Aggregating Utah's Statewide Roads Dataset

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AGRC

Automated Geographic Reference Center

State of Utah's map technology coordination office (est. 1984)

gis.utah.gov

SGID

State Geographic Information Database

one-stop access point to hundreds of statewide data layers (developed, aggregated and acquired)

utah.maps.arcgis.com (web services)

gis.utah.gov/data (data downloads)

SGID >>> Statewide Roads >>>

Goal

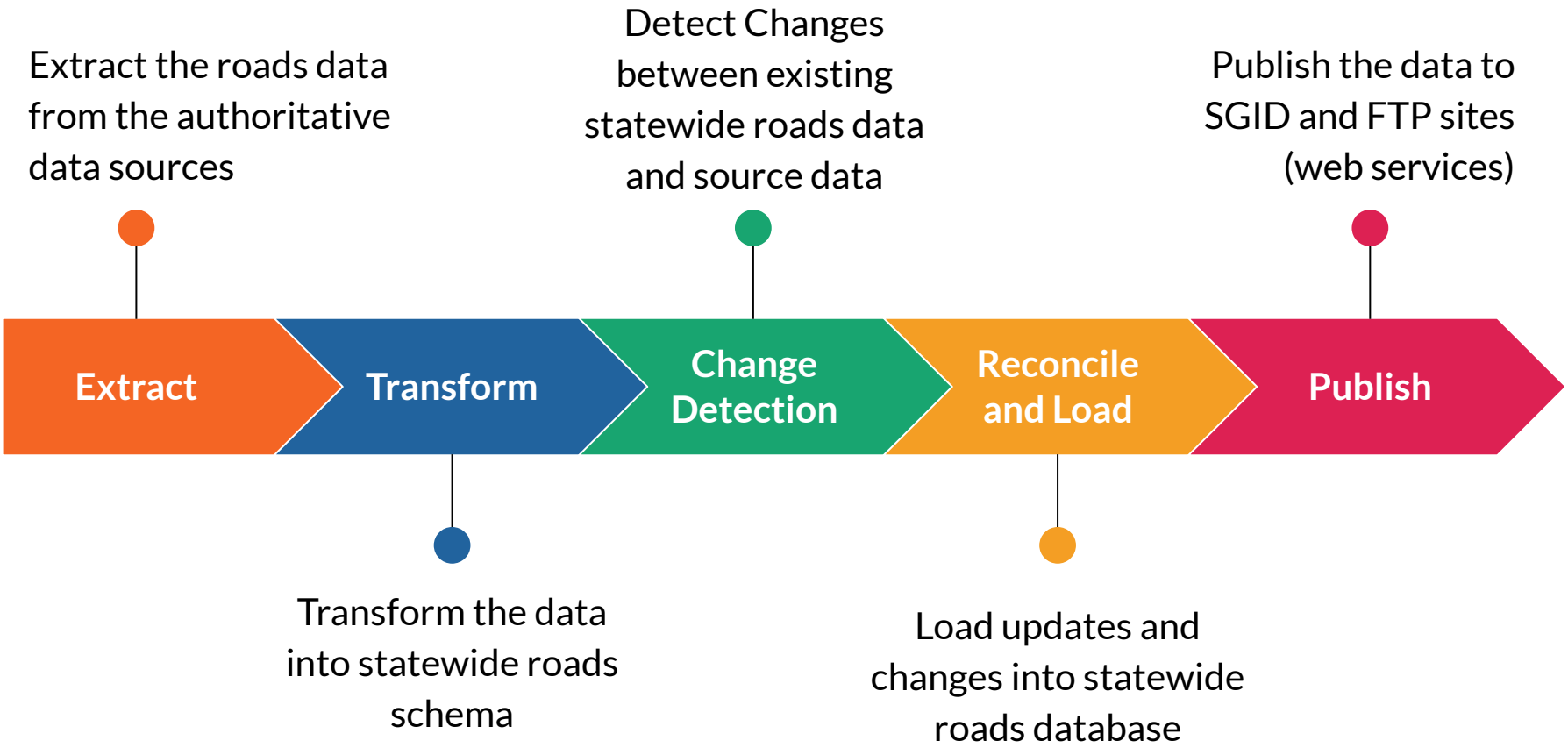
Provide a seamless, standardized, and regularly updated statewide dataset

