



GS6593 - Show Me How - Manage Design Data and Update Assets in GIS

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Description How many times do we re-create and re-engineer design data? Wouldn't it be nice to work with Autodesk, Inc., design tools and directly use existing geographic information system (GIS) data to store and retrieve data regardless of data format? There is always a difference between the design-mode land GIS model that makes this process costly and inefficient. This class will demonstrate how you can configure and use the AcClassify GIS data utility to translate data (round-trip and on the fly) to and from your enterprise GIS. You will learn how to use the AcClassify data utility to define profiles that encapsulate the complexities of data model transformation, and you will see how AcClassify works with the current AutoCAD Utility Design software data exchange (DX) adaptor to create a smooth workflow. You will also see how to use AcClassify for many other dynamic transformations, including those between Autodesk design tools and the cloud.

Learning Objectives

At the end of this class, you will be able to:

- Learn how to prepare for data model transformation between disparate systems
- Explore and learn how to configure and deploy the AcClassify tool
- Learn to identify the principles of data exchange between systems
- Learn how to streamline the workflow between design and geographic information system

About the Speaker

Clayton Hotson is a Solution Architect/Software Engineer working within the Americas Autodesk Consulting team. Clayton has been an engineer with Autodesk for the last 15 years supporting CAD and GIS workflows.

Overview and Limitations of the Current Data Mapping Tools in Autodesk Utility Design (AUD)

What is Data Exchange (DX) in Autodesk Utility Design?

Data exchange is a component introduced in Autodesk Utility Design (AUD) 2014 which allows users to map and exchange data between AUD and external FDO (Feature data source) sources.

It is available in the “Configuration” tab on the ribbons.



Figure 1 - DX Mapping Tools

What are its capabilities?

- Allow mapping of GIS features to AUD features (reverse map too)
- Import GIS data to AUD
- Keep track of the foreign keys and GIS Ids
- Keep track of changes performed on GIS features and new AUD features
- Merge back to Source selectively using a UI

What it cannot do today?

- Complex mappings
- Attribute tables without geometry
- Non-FDO data sources
- Multiple source schemas

DX is suitable as a data transport system when schemas in the source are similar in structure to the AUD schema. **However**, when data representation differs markedly between the source GIS and AUD, the capabilities of DX are too limited to support translation.

Overview and Limitations of the Current Data Mapping Tools (DX)

Example of complex mapping

Figure 2 depicts the complexities of a bi-directional mapping of a common electrical component between ArcFM and AUD. The differences in the representation of a common electrical conductor require comprehensive mapping capabilities. In the example shown, a single conductor in ArcFM (upper half) must map to (at least) 3 tables in AUD. On the return trip, those same three table entries (lower half) must map back to a single table in ArcFM, but may be one of several depending on the properties of the conductor itself.

The Data Exchange (DX) data-mapping feature of AUD is not capable of this specific sort of mapping.

