FME Training for Esri Utility Network Migration

Safe Software training team: Ryan Cragg Trent Kading Mark Stoakes

GOALS

- Give attendees a **good understanding of the Esri UN migration workspaces** so that you can modify them for your datasets that need to be migrated into the UN Asset Packages
- Introduce the key aspects of FME Workbench for newer FME users
- Review the primary transformation tools used in the migration workspaces
- Deep dive into Water migration workspace (Simple migration)
- Deeper dive into Electric migration workspace (Basic migration)

By the end of the training you should be able to edit the water, gas & electric migration workspaces to suit your source data. Understand the resources available to you if you need assistance.

NOT THE GOAL

We will NOT be covering:

- ArcPro and editing UN data
- Nuances of UN data model schemas
- Esri Data Reviewer Validating ArcGIS

AGENDA

Schedule is 8:00 - 11:00 PST with breaks

Day 1 (Monday)

Ryan

Introduction to FME Desktop Workbench

Day 2 (Tuesday)

Ryan

Dive into transformation tools and other workbench functionality used in the Esri UN migration workspaces

Day 3 (Wednesday) Trent n' Mark

Getting started with Utility Network migrations and deep dive into • water migration and the schema mapping

Day 4 (Thursday) Mark n' Trent

Deeper dive into electric migration and the schema mapping

RESOURCES

Day 1:

Introduction to FME Desktop Workbench tutorial

Day 2:

• Continued from Day 1

Day 3:

• Migration Tools PDF located under the following directory:

C:\FMEData2019\Resources\EsriUN

Day 4:

 Electric Documentation located in: C:\FMEData2019\Resources\EsriUN

GOTOWEBINAR HOUSEKEEPING



AUDIENCE PARTICIPATION



Open and hide your control panel.

Join audio:

- Choose "Mic & Speakers" to use VoIP
- Choose "Telephone" and dial using the information provided.

Submit questions and comments via the Questions panel.

TIME FOR QUESTIONS



Please continue to submit your text questions and comments using the Questions Panel.

Raising your hand is reserved for impromptu polls.

We'll use the Chat panel to pass links to resources and any other tips we might have.

JARGON

- Feature The smallest piece of data.
- **Feature Type** A collection of features. Usually called a layer, level, table, feature class, etc.
- **Dataset** Where your data is stored. A file, folder, server, etc.
- **Inspector** A tool for viewing your data.
- **Workbench** A tool for transforming your data, using a data flow diagram.
- **Canvas** Where you create your data flow diagram.
- **Transformers** Tools in a data flow diagram that filter features, change attributes, or change geometry.
- Feature Connector Lines used to connect feature types and transformers.

Virtual Machines

- Please ensure you are logged into your **FME virtual machine**
- If you have, please join us at 8:20
- If you have not, please go to fme.ly/fmevm and request one
- If you have requested one, but cannot access it, please ask for help in the GoToWebinar Questions panel now



That's all folks! Let's begin :)

ArcGIS Licensing using ArcPro

ESU590151892 ArcGIS Pro Advanced Single Use

And run C:\temp\FMEDataDownloadInstall.bat from the command line

Thanks to Esri for supplying the training licenses

Open ArcGIS Pro

Wait...wait...wait...

Click Add...



Click Add again

Then click Close



Configure your licensing options

It's the tiny link, way at the bottom



Single Use License

Advanced

Click Authorize

Licensing

Configure Authorization

Select your authorization type from the drop-down list below:

		Leanninoie
Single Use License		
Named User License		
Concurrent Use License		
	Single Use License Named User License Concurrent Use License	Single Use License Named User License Concurrent Use License

Advanced Standard Basic

This lists the software installed, along with its authorization status and expiration date. Double-click a feature for more information.

Licensed	Expires	1
No	N/A	
Machine ID		
	Licensed No No No No No No No No No No No No No	Licensed Expires No N/A No N/A

Click Next

ftware Authorization Wizard	
Authorization Options You must authorize the software prior to use. Select from the options	below.
Authorization Options	
I have installed my software and need to authorize it.	
O I have already authorized the software and need to authorize additio	nal extensions.
O I have received an authorization file and am now ready to finish the process.	authorization
	Browse

Click Next

Authorization Method

Select the method you want to use to authorize the software.