Data Sources

City agencies
County agencies
VECC (Valley Emergency Communications Center)
UDOT

Data Users

Blue Stakes of Utah (811)
911 Community and Dispatch Centers


Extract the roads data from the authoritative data sources
Detect Changes between existing statewide roads data and source data
Publish the data to SGID and FTP sites (web services)
Extract
Transform
Change Detection
Reconcile and Load
Publish
Transform the data into statewide roads schema
Load updates and changes into statewide roads database

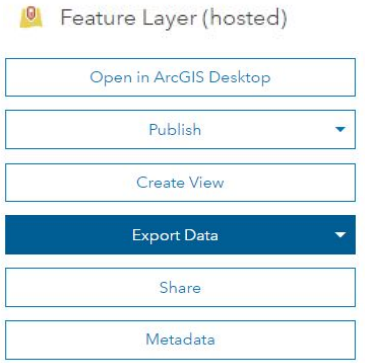
Extract | Transform | Change Detection | Reconcile and Load | Publish

Extract the roads data from the authoritative data sources...

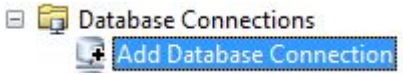
Current Forms of Data Extraction

- Email request
- AGRC-hosted and provided AGOL Feature Layer Service
- FTP/Website Download page
- Direct Connection to agencies SDE Geodatabase
- ArcGIS Server Distributed Geodatabase (Geodata Service)

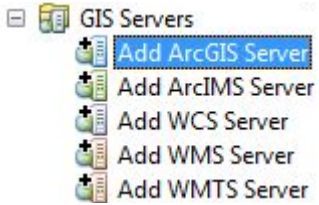
AGOL



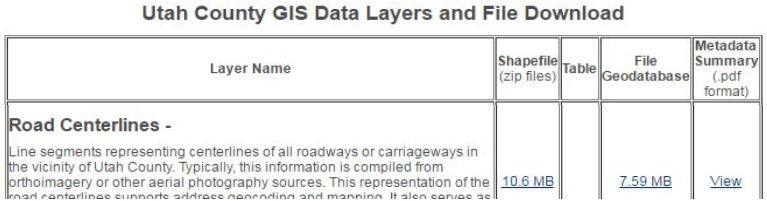
SDE



GeoService



FTP/Download



Utah County GIS Data Layers and File Download

Layer Name	Shapefile (zip files)	Table	File Geodatabase	Metadata Summary (.pdf format)
Road Centerlines - Line segments representing centerlines of all roadways or carriageways in the vicinity of Utah County. Typically, this information is compiled from orthoimagery or other aerial photography sources. This representation of the road centerlines supports address geocoding and mapping. It also serves as	10.6 MB		7.59 MB	View

Email

Extract | **Transform** | Change Detection | Reconcile and Load | Publish

Transform the data into statewide roads schema...

Schema Transformation

- Each agency has unique set of needs for roads data
- Variety of schemas throughout the State
- Transform the data into SGID Schema
- Python Scripts

