# Esri Southeast User Conference

Charlotte, NC

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# Data Interoperability: An Introduction

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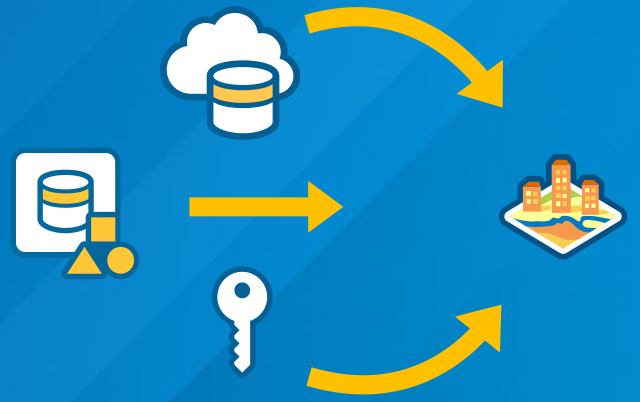
# Agenda

- Data Interoperability extension – What / Where / Why
- Data Interoperability and the Utility Network
- Ways to use Data Interoperability to automate Open Data
  - QA/QC – Simple methods
- Resources

# What is the Data Interoperability Extension?

**Moving data from app to app – "ETL" in industry jargon**

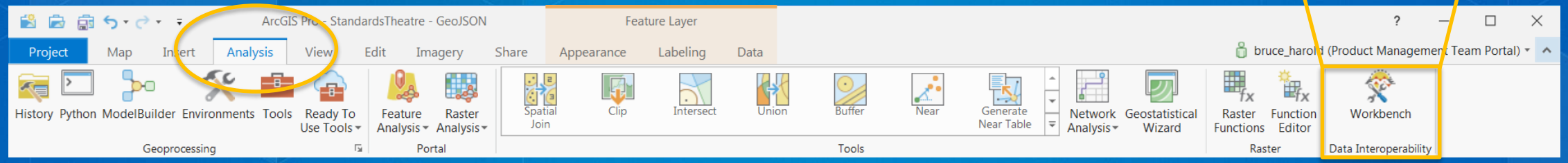
- If you are not the custodian you don't control the data
  - Format or System of Record
  - Attribute Schema
  - Transport Technology
- Data providers probably don't care much about your functional requirements
- Data itself certainly doesn't care about you at all
- Data Interoperability empowers the ArcGIS data professional
  - Connectivity & Authentication
  - Data Transformation & Business Rules
  - Workflow Automation
  - Sharing

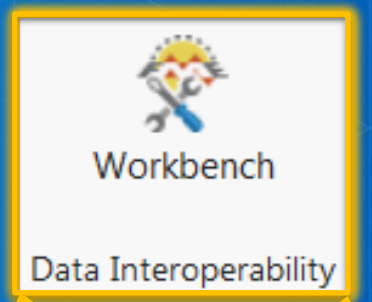


# Where is the Data Interoperability Extension?

**ArcGIS Pro**

- Licensed like any extension
  - Evaluation licenses available
- You must *install* the extension
- Immediate authoring from the Analysis ribbon in Pro
  - We'll get to the Workbench later

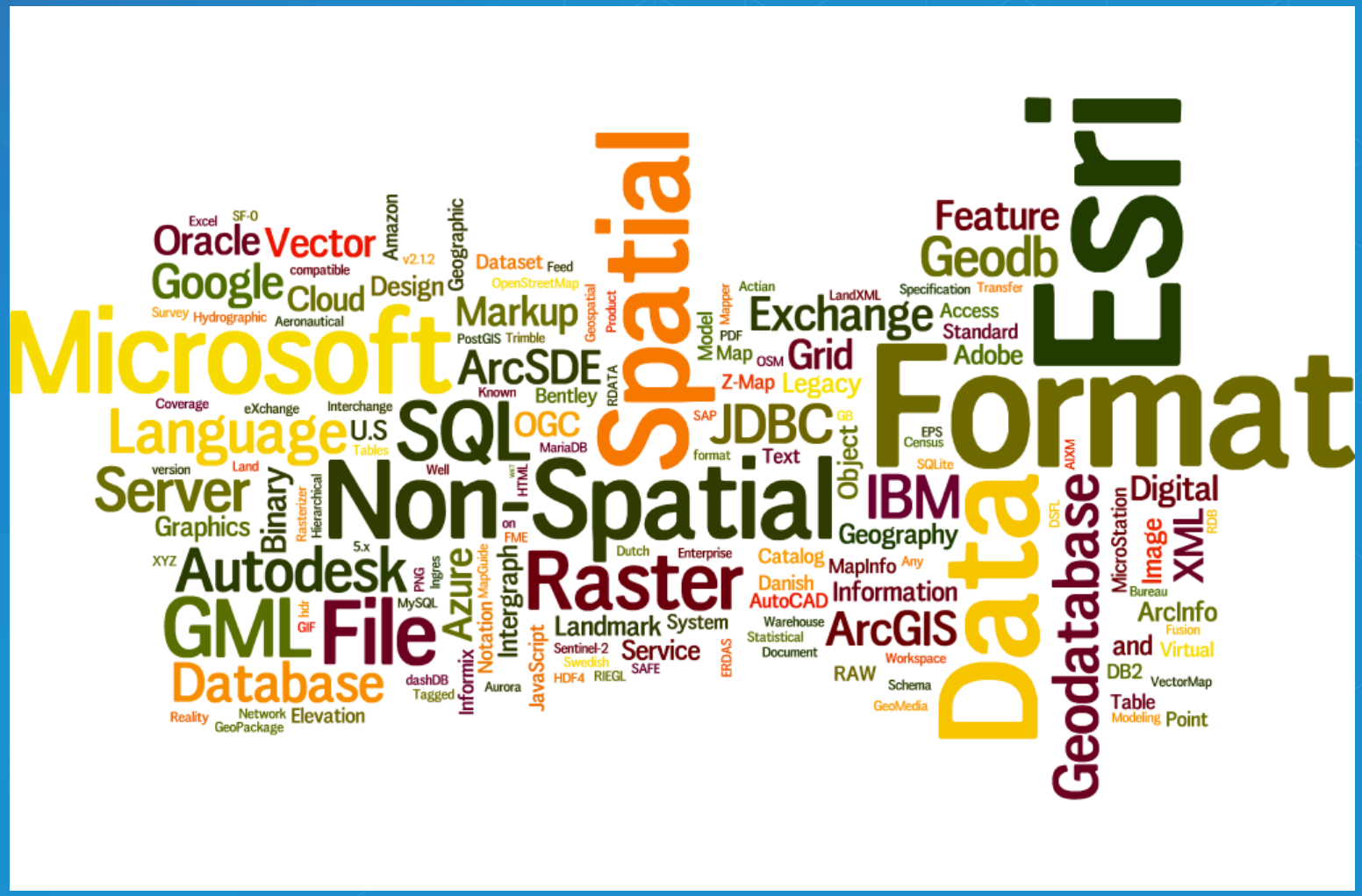


# The Format Challenge

**Read and Write to many different formats**

- Pick from 100's
  - On Disk
  - Database
  - Semantic (XML, JSON)
- Web as Filesystem
  - Box
  - DropBox
  - OneDrive
  - AWS S3
  - Google Drive