(e) Authorize with Esri now using the Internet. (This automatic method is the easiest way to authorize. It requires an Internet connection.)

O Authorize at Esri's website or by email to receive your authorization file.

O Authorize your software from a local license server.



Cancel

Fill this out

Sorry

Don't skip the fields with *

*First Name:	I	
*Last Name:		
*Organization:		
Department:		
*Address 1:		
Address 2:		
*City:		
*State/Province:		
*Zip/Postal Code:		
*Location:		~
*Phone Number:		
*Email:		
Comment:		
	Dptional user-defined authorization des	scription.

This one too

Sorry

Software Authorization Wiza	ard	>
Authorization informatio We will use the following the software. (* required	n (continued) g information to verify our records and authorize your use of field)	
*Your Organization:	Commercial/Private Business	~
*Your Organization: *Your Industry:	Commercial/Private Business GIS Services	~ ~

The personal information you supplied is protected under Esn's privacy policy. If you want to view Esn's privacy policy, click the View button below.

View...

< Back Next >

Cancel

Almost done

ESU590151892



Click Next

We don't need any extensions

Let's not all hit Next at the same time.

The Esri license server is easily overwhelmed.

Options I do not want to authorize any extensions at this time. I have authorization number(s) to authorize one or more extensions. 	
Extensions	
Feature Authorization Number	
3D Analyst	
Spatial Analyst	
Network Analyst	
Publisher	
Data Interoperability	
Geostatistical Analyst	
Workflow Manager	
Data Reviewer	
< Back Next >	Cancel

Software Authorization Wizard

Authorizing Software

Finished in 3...

Click Finish

Authorizing Software				
Congratulations, your sof	tware has beer	n authorized ar	nd is now ready t	for use.

 \times

2...

Click OK

Licensing

Configure Authorization

Select your authorization type from the drop-down list below:

License Type Single Use License

Learn More

License Level

Select the Pro core product license level below:



This lists the software installed, along with its authorization status and expiration date. Double-click a feature for more information.

	Expires	
Yes	8/17/2019	_
No	N/A	
Machine ID		
	Yes No No No No No No No No No No No	Yes 8/17/2019 No N/A Machine ID No

1...

Click OK

The open ArcGIS Pro again



FME Training for Esri Utility Network Migration When Migration Workspace



ArcGIS Licensing using ArcPro (or ArcGIS Administrator for ArcGIS)

ESU590151892 ArcGIS Pro Advanced

Thanks to Esri for supplying the training licenses for this course

AGENDA

Schedule is 8:00 - 11:00 PST with a break

Day 1 (Monday) Ryan

Introduction to FME Desktop Workbench

Day 2 (Tuesday)

Dive into transformation tools and other workbench functionality used in the Esri UN migration workspaces

Day 3 (Wednesday)

- Trent n' Mark
- Getting started with Utility Network migrations and deep dive into • simple migration and the schema mapping

Day 4 (Thursday) Mark n' Trent

Deeper dive into electric migration and the schema mapping

TODAY'S GOALS



- Introduce the key aspects of FME Workbench
 - Review the primary transformation tools used in the migration workspaces
 - Deep dive into Water migration workspace (Simple migration)
 - $\circ~$ Getting Started with Asset Packages
 - Schema Mapping using spreadsheet
 - $\circ~$ Validating Asset Package
 - Applying/Staging Asset Package
 - Deeper dive into Electric migration workspace (Basic migration)

By the end of today you should have a good understanding of how to get started with the migration workflows including using the water migration workspace and the resulting Asset Package. You should be able to edit the key components of the workspace.

RESOURCES

Day 1:

Introduction to FME Desktop tutorial

Day 2:

• Continued from Day 1

Day 3:

 Migration Tools PDF located under the following directory: C:\FMEData2019\Resources\EsriUN\Simple\Document ation

Day 4:

• Electric Documentation located in:

C:\FMEData2019\Resources\EsriUN\TrainingDocs

• Examples:

C:\FMEData2019\Resources\EsriUN\Basic

Asset Packages 101

 Asset Packages deployed through ArcGIS Pro Projects via: <u>https://community.esri.com/message/769190-esri-utilityy-network-configuration-and-migration-tool-status</u>

 Water Asset Package found here: <u>http://solutions.arcgis.com/water/help/water-distributio</u> <u>n-utility-network-foundation/</u>