Python Scripts

```
for field in fields:
    if not arcpy.ListFields(fc, field[0]):
        arcpy.AddField_management(*(fc,) + field)

 #_____________________________________________________________________________________________________________
 # check if field is in the field list before we calc values
 flds=[]
 fldObj=arcpy.ListFields(fc)
for fld in fldObj:
    flds.append(fld.name)

 #then loop through your list of variables that the search cursor is looking for:
 missingvar=["PREDIR", "Pre_Dir", "STREETNAME", "Street_Nam", "STREETTYPE", "Type", "SUFDIR", "Suf_Dir", "MODIFYDATE", "GPS_Date", "FULLNAME",
                                    "L_F_ADD", "Left_From", "L_T_ADD", "Left_To", "R_F_ADD", "Right_From", "R_T_ADD", "Right_To"]
for v in missingvar:
    if v not in flds:
        print "missing field: " + v
 #_____________________________________________________________________________________________________________
 print "done with checking for missing fields"

 #index                              0         1          2           3           4         5         6         7          8
 rows = arcpy.da.UpdateCursor (fc, ["PREDIR", "Pre_Dir", "STREETNAME", "Street_Nam", "STREETTYPE", "Type", "SUFDIR", "Suf_Dir", "MODIFYDATE",
 #index                                12          13         14          15          16          17          18         19
                                   "L_F_ADD", "Left_From", "L_T_ADD", "Left_To", "R_F_ADD", "Right_From", "R_T_ADD", "Right_To"])

 print "Begin calculating values over..."
for row in rows:
    if row[1] != None or row[1] != '0':
        row[0] = row[1][:1].upper()
```

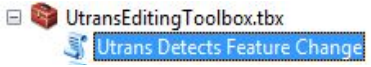
Extract | Transform | **Change Detection** | Reconcile and Load | Publish

Detect Changes between existing statewide roads data and source data...

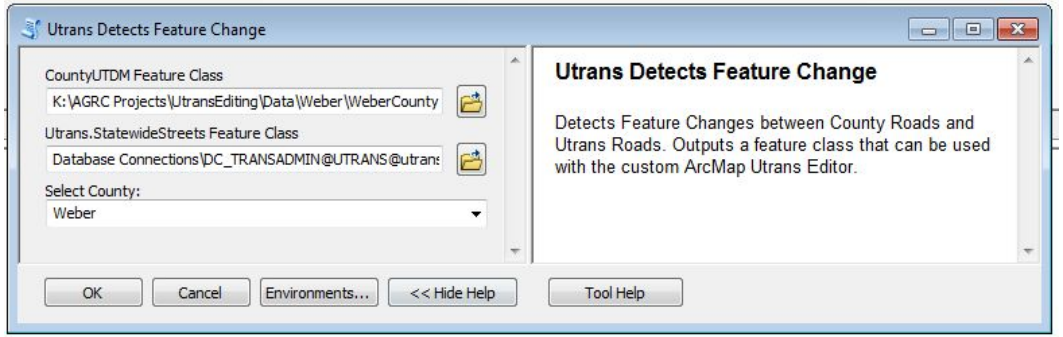
Detect Feature Changes

- Compare (transformed) source data to existing SGID data - feature by feature
- Python tool built around ESRI's Detect Feature Change geoprocessing tool
  - search distance, spatial change tolerance, compare fields
- Tool outputs a feature class indicating change type
  - New, Deleted, Attribute, Spatial, Attribute and Spatial, None

ArcCatalog



Python Tool



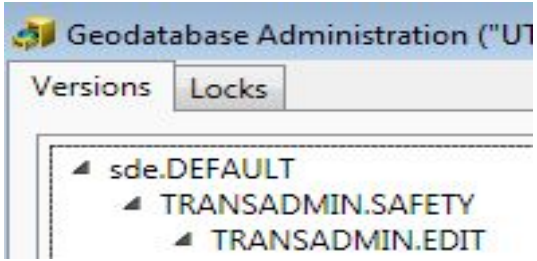
Extract | Transform | Change Detection | **Reconcile and Load** | Publish

Load updates and changes into statewide roads database...