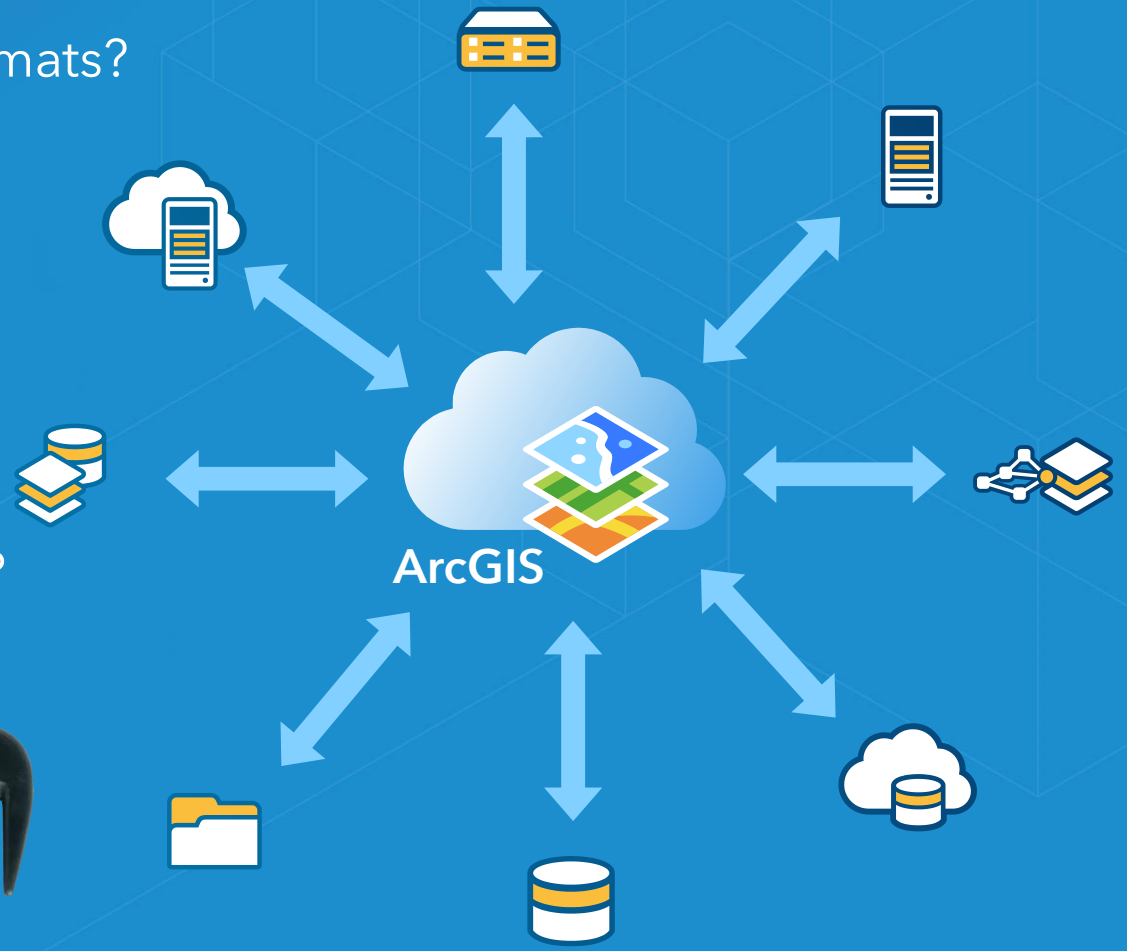
# Spatial ETL – Moving Data With Transformation

**Extract Transform Load**

- Doesn't ArcGIS Already Read Most Useful Formats?
  - Arguably, but the details really matter
- Spreadsheets
- Character Separated Values
- Shapefile

**Issues**

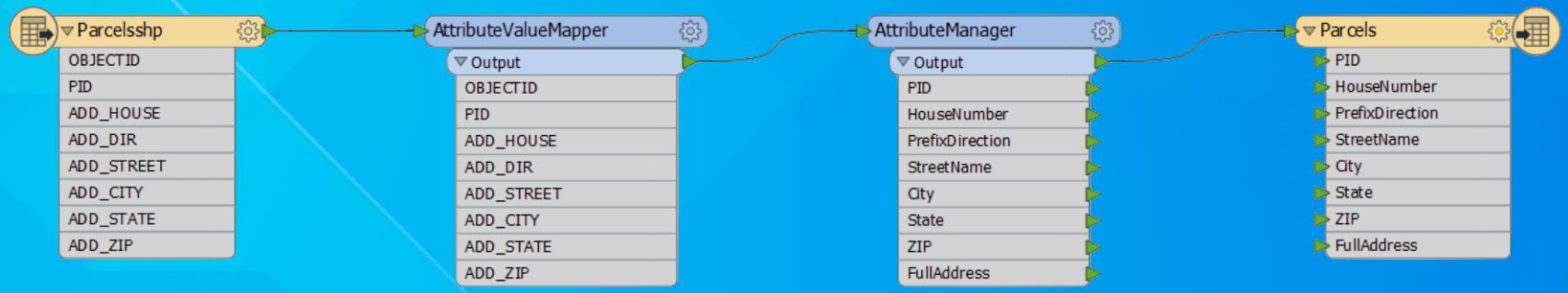
- Did you notice the non-spatial formats above?



# What's a Transformer?

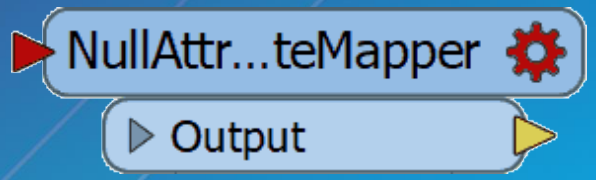
**Extract Transform Load**

- Transformers Are Analogous to a Geoprocessing Tool
- Have Input and Output Port(s)
- Typically Operate Per Feature
- May Operate on Attributes and/or Geometry
- Optionally Operate Per Group of Attribute Value
- May Operate With Parallel Multiprocessing
- https://www.safe.com/transformers/#/

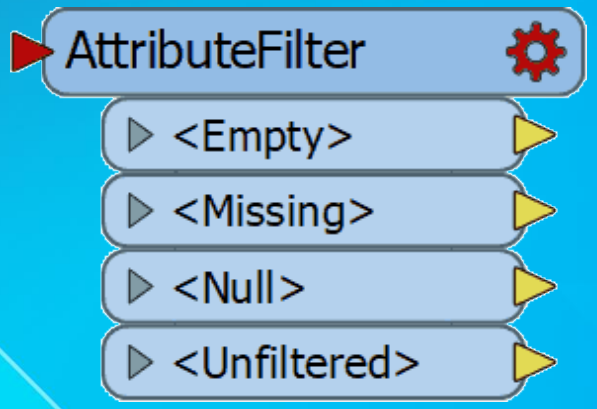


# Transformers to help you get started

Null Attribute Mapper

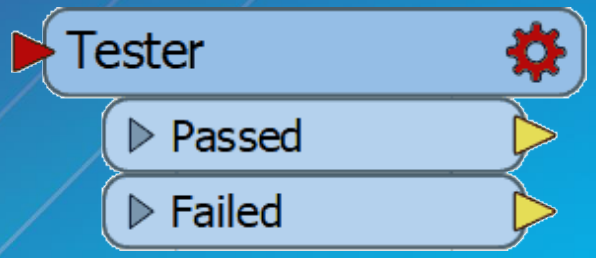



- Pseudo nulls? – QA/QC
- Takes empty, missing, space, NULL…
- Applies NULL, make it consistent

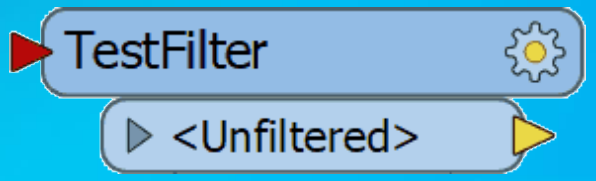



- Field filter
- Creates a port for each distinct value
- Apply different logic to many values
- Think domain values….

