
Aggregating Utah's Statewide Roads Dataset

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• 05.11.2017 • UGIC 2017 •



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

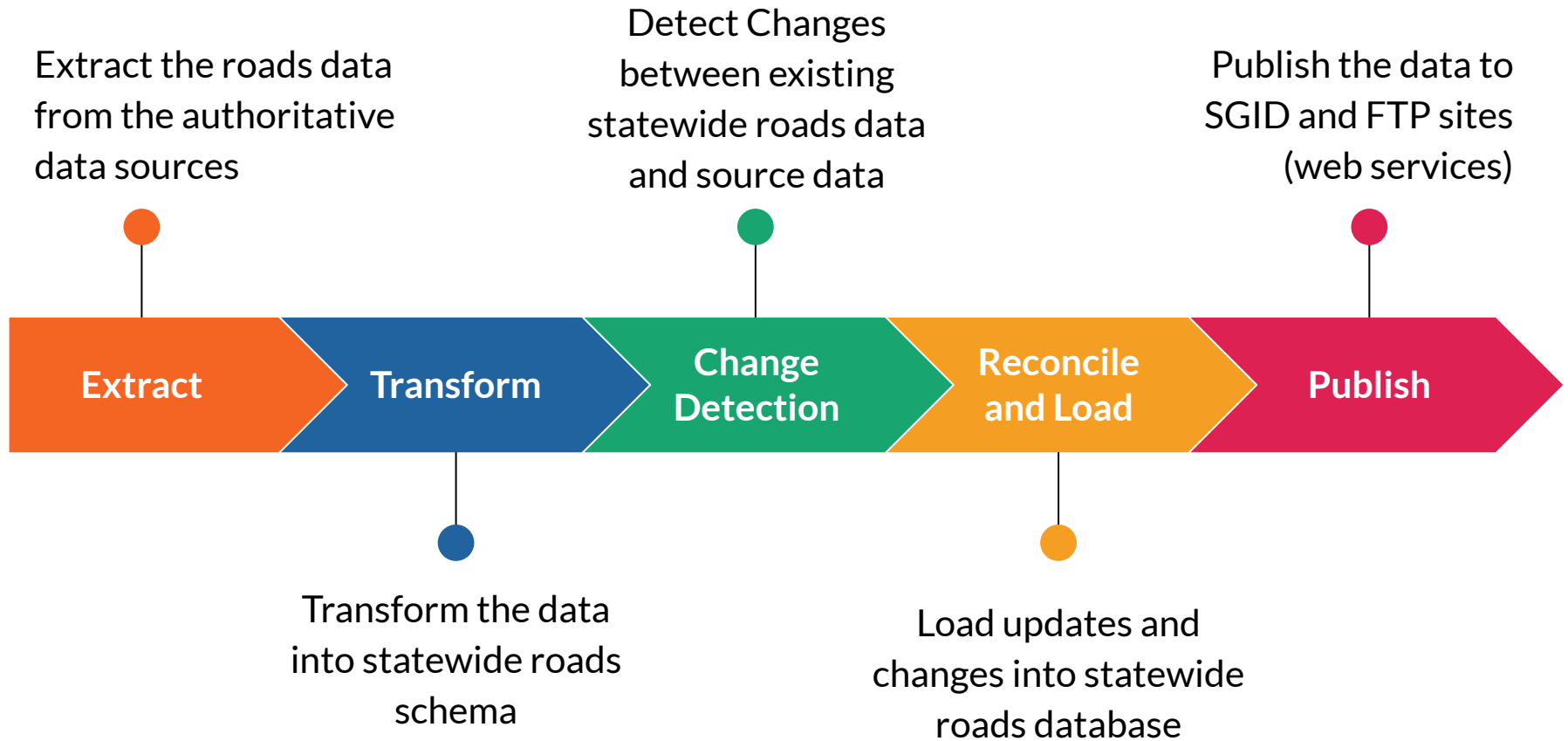
VECC (Valley Emergency Communications Center)

UDOT

Data Users

Blue Stakes of Utah (811)

911 Community and Dispatch Centers



Extract

Transform

Change
Detection

Reconcile
and Load

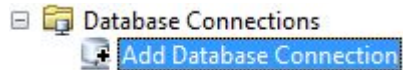
Publish

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

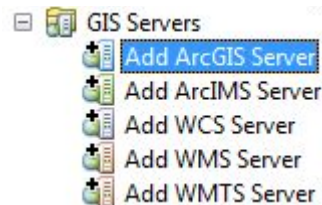
Current Forms of Data Extraction

- 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)

SDE



GeoService



AGOL

Feature Layer (hosted)