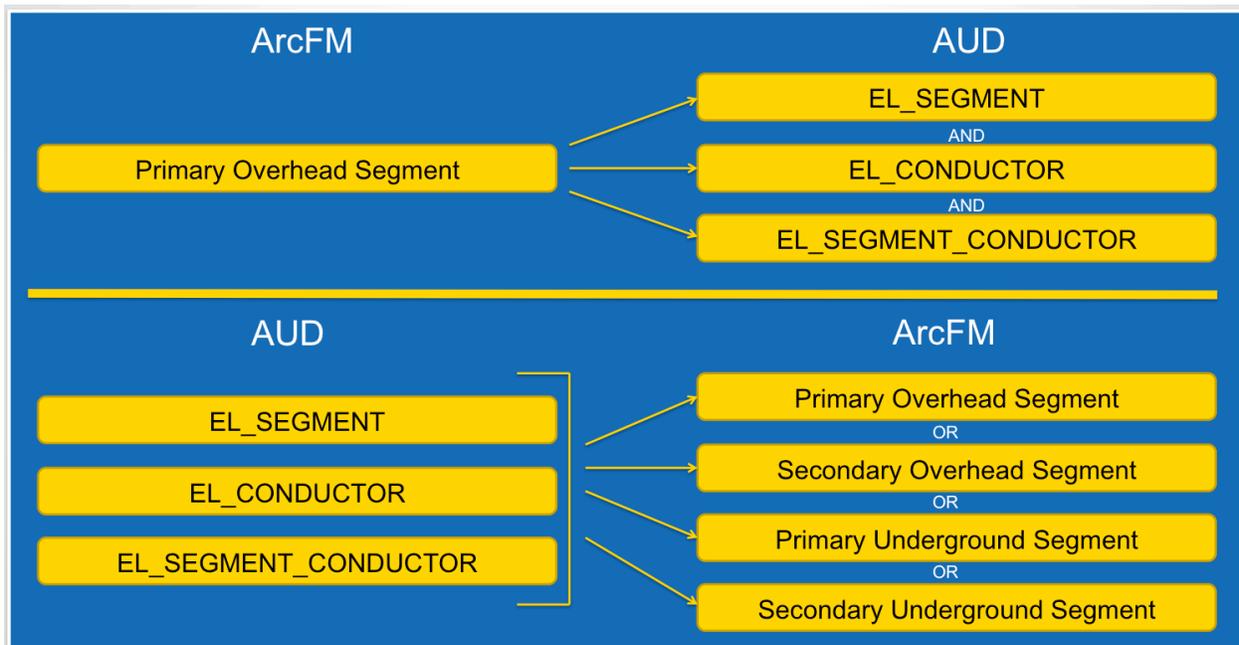


Figure 2 - ArcFM to AUD and Back

What is AcClassify?

AcClassify is a general-purpose data conversion utility that uses a neutral SQL language derivation to express complex transforms between data systems. It is typically used as a data translation layer between FDO systems and AUD, and is also capable of transforms between AutoCAD DWG data and GIS systems.

More specifically, AcClassify is a translation engine placed between two data abstraction layers which represent data schema tables as managed (.NET) class libraries so that type reflection may be used to interrogate the data as though it were exposed explicitly as code. This allows the data table records to be treated as class instances, and the table attributes to be similarly treated as class properties.

Abstracting data in this way affords tremendous flexibility toward representing data in its various incarnations.

AcClassify has been maintained by the **Autodesk Consulting** team over the last several years as an in-house support tool for complex migrations for customers and partners. It was originally designed to support one-way migrations between CAD and GIS, but has recently been updated to support the full round-trip functionality.

What can AcClassify do?

AcClassify represents the mapping between two systems as a *profile*, which encapsulates all the rules between tables, rows and values. Once successfully defined, a single profile may be used to perform a mapping transaction between any specified set of data, such as a spatial query executed by a normal user.

The profiles, therefore, must be defined by an **administrator**, familiar with the data systems, and provided to users that must work with the *data* contained in those systems. Once a profile is in place, a **user** may perform the translations seamlessly without any knowledge that a transform layer is at work between the systems.

One-to-Many Mappings

Table mappings in AcClassify may be setup to map a single source table to multiple target tables such as shown in the upper half of Figure 2. In such cases, AcClassify must insert several rows into several tables for a given source row. Any number of mappings may be defined this way in AcClassify

Many-to-One Mappings

Similarly, there are times when multiple tables in the source must be mapped in to a single table on the target, as is shown in the lower half of Figure 2. AcClassify can use inter-table references as *pointers* (exactly like pointer references in code) to other table records, so that expression definitions may be defined as quickly as possible. These references may be used to treat multiple records as one, for insertion in to target tables.

Defining an AcClassify Profile

AcClassify profiles are defined by a data administrator using the AcClassify mapping editor, depicted in Figure 3. When the data sources are hooked up, AcClassify can interrogate them to obtain the *source* and *target* schemas, and allows the profile designer the ability to link a source to a target, and define mappings between individual properties of each with as much complexity (see Figure 5) as required.

For example, an ArcFM data source will expose its schema for AcClassify to provide to the profile designer for mapping to the (quite different) AUD schema. Once mapping expressions have been created for the ArcFM to AUD direction, the profile designer can switch directions and define the reverse rules, supporting mapping from AUD *back* to ArcFM (reverse mapping shown in Figure 4).