# Transformers to help get you started cont'd…

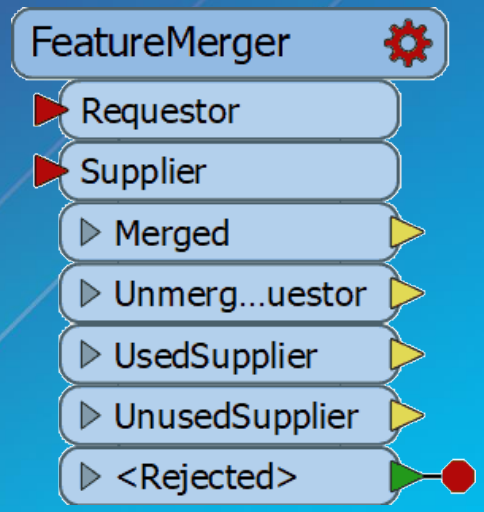



- Just like school – Pass/Fail
- Evaluate a condition or set of conditions
- Filter features (like querying in GIS)

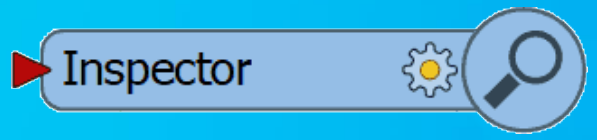



- Tester with ELIF
- Filter into buckets with logic
- If (A)
  - Else If (B) OR many more Else If's…
    - Else (C = everything else)

# Transformers to help get you started cont'd…

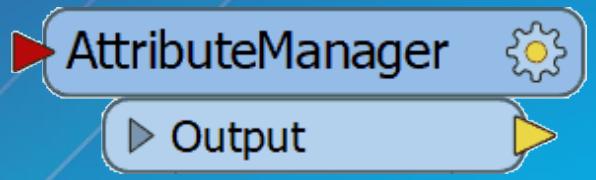



- Joins just like in GIS
- Join the Supplier to the Requester
- Multiple output ports
  - Joined records, records that did not join, etc…

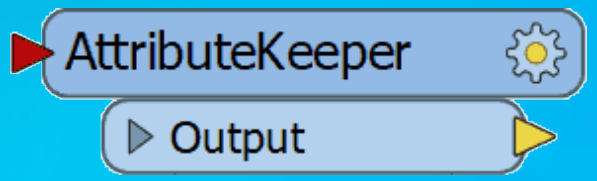



- Preview features before writing
- Brings up table, map if spatial

# Transformers to help get you started cont'd yet again…




- Rename attribute(s)
- Create new attribute(s)
- Delete attribute(s)
- Set attribute value(s)




- Quickly delete any and all attributes
- Default selection is to delete all
- You choose which attributes to keep