Create User Versions for Editing

- Each editor creates a version in the roads editing database
- All edits are done via user's version
- User reconcile and post to parent version

SDE Editing Database



... user version
... user version
... user version
... user version

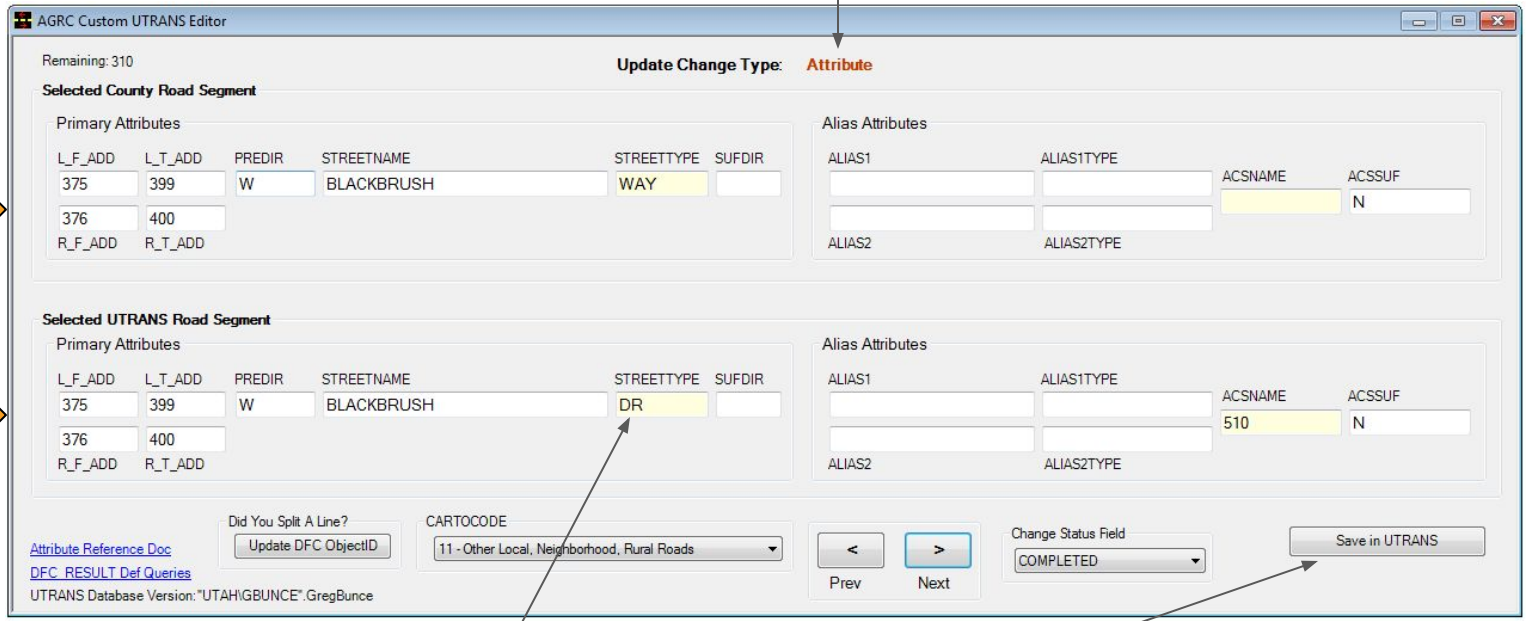
Load updates and changes into statewide roads database...

ArcMap Editing Environment

- Custom editor tool
- ArcObjects SDK and C#
- Tool provides a UI for the change detection output files
    - Iterate through changes
    - Visual inspection (features and attributes)
    - Update | Import | Ignore
    - Feedback loop

Load updates and changes into statewide roads database...

