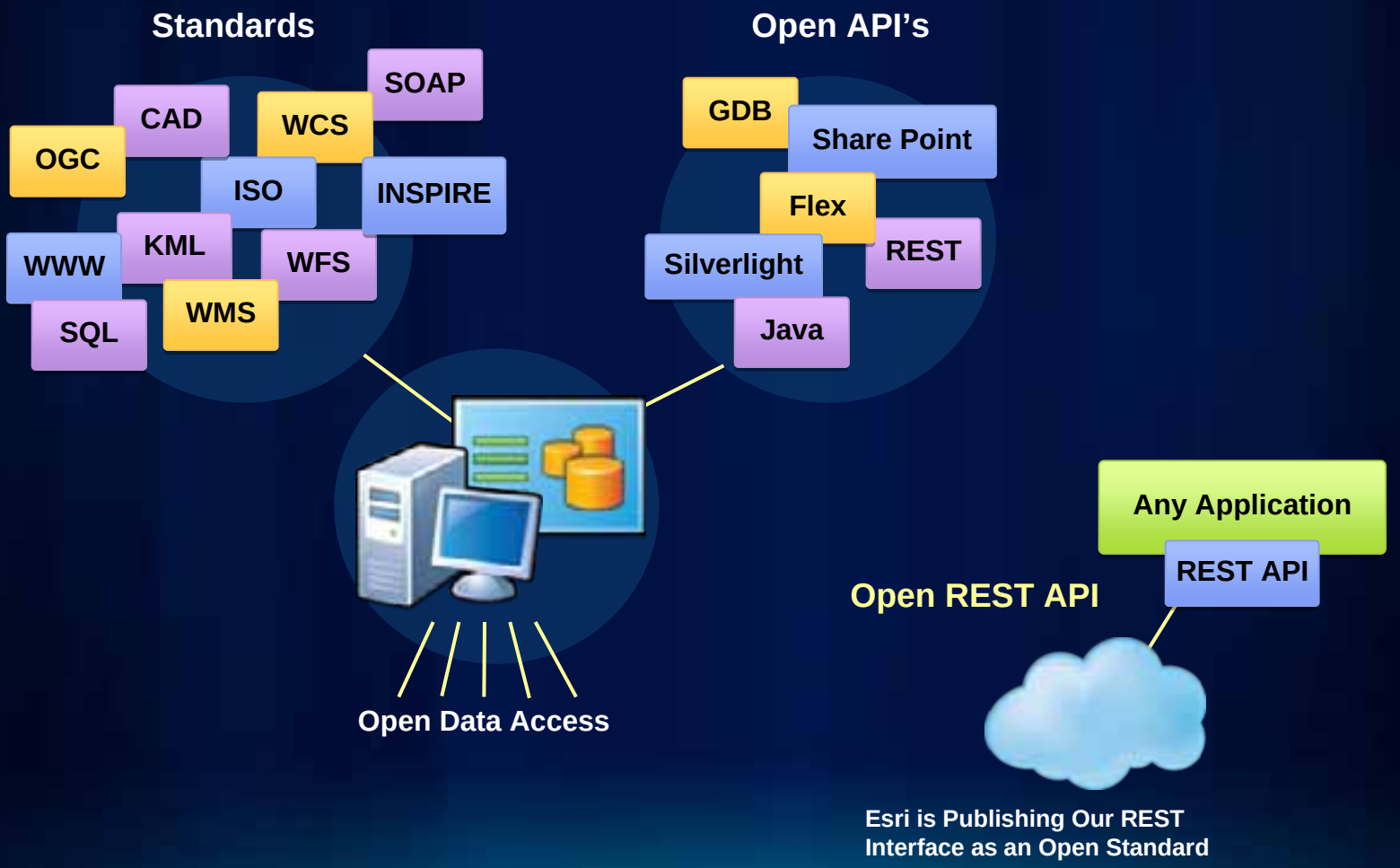
Web GIS

New

ArcGIS 10 — A Complete System

Easier
More Powerful
and Everywhere

Quick Style — Moderate Effect



Access the Entire Icon Library

Over 160 items added in 2010

- **430 total icons available for Esri use**
- **Browse and search from any Microsoft Office application**
- **Accessible when you're connected to the Esri Network**
- **Also available offline as directories of PNG files**
- **See the presenter notes below for details**

A Selection of Frequently Used Icons

ArcGIS Desktop

ArcGIS Online

Web Blog

Web Blog

Mashups

Mashups

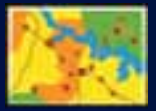
Browser

Open Standards

ArcGIS Desktop Authors

Web Map

Web Map


Map

Web Map

Map

Web Map

Map

Raster Files

Raster Files

Web Map

Map

Web Map

Map

Web Map

Map

Web Map

Map

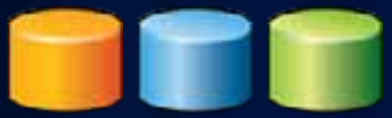
Web Map

Map

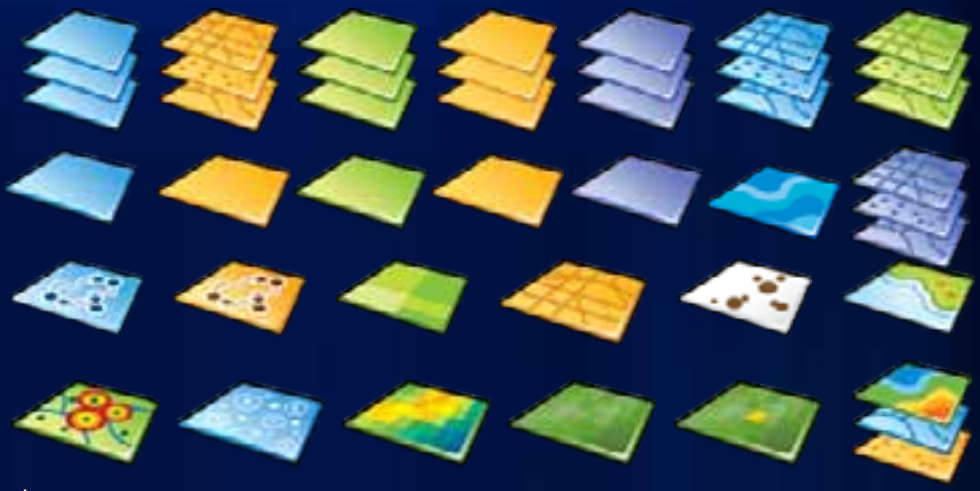
Explorer

Web Map

Globes



Databases



Layers

Files

Table

Files

CD/DVD

Internet/Cloud

Legend

Network

Models

Designing
& Planning
Situational Awareness
Professional Services

Professional
Services
Education
Education
Business
Partner

Mobile GIS User
GIS User

Data Server

Data Appliance

GIS Users

Geodatabase

Web GIS

Mashups