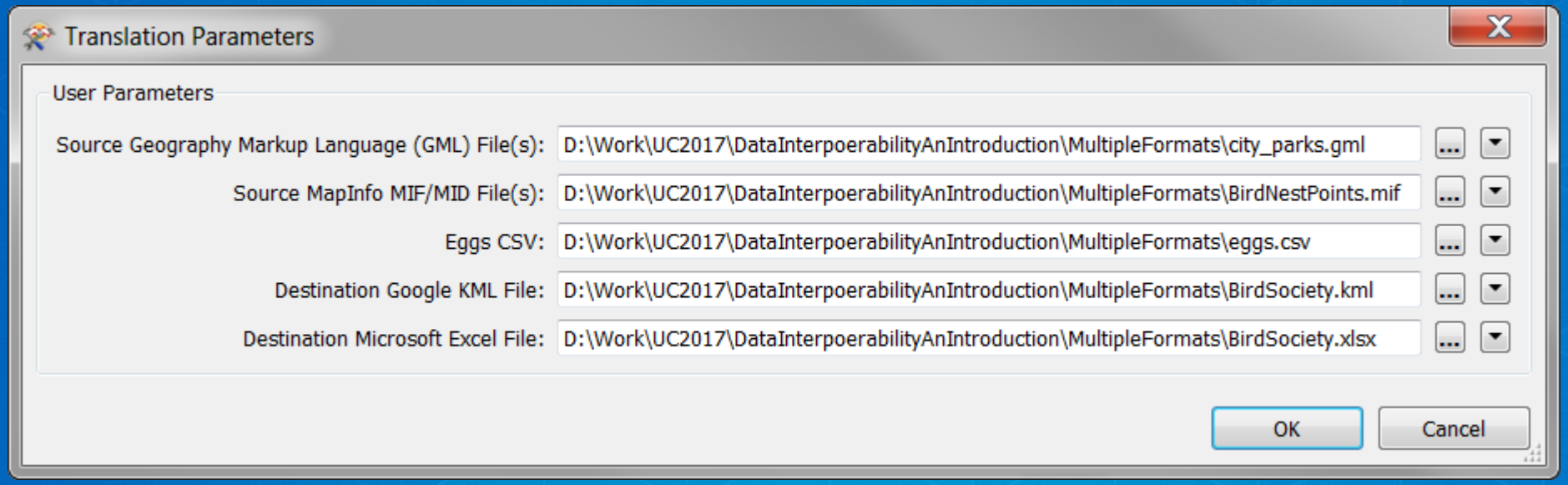
# Multiple Formats

**Combining is OK**
**Different schema is OK**

- Read Many
- Join Many
- Spatial Interact Many
- Write Many

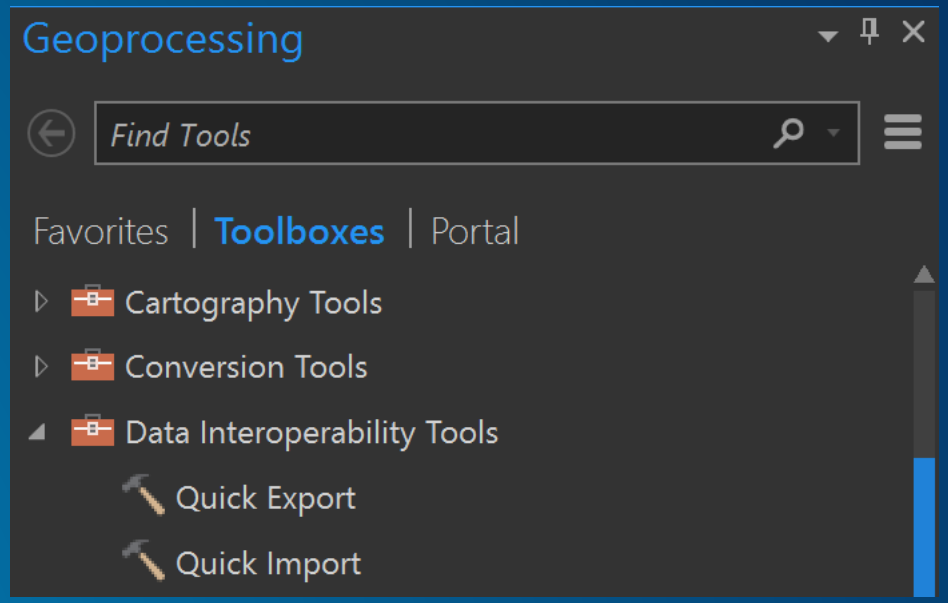
ETL

# Beautiful Data



# Quick Import and Quick Export

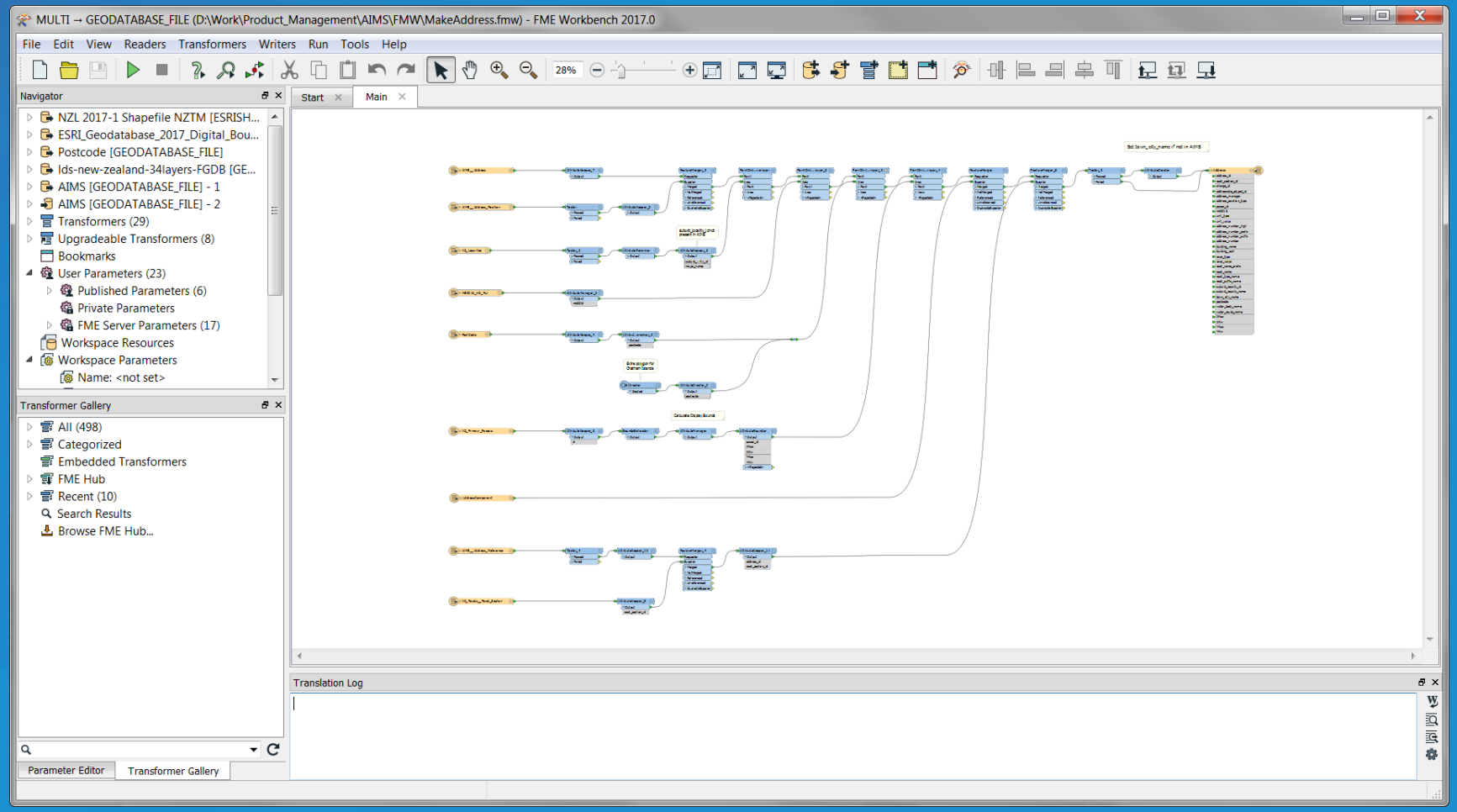
- Easy Button
- When you need data to participate in:
  - Editing
  - Geodatabase behavior
- Quick Import
  - Writes to Geodatabase
  - Create or Overwrite
  - Default Schema
- Quick Export
  - Writes Any Format (200+ available)



# Workbench

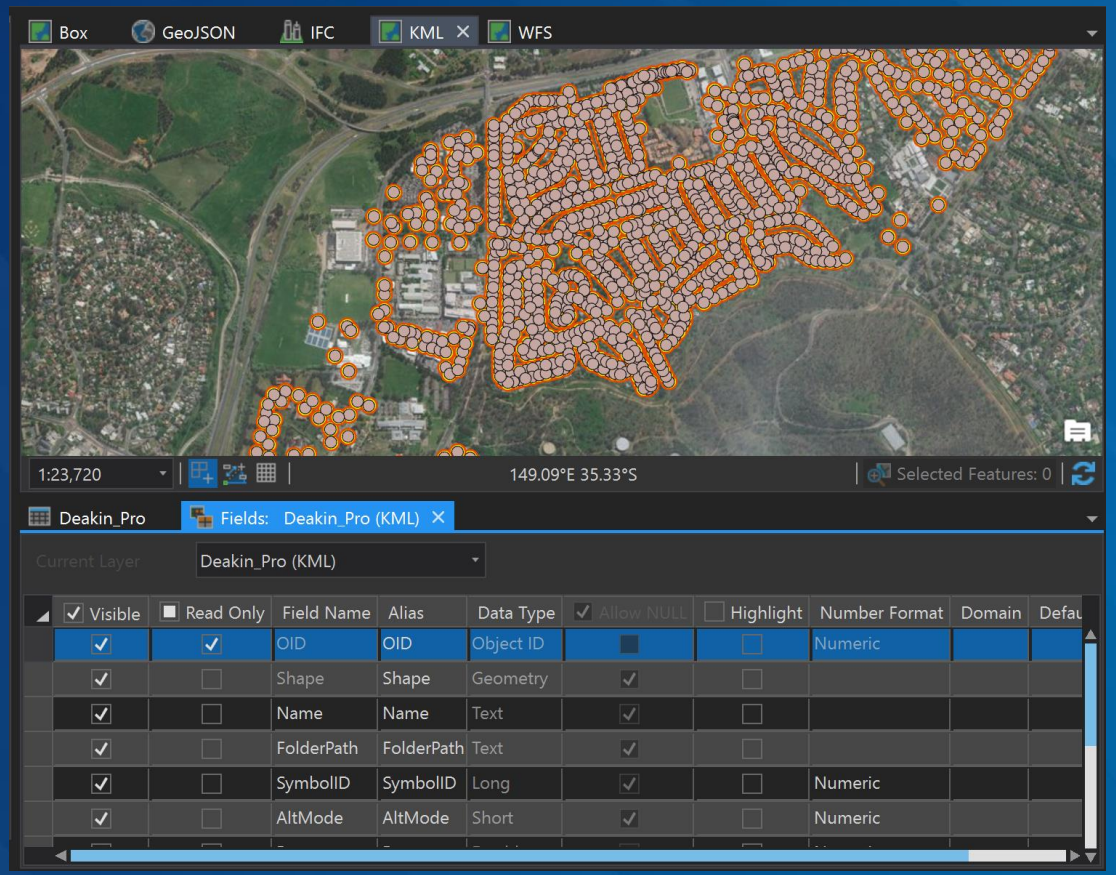
## Graphical Programming Application

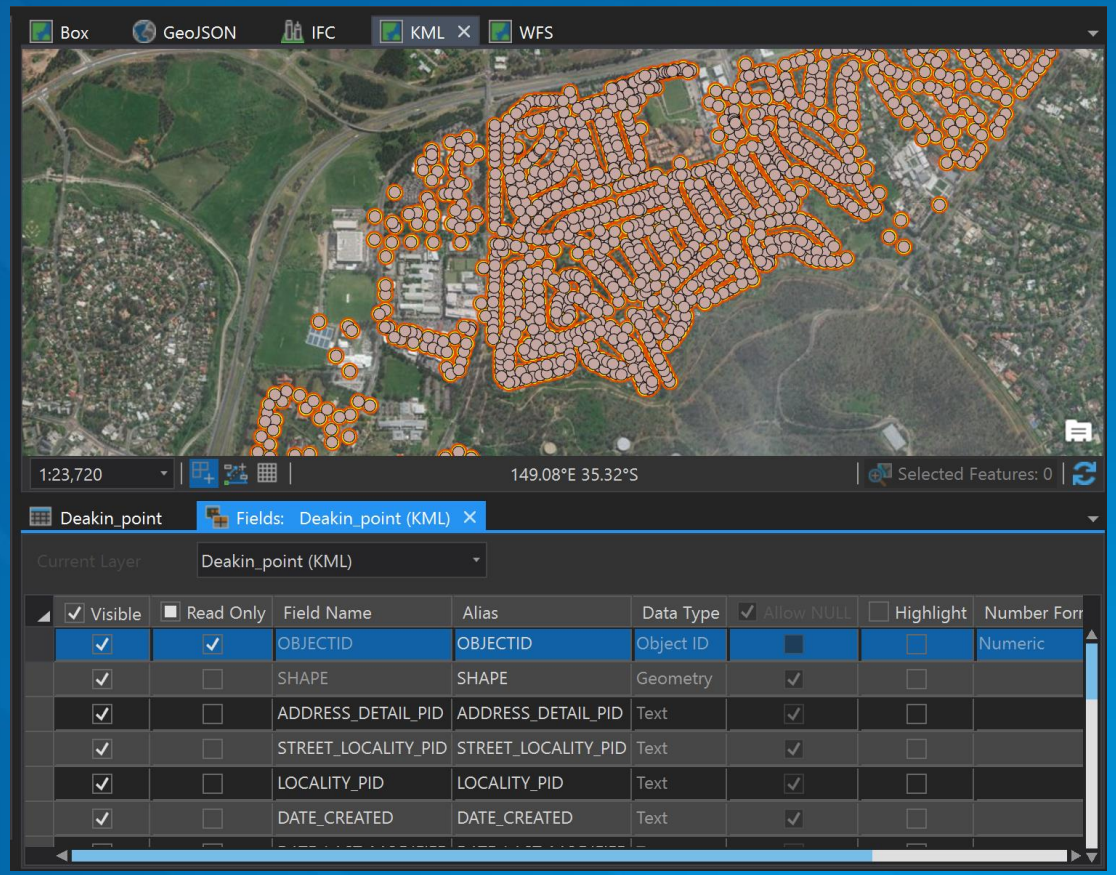
- Separate Process
- Menus, Controls
- Canvas
  - Readers
  - Transformers
  - Writers
- Navigator
- Transformer Gallery
- Log