Change Type:
New, Attribute, Spatial, Attribute and Spatial



County Segment

AGRC Segment

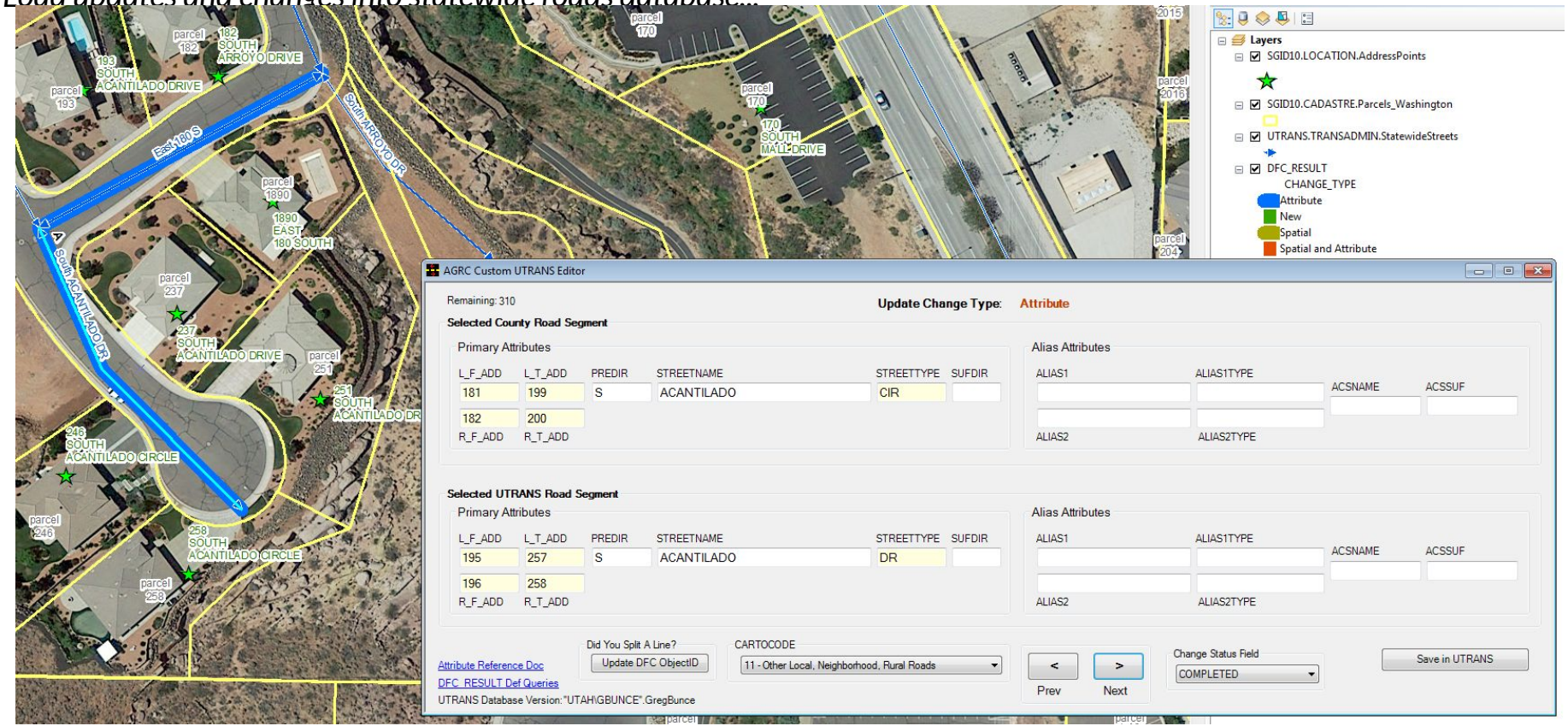
User can double-click the field name to transfer values from County segment.

Save Button: checks for expected values, formats, spatially assigns attributes (zip codes, address grid, cities, etc.)