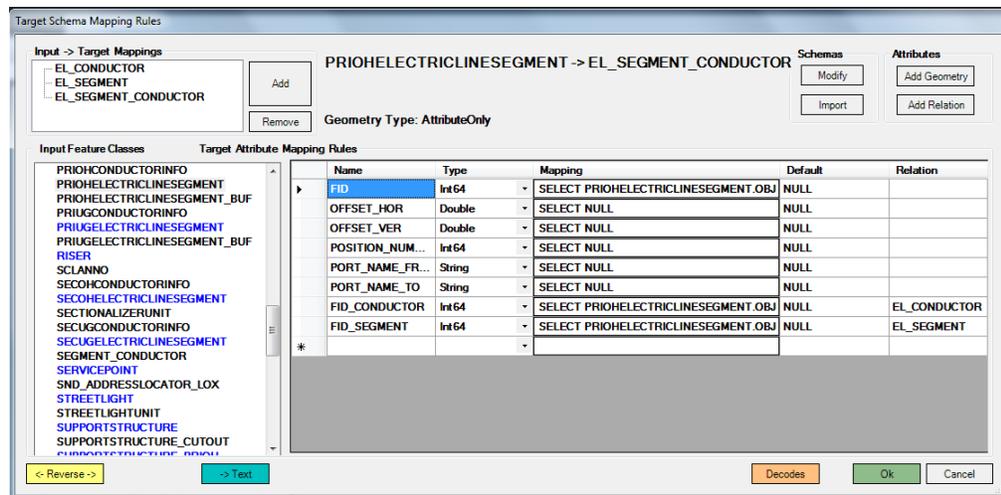


Figure 3 - Many to One Mapping in AcClassify Profile Designer

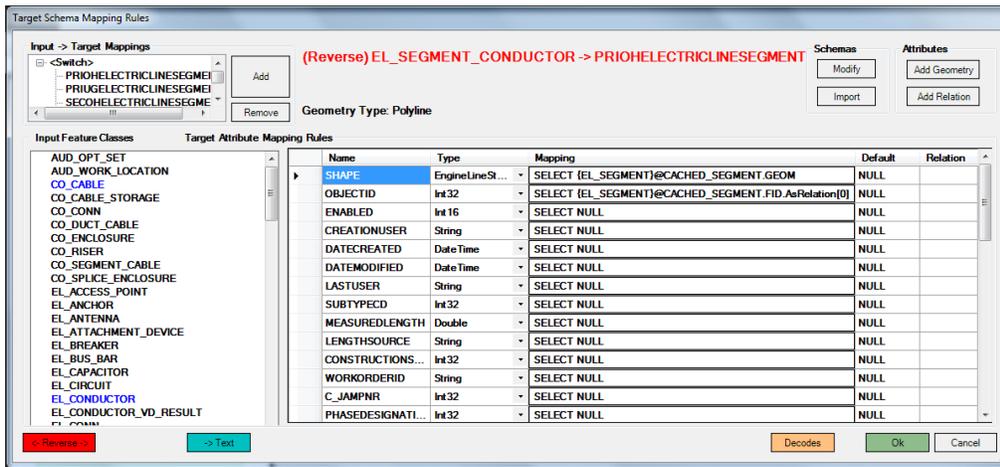


Figure 4 - Complex Reverse Mapping of a Table in AcClassify profile designer

For each property value migrated between the two systems, a single migration statement may be defined. Typically the statement is simple, such as:

```
SELECT InputTable.Property;
```

AcClassify can treat any property as a proper value, and therefore invoke inline functions on them:

```
SELECT InputTable.StringValue.Left[5]; // Retrieve the first 5 characters of the StringValue property.
```

As described above in Many-To-One mappings, you may define statements that obtain values from an entirely different table. Such statements require a narrowing clause (WHERE) to specify which row is to be used:

```
SELECT OtherTable.OtherValue FROM OtherTable WHERE OtherTable.FID = ThisTable.OtherTableFID;
```

In this example, you can see how a given relation property (OtherTableFID) in the current table can be used to query a row in a separate table (OtherTable), and obtain the value (OtherValue) as though it were a property in the current table.