# Quick Tools Demo

## ArcGIS Pro – KML & Excel



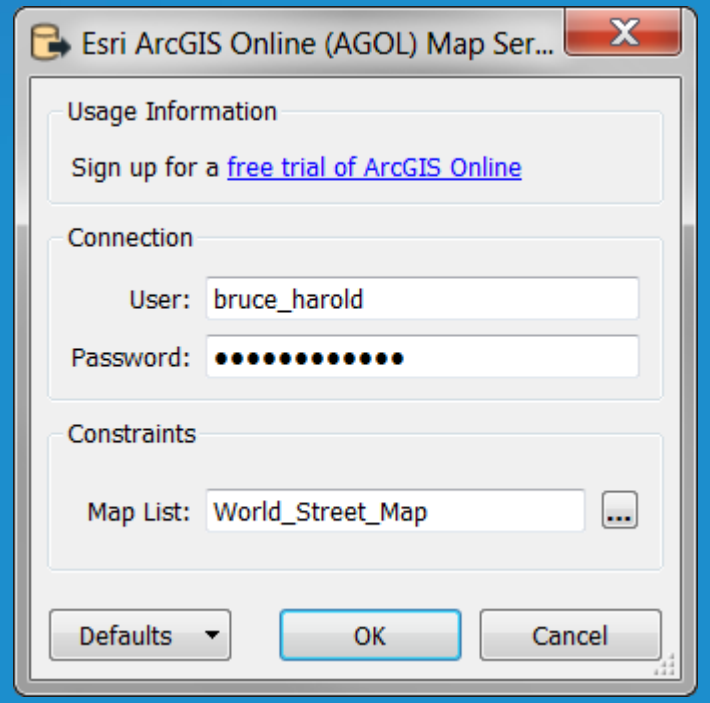



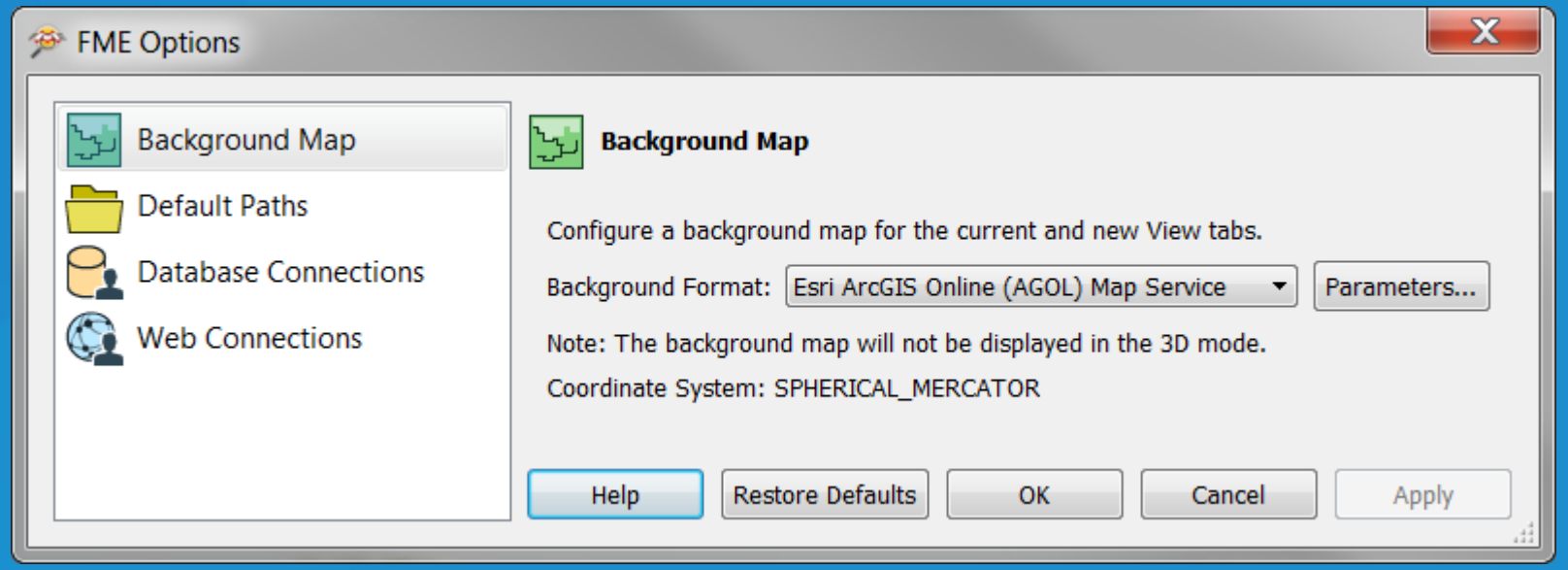

Same… Or different?

# Working With Portals

## ArcGIS Online and ArcGIS Enterprise

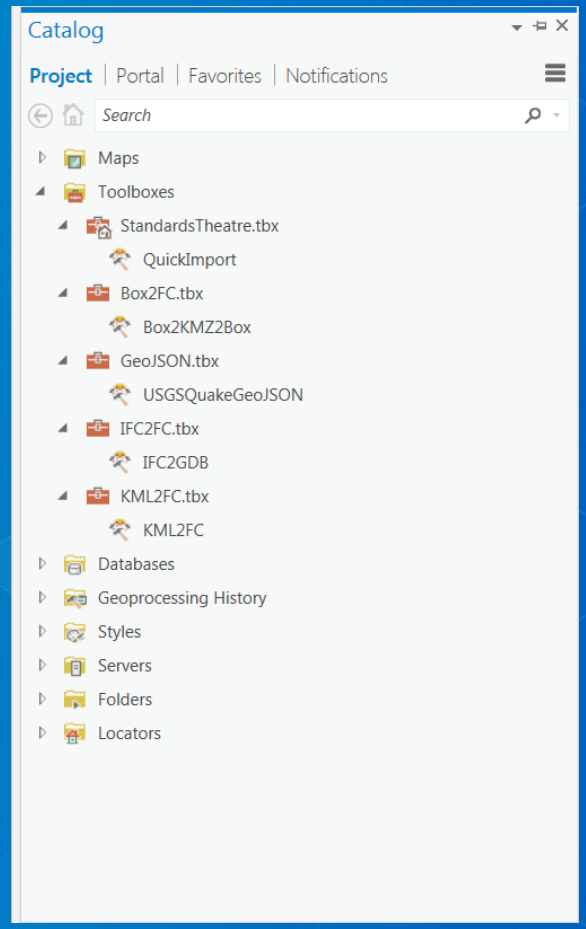
- Background Map
  - Choose BaseMaps from ArcGIS Online
- Feature Services
  - Existing
  - New
  - Add, Delete, Update
  - Truncate