Extract | Transform | Change Detection | **Reconcile and Load** | Publish

https://youtu.be/jZqsOUCc6XU
https://youtu.be/hbYOEnn9vMk

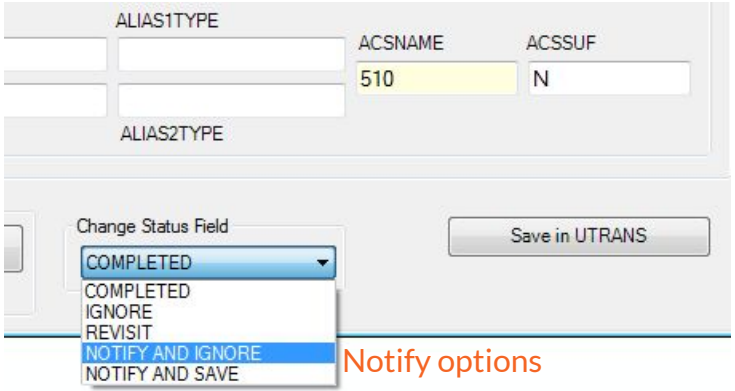
Load updates and changes into statewide roads database...



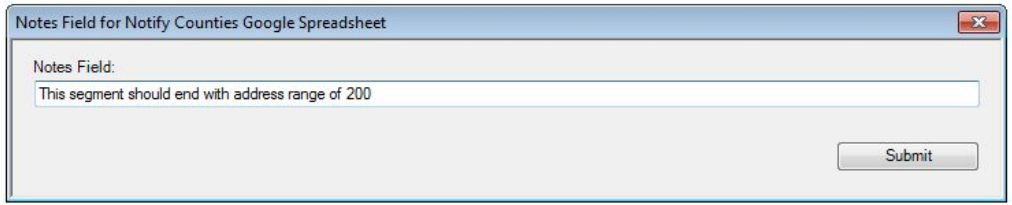
Extract | Transform | Change Detection | **Reconcile and Load** | Publish

Load updates and changes into statewide roads database...

Notify Agency >>> Resolve Difference

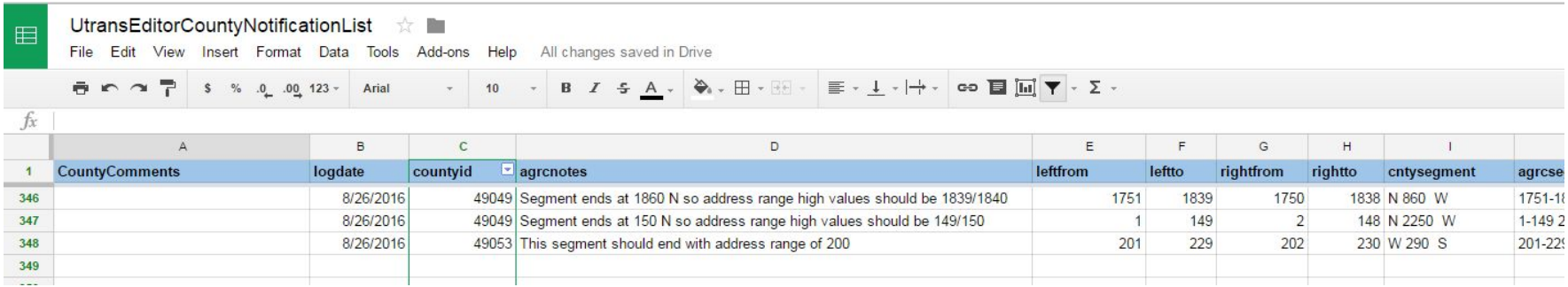


Notify options



Specify a note/description

Provide agency spreadsheet to inspect



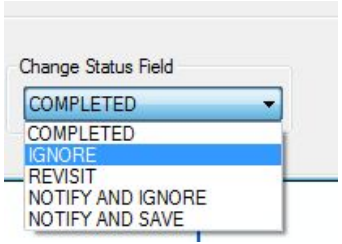
	A	B	C	D	E	F	G	H	I	
1	CountyComments	logdate	countyid	agrcnotes	leftfrom	leftto	rightfrom	rightto	cntysegment	agrcse
346		8/26/2016	49049	Segment ends at 1860 N so address range high values should be 1839/1840	1751	1839	1750	1838	N 860 W	1751-18
347		8/26/2016	49049	Segment ends at 150 N so address range high values should be 149/150	1	149	2	148	N 2250 W	1-149 2
348		8/26/2016	49053	This segment should end with address range of 200	201	229	202	230	W 290 S	201-229
349										

Load updates and changes into statewide roads database...