Open in ArcGIS Desktop

Publish

Create View

Export Data

Share

Metadata

FTP/Download

Utah County GIS Data Layers and File Download

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

Email



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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
#index
rows = arcpy.da.UpdateCursor (fc, ["PREDIR", "Pre_Dir", "STREETNAME", "Street_Nam", "STREETTYPE", "Type", "SUFDIR", "Suf_Dir", "MODIFYDATE",
                                     "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()
        if row[1].startswith('L'):
            row[0] = 'L_' + row[0]
```

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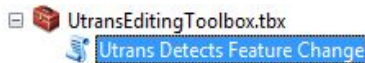
Publish

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

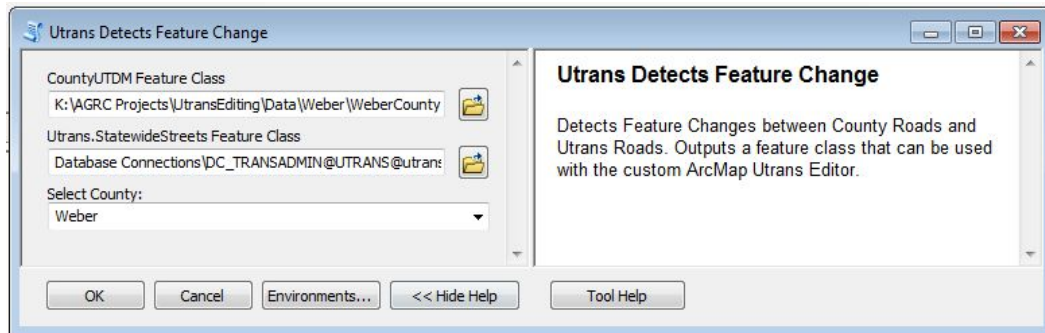
Detect Feature Changes

- 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



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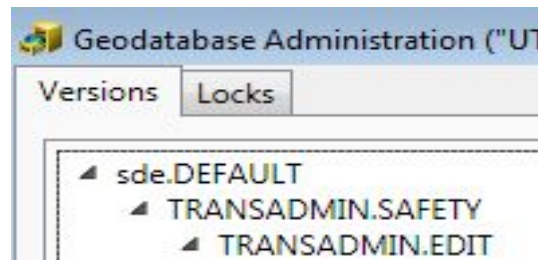
Publish

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

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Load updates and changes into statewide roads database...

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

County
Segment

AGRC
Segment

AGRC Custom UTRANS Editor

Remaining: 310

Update Change Type: **Attribute**

Selected County Road Segment

Primary Attributes

L_F_ADD	L_T_ADD	PREDIR	STREETNAME	STREETTYPE	SUFDIR
375	399	W	BLACKBRUSH	WAY	
376	400				
R_F_ADD	R_T_ADD				

Alias Attributes

ALIAS1	ALIAS1TYPE	ACSNAME	ACSSUF
			N
ALIAS2	ALIAS2TYPE		

Selected UTRANS Road Segment

Primary Attributes

L_F_ADD	L_T_ADD	PREDIR	STREETNAME	STREETTYPE	SUFDIR
375	399	W	BLACKBRUSH	DR	
376	400				
R_F_ADD	R_T_ADD				

Alias Attributes

ALIAS1	ALIAS1TYPE	ACSNAME	ACSSUF
		510	N
ALIAS2	ALIAS2TYPE		

Did You Split A Line?

CARTOCODE
11 - Other Local, Neighborhood, Rural Roads

Attribute Reference Doc
DFC_RESULT Def Queries

UTRANS Database Version: "UTAH\GBUNCE".GregBunce

Change Status Field
COMPLETED

Save in UTRANS

Prev Next

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.)

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<https://youtu.be/iZqsOUCc6XU>
<https://youtu.be/hbYOEnn9vMk>

Load updates and changes into statewide roads database...

AGRC Custom UTRANS Editor

Remaining: 310

Update Change Type: Attribute

Selected County Road Segment

Primary Attributes

L_F_ADD	L_T_ADD	PREDIR	STREETNAME	STREETTYPE	SUFDIR
181	199	S	ACANTILADO	CIR	
182	200				
R_F_ADD	R_T_ADD				

Alias Attributes

ALIAS1	ALIAS1TYPE	ACSNAME	ACSSUF
ALIAS2	ALIAS2TYPE		

Selected UTRANS Road Segment

Primary Attributes

L_F_ADD	L_T_ADD	PREDIR	STREETNAME	STREETTYPE	SUFDIR
195	257	S	ACANTILADO	DR	
196	258				
R_F_ADD	R_T_ADD				

Alias Attributes

ALIAS1	ALIAS1TYPE	ACSNAME	ACSSUF
ALIAS2	ALIAS2TYPE		

Did You Split A Line?

CARTOCODE
 11 - Other Local, Neighborhood, Rural Roads