# Spatial ETL Tools

- Spatial ETL Tools are ArcGIS Geoprocessing Tools
  - Use in Modelbuilder
  - Use Spatial ETL Tools in standalone Python scripts
  - Use ArcPy inside Workbench
  - Publish to ArcGIS Enterprise (Windows, 10.x)
- ArcGIS Pro 2.0 interoperates with FME
  - Read and Write .fmw files
  - FME 2017 Engine

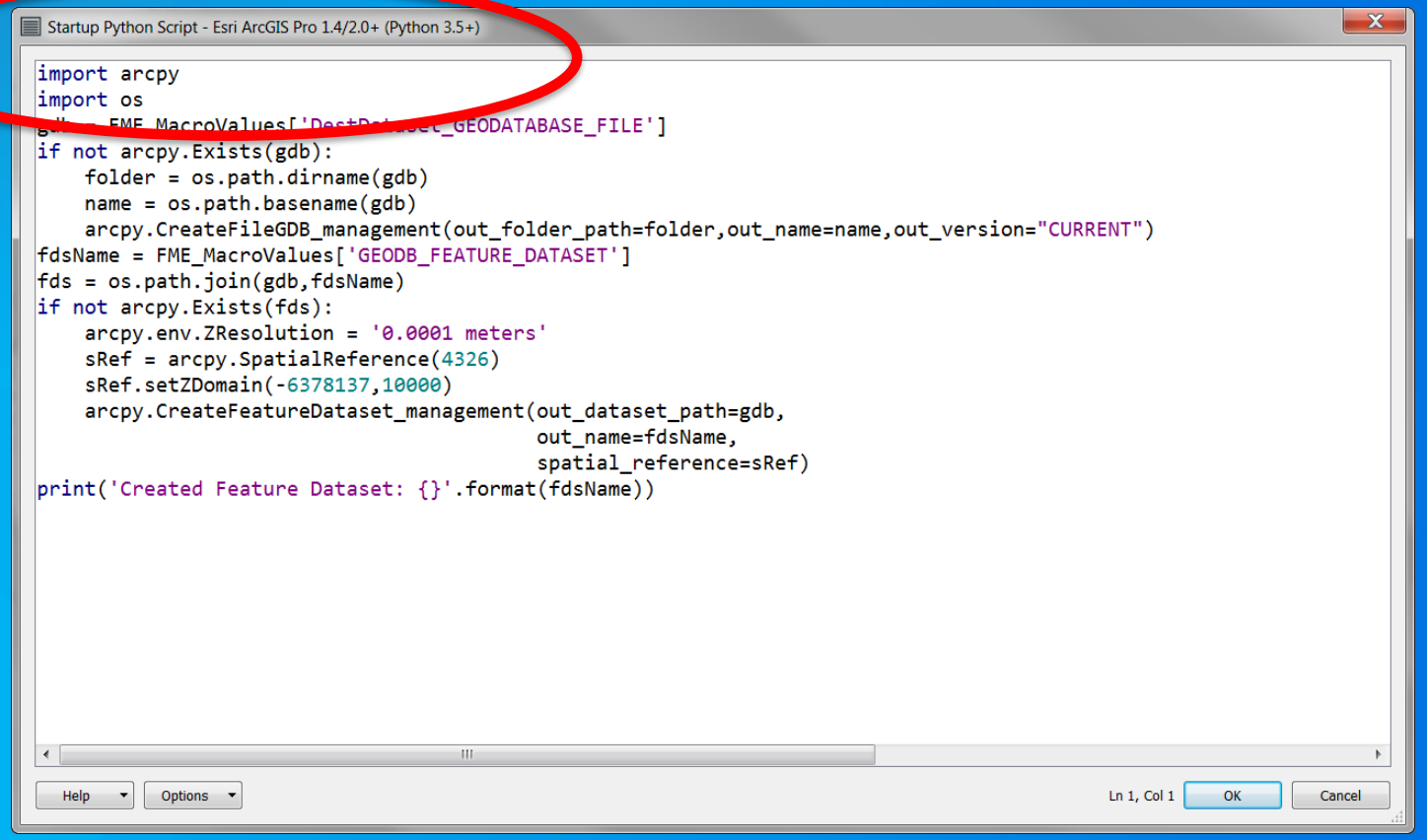


# Python

**Parameters available as a dictionary**

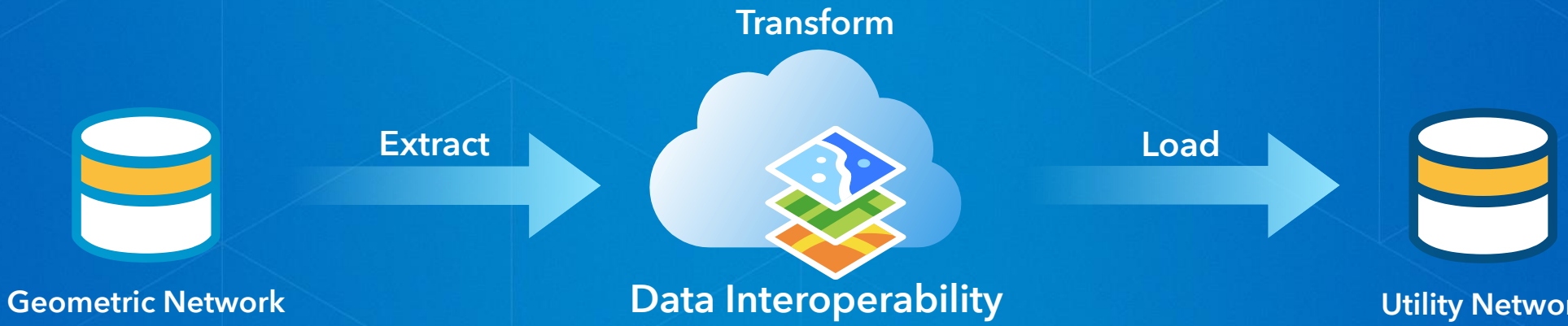
- Startup Scripts
  - Run first
- Scripted Parameters
  - Runtime logic
- PythonCreator
  - Make features
- PythonCaller
  - Operate on features
- Shutdown Scripts
  - Run last

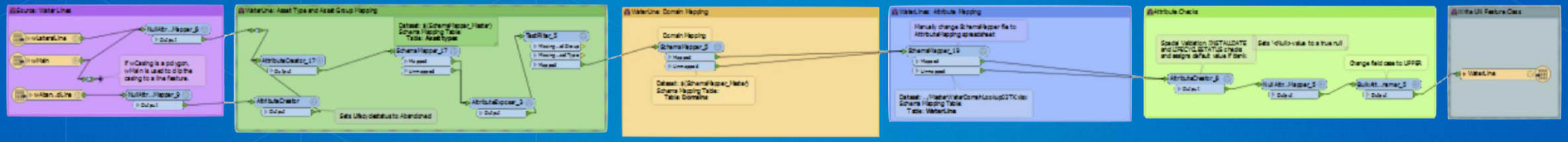
## In-App Script Editor



# Utility Network Migration Tools

- Migration tools are currently in prerelease (release is phased):
  - Water, Gas, Electric
- Data Interoperability provides ETL framework