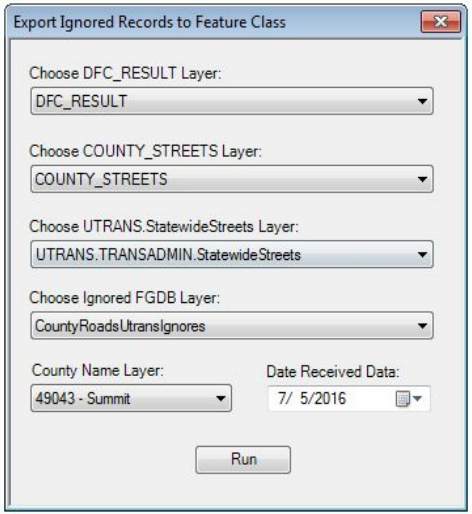
Ignore Process

- When ignoring a difference, log the transaction
- The idea is to not flag/inspect the segment again if we've ignored it in the past
- When we get the agency's data again, and if their data and our data is exactly the same (spatial and attributes), we have the option to utilize the ignore log to remove segments from the process

Ignore option on editor tool



Additional custom tool to preserve and log the segments we have ignored

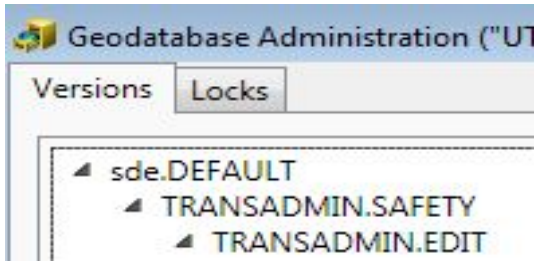


Publish the data to SGID and FTP sites...

Roll-up the editing database

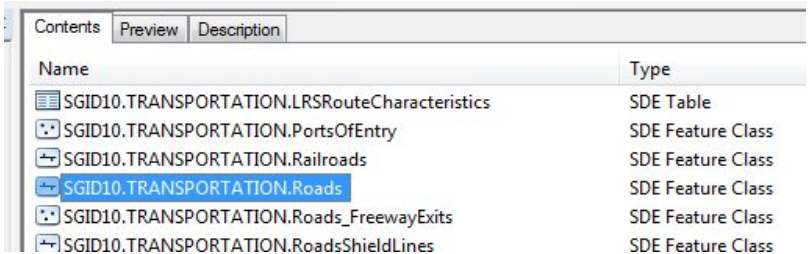
- Push all user versions to the Edit version (reconcile and post)
- Roll all versions to sde. DEFAULT
- Delete all child versions