In complex scenarios, a CASE – WHEN ladder may be built to support multiple possibilities for mapping. This, and the SQL expression editor, is shown in Figure 5

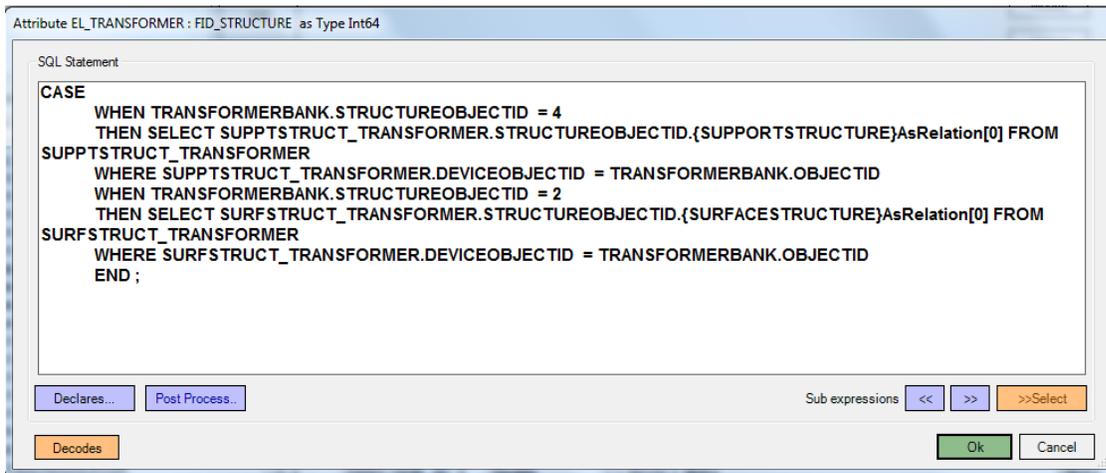


Figure 5 - Mapping a single value can be complex in some cases

Using an AcClassify as a Transform in AUD – a typical case for normal user

Note – For optimal use in AUD and Map, AcClassify defines its *own* FDO provider to expose data as a transform. This provider shows up in the AUD user interface as a normal FDO provider to provide minimal change to the standard AUD workflows.

Here are typical steps to import transformed data using AcClassify with a predefined profile:

- 1) Specify a data connection to the AcClassify FDO using the AcClassify FDO provider (See Figure 6) - Typically, defaults may be accepted (Notice the choice of profile, SCL3 shown).

Once connected (pressing the 'Connect' button), the data connection may be used by the DX transform as normal. Note, that since AcClassify's output is obtained from AUD directly, there is NO mapping required in DX, since the schemas are *identical*. i.e. there is no extra work.