Attribute Reference Doc
 DFC_RESULT Def Queries

UTRANS Database Version: "UTAH\GBUNCE": GregBunce

Change Status Field
 COMPLETED

Save in UTRANS

Prev Next

Notify Agency >>> Resolve Difference

Notes Field for Notify Counties Google Spreadsheet

Notes Field:

This segment should end with address range of 200

Submit

Provide agency spreadsheet to inspect

[illegible]

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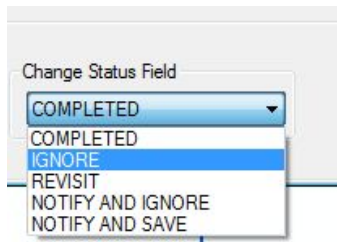
Publish

Load updates and changes into statewide roads database...

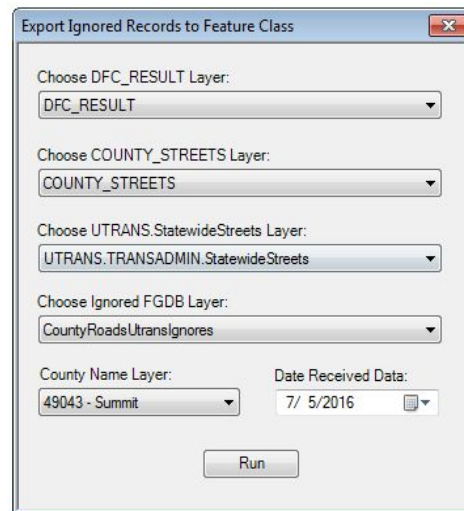
Ignore Process

- 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



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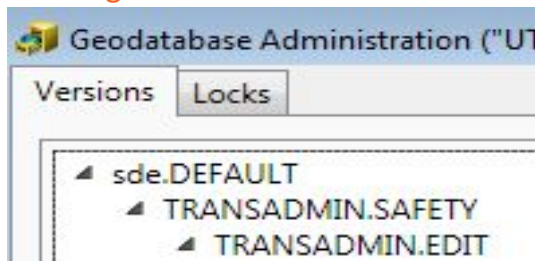
Publish

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



SGID Database

Contents		Preview	Description
Name	Type		
SGID10.TRANSPORTATION.LRSRouteCharacteristics	SDE Table		
SGID10.TRANSPORTATION.PortsOfEntry	SDE Feature Class		
SGID10.TRANSPORTATION.Railroads	SDE Feature Class		
SGID10.TRANSPORTATION.Roads	SDE Feature Class		
SGID10.TRANSPORTATION.Roads_FreewayExits	SDE Feature Class		
SGID10.TRANSPORTATION.RoadsShieldLines	SDE Feature Class		

Extract

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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

Convert Nulls/Blanks to Empty String (or Zero if double or int field)

This tool checks for blank and null values in the specified fields, with the option to convert them to empty string or Zero if the field is Double, Short Int, or Long Int.

The tool will honor the layer's definition query. In order to update the values, the user must be editing.

Choose GIS layer to work with:
UTRANS.TRANSADMIN.StatewideStreets

Select Features that have Blanks or Nulls:
Choose Field to Check: PREDIR
☒ Nulls Only
Select Blank or Nulls

Convert the Selected Features' Blanks and Nulls to Empty String (or Zero if integer field):
Choose Field to Update Values: PREDIR
Update Selected Fields

Progress Bar...

Nulls and Blanks

Check Address Ranges

Choose GIS layer to work with:
UTRANS.TRANSADMIN.StatewideStreets

Check Address Ranges:
Left From: L_F_ADD
Right From: R_F_ADD
Left To: L_T_ADD
Right To: R_T_ADD
Check for Odd/Even Parity
Check Range Value Order

Check for Decimals in Field:
Choose Field: L_F_ADD
Check for Decimals
Round Decimals

Check Ranges

Assign Attributes Spatially

Choose GIS layer to work with:
UTRANS.TRANSADMIN.StatewideStreets

Choose Fields to Assign:

City Right: R_CITY	City Left: L_CITY
Zip Right: ZIPRIGHT	Zip Left: ZIPLEFT
County COFIPS: COFIPS	Address System: ADDR_SYS
USPS Name: USPS_PLACE	Address Quad: ADDR_QUAD
USNG_UniqueID: UNIQUE_ID	GRID1MIL: GRID1MIL
GRID100K: GRID100K	MIDX: MIDX
MIDY: MIDY	

Assign Attributes

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

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**Thank
You!**