Editing Database



… user version
… user version
… user version
… user version

SGID Database

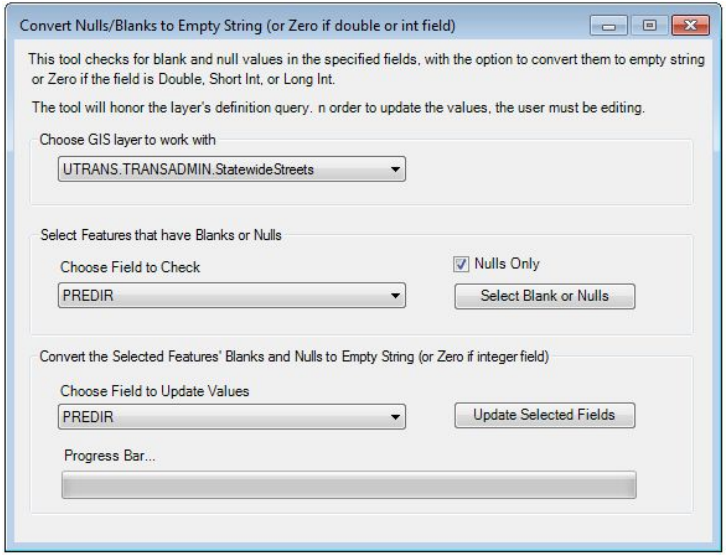


Extract | Transform | Change Detection | Reconcile and Load | **Publish**

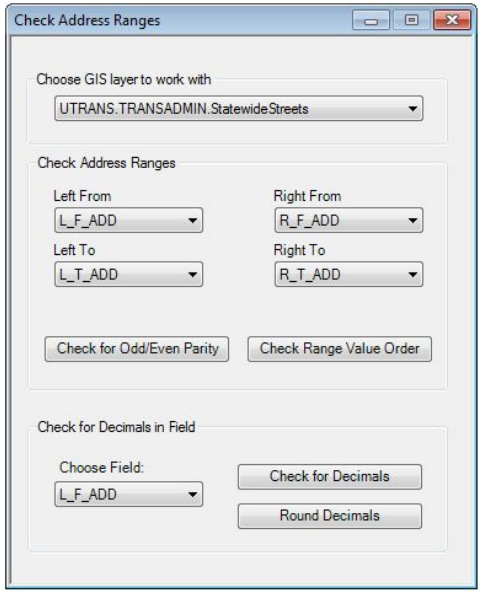
Publish the data to SGID and FTP sites...

Perform final quality checks

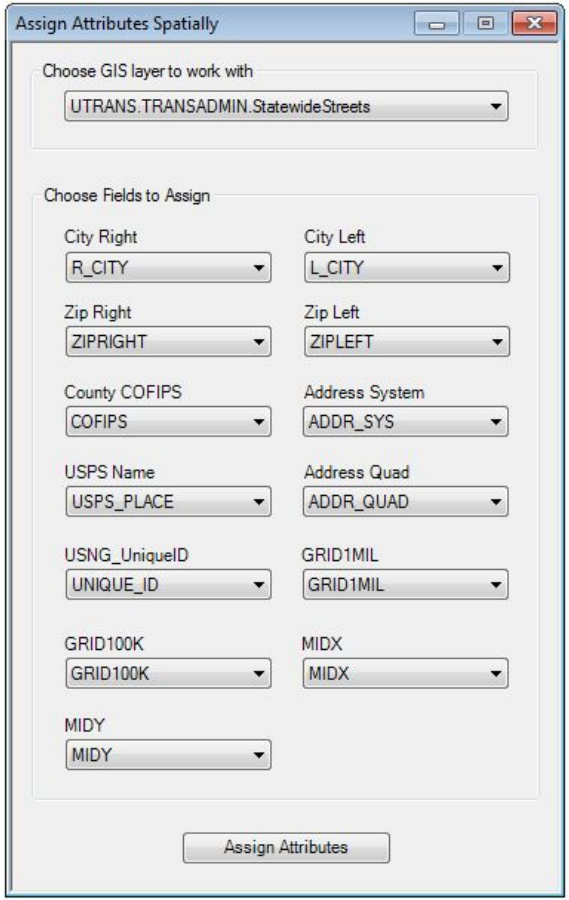
- Null values and empty ranges
- Range parity and order
- Missing spatial attributes
- UniqueID



Nulls and Blanks



Check Ranges



Assign Spatial

Looking Forward

Multi-User Editing

trusted editors

Direct user input and feedback

trusted contributors

Greater Efficiency

less processing

More frequent updates

semi-live data, decrease shelf-life

ArcGIS Pro and web editing

~~Roads~~ as a web service

NexGen911 and GIS (new schema)

Questions?

Statewide Roads Dataset

gis.utah.gov/data/sgid-transportation/roads-system

Github Repo to custom ArcMap tool (arcobjects, c#)

github.com/gregbunce/UtransEditorArcMap

Contact Info

gbunce@utah.gov

Thank You!