# Migration Process Overview

**ArcGIS Data Interoperability Extension**

**Geometric Network**

Source / Target Schema Mapping

- Attributes
- Domains

Update Source Features

- Point to Source Data
- Connect Translators

Migrated Asset Package

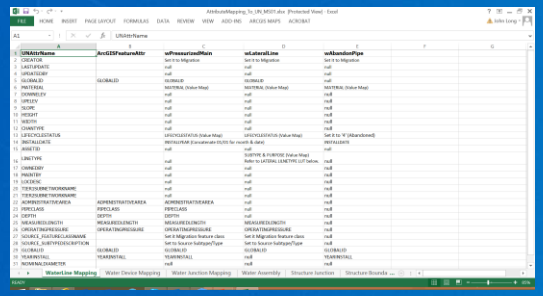
- Staging Database

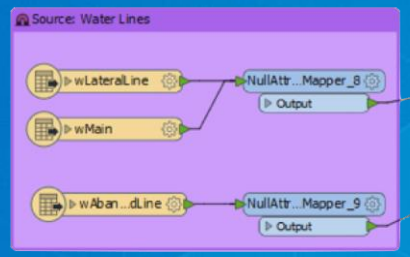
**Domain Specific Asset Package**

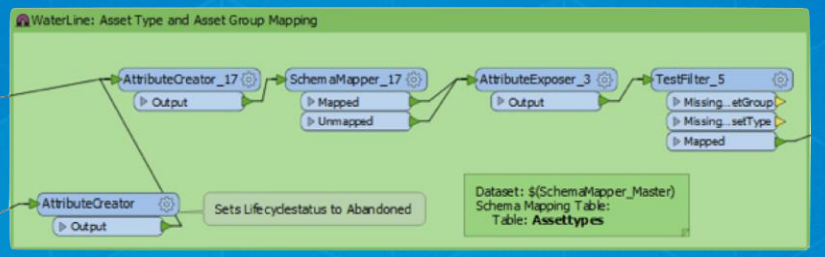
**Load**

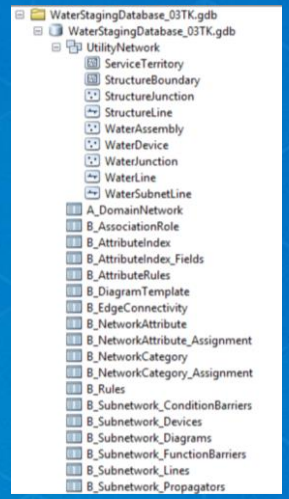
**Utility Network**

**Utility Network Migration Tools**





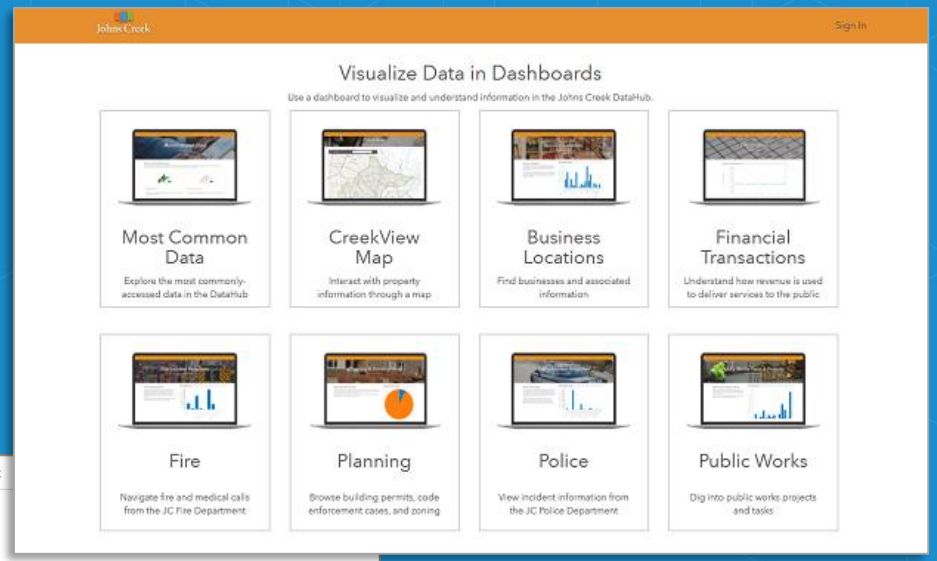



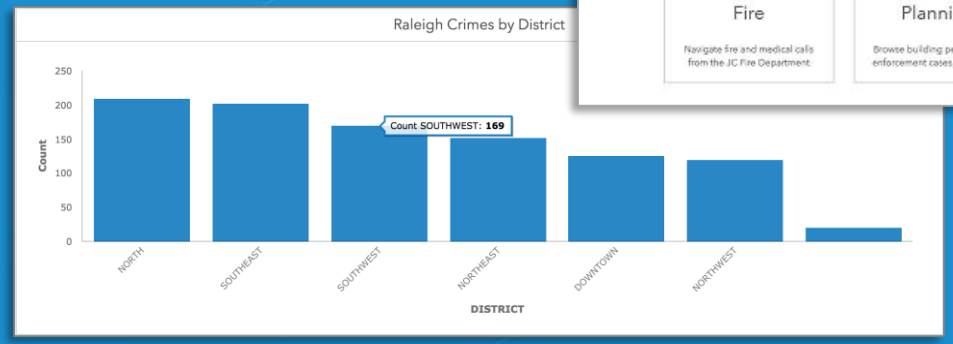



# Open Data

**ArcGIS Online organization includes Open Data portal at no additional cost**

- Why Open Data?
  - Transparency
  - Accountability
  - Participation
  - Innovation
  - Economic development

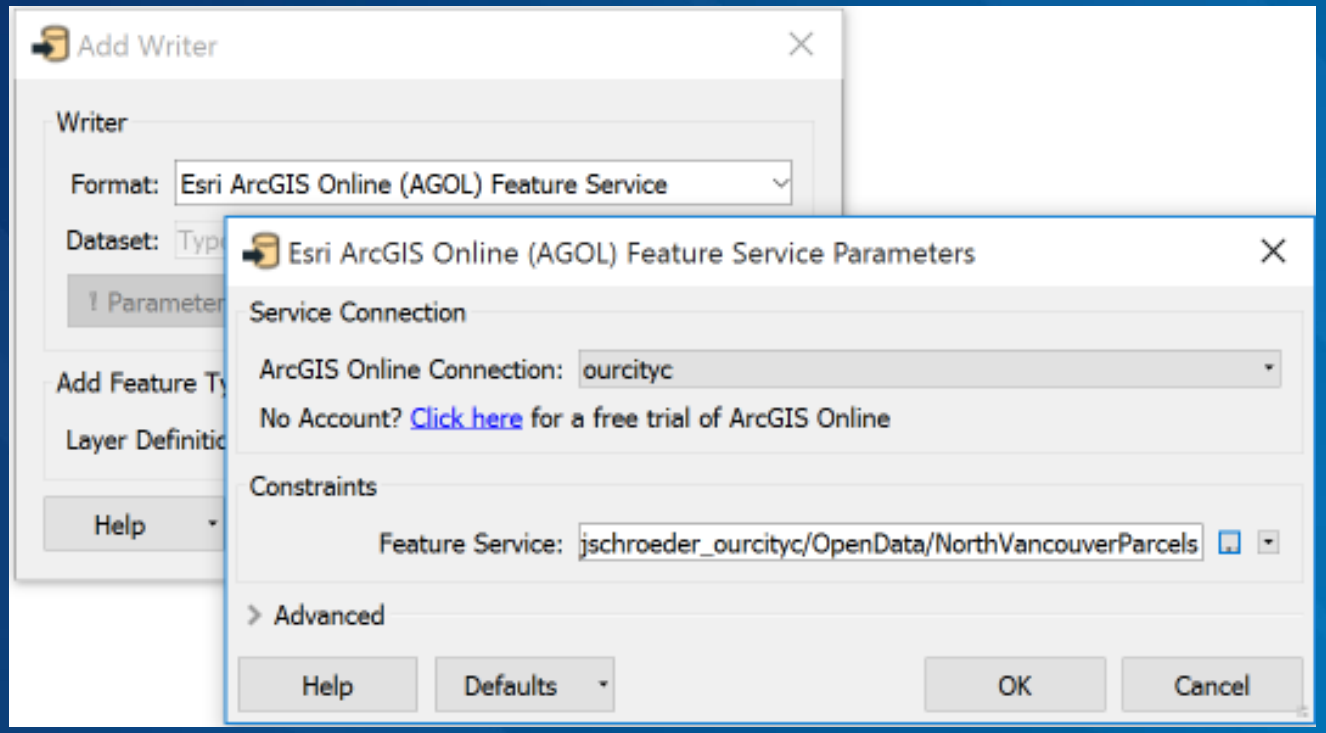


# What does Data Interoperability have to do with Open Data?

- One word: ETL (yes, I know it's technically an acronym)
  - Extract: Connect to data silos
    - ✓ CADD, Excel, CSV, SQL Server (Spatial or Non-Spatial), Shapefile, MySQL, this list keeps going…..
  - Transform: Filter, change data format, etc..
  - Load: Push the data into ArcGIS Online
- Automate: Spatial ETL in geoprocessing toolbox and automate with Task Scheduler