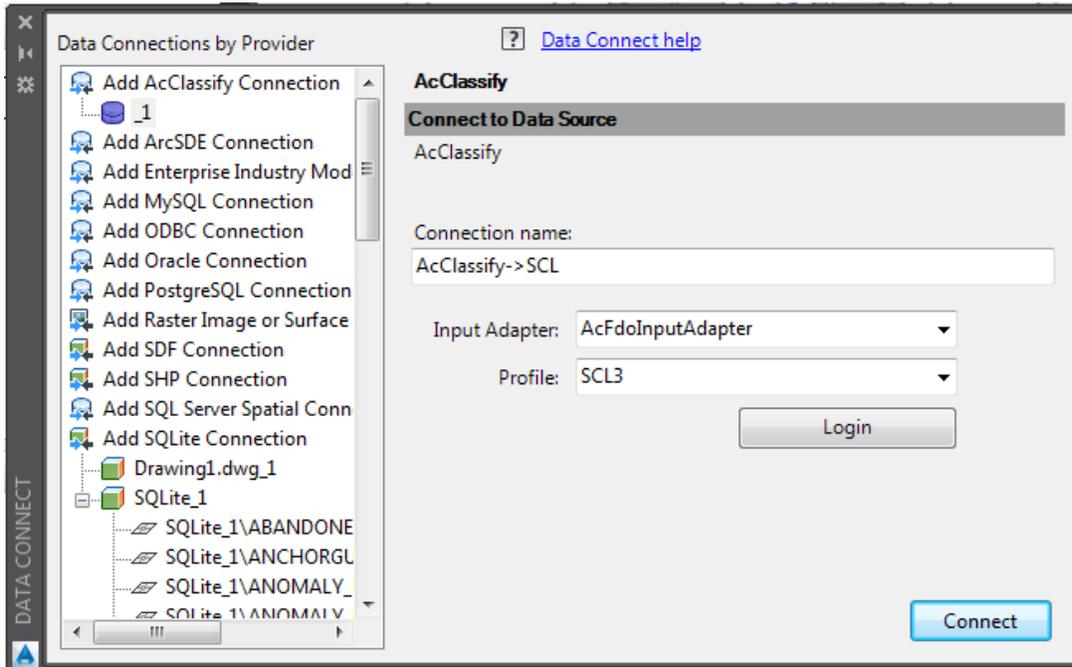


Figure 6 - AcClassify FDO Provider and connection parameters.

- 2) Use the “Extract Existing” function (see Figure 1) and specify an area of interest for data extraction. Note – typically in AUD, a template DWG is predefined with the connection and DX mapping information – the same is true for an AcClassify connection.

Figure 7 shows AUD interpreting AcClassify’s transformed output as direct input to the AUD schema; the direct result of “Extract Existing”.

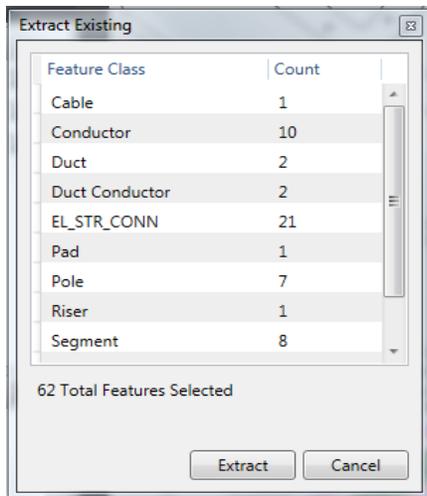


Figure 7 - Extract Existing from AUD through AcClassify

- 3) Once complete, the data that resides in the GIS has been transformed to AUD features using the rules defined in the chosen profile (e.g. SCL3). Figure 8 shows the inserted poles, conductors and transformers among other AUD features.

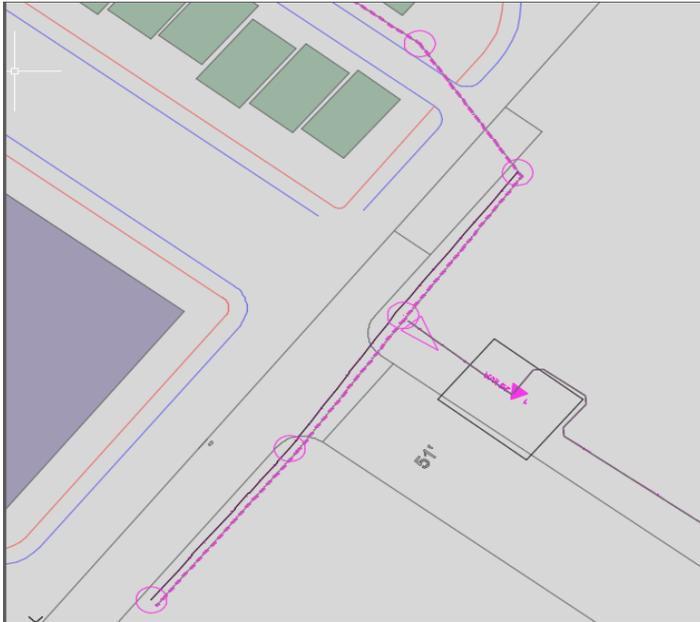


Figure 8 - Electrical Features inserted into AUD from an independent GIS

- 4) Round trip of data either updated or added in the editor may be written back to the GIS using the reverse profile (also contained in SCL3) defined by the profile designer.

How can I use AcClassify Today?

Please contact **Mr. Ram Ramalingam**, Solution Architect in the Autodesk Consulting Americas team for more information about using AcClassify for data transformation in your environments.

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Thank You!!