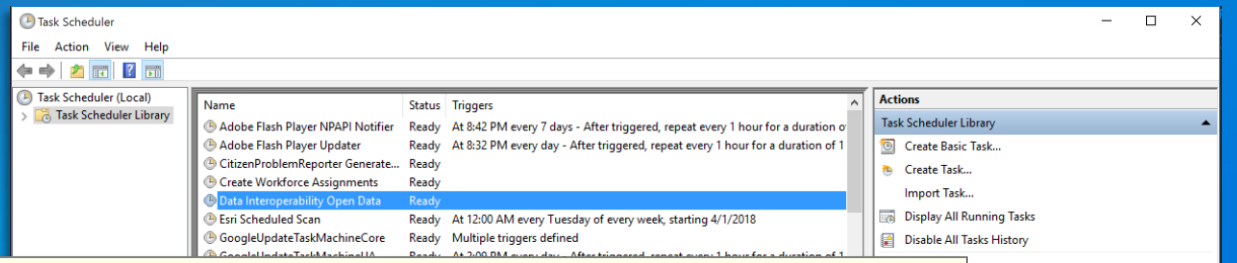
# Utilize Data interoperability to orchestrate movement of data




# Demo

## Data Interop Feeds Open Data

# Automate with Windows Task Scheduler

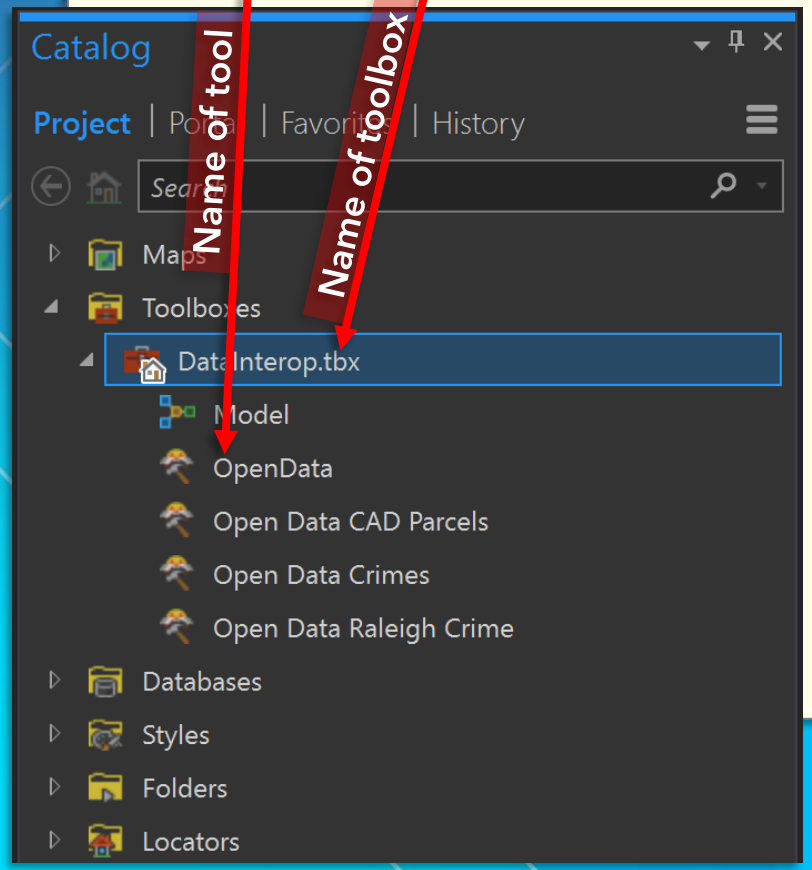



## OpenData.py

```
import arcpy
arcpy.ImportToolbox("C:/Users/YourUser/Documents/ArcGIS/Projects/DataInterop/DataInterop.tbx")
arcpy.OpenData_DataInterop("C:/Users/YourUser/Documents/RaleighCrimes.csv")
```

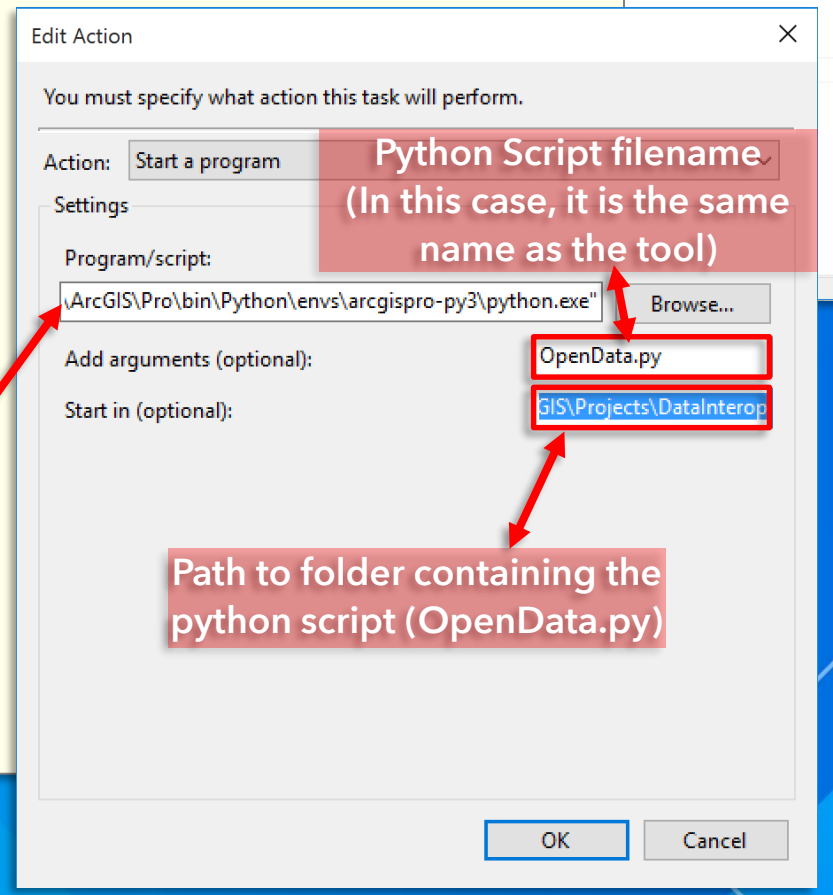
Path to toolbox

Parameter
(input file for Spatial tool)




Name of tool

Name of toolbox




Python Script filename
(In this case, it is the same name as the tool)

Path to Python

Path to folder containing the python script (OpenData.py)

# Try it, Learn it

- 21-day Trial:
- http://www.esri.com/arcgis/trial

- Courses – search 'ETL' in the Training Catalog:
  - Transforming Data Using Extract, Transform, and Load Processes
  - Controlling Data Translations Using Extract, Transform, and Load Processes

# Question time

- Jason Schroeder jschroeder@esri.com

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