- Asset Package version tied to ArcGIS Pro release(important to remember)
- Pre-processing Asset Package changing the Spatial Reference of the provided Asset Package

Getting started with a Utility Network

• Create Utility Network Tool - creates a Utility Network class inside a Feature Dataset in your Enterprise Geodatabase with a Service Territory

• Stage Utility Network *automates the Creation tool highlighted above*

View the data in FME Data Inspector

- Open FME Inspector Data
- Format: Esri Geodatabase (File Geodb)
- Find the folder:

C:\FMEData2019\Resources\EsriUN\Simple \SourceData\SimpleUN_Training.gdb

• Select Feature Classes to display: WaterUtilityDistrict wControlValve wFitting wHydrant wLateralLine wMain wServiceConnection

View Source Data



Run the Water Migration workspace

• Find the folder:

C:\FMEData2019\Resources\EsriUN\Simple

- Open the workspace: WaterMigration.fmw
- Set Enable Feature Caching: Off



View Source Data


Water Migration Pattern



Simple Migration

Schema Mapping

- Prepare spreadsheet
- Plug and play Schema Mapping

Network topology

- Geometric Network (lines & junctions)
 - Handled by default(especially if source is a valid Geometric Network)
- Explicit network (associations between Assemblies, junctions & devices)
 - Few scenarios of this in Simple models
 - Pump Stations and Pumps

Schema Mapping: Setting Asset Group & Asset Type

Spreadsheet

1	UNFeatureClass	assetgroupValue	assetgroupDesc	assettypeValue
66	WaterDevice	9	Flushing and Blow Of	0
67	WaterDevice	9	Flushing and Blow Of	361
68	WaterDevice	9	Flushing and Blow Of	362
69	WaterDevice	9	Flushing and Blow Of	363
70	WaterDevice	9	Flushing and Blow Of	364
71	WaterDevice	9	Flushing and Blow Of	365
72	WaterDevice	19	Injection Facility	0
73	WaterDevice	19	Injection Facility	401
74	WaterDevice	19	Injection Facility	402
75	WaterDevice	50	Anode	0
76	WaterDevice	50	Anode	0
77	WaterDevice	51	Rectifier	0
78	WaterDevice	51	Rectifier	941
79	WaterDevice	52	Test Point	0
80	WaterDevice	52	Test Point	981

😤 SchemaMapper Parameters	
Create Actions To create an action, click Add,	and select an action type. Fill in the details in the subsequent dialog.
Actions	
Action	Description
Filter Features	FeatureTypeAttr = ArcGISFeatureClass
Filter Features	PrimaryAttrName = PrimaryAttrValue
Filter Features	SecondaryAttrName = SecondaryAttrValue
Filter Features	TertiaryAttrName = TertiaryAttrValue
Set New Attributes	assetgroupAttr = assetgroupValue
Set New Attributes	assetTypeAttr = assettypeValue
Cat Name Astalling and	Company Company Alter Street Street Street

2

×

assetTypeDescAttr = assettypeDesc Set New Attributes

Tip: Accurate mapping to asset group & asset type for both device (assembly) and unit tables (devices) really helps



Schema Mapping: Mapping Domains

Spreadsheet

ArcGISFeatureClass	ArcGISAttrName	UNAttrName	ArcGISDesc	ArcGISCode UNDesc	UNCode
	DIAMETER	DIAMETER	Unknown	0 Unknowr	n 0
	DIAMETER	DIAMETER	3/4"	0.75 3/4"	0.75
	DIAMETER	DIAMETER	1"	1 1"	1
	DIAMETER	DIAMETER	1 1/4"	1.25 1 1/4"	1.25
	DIAMETER	DIAMETER	1 1/2"	1.5 1 1/2"	1.5
	DIAMETER	DIAMETER	2"	2 2"	2
	DIAMETER	DIAMETER	2 1/2"	2.5 2 1/2"	2.5
	DIAMETER	DIAMETER	3"	3 3"	3
	DIAMETER	DIAMETER	4"	4 4"	4
	DIAMETER	DIAMETER	6"	6 6"	6
	DIAMETER	DIAMETER	8"	8 8"	8
	DIAMETER	DIAMETER	10"	10 10"	10
	DIAMETER	DIAMETER	12"	12 12"	12

SchemaMapper Parameters ? X Create Actions To create an action, click Add, and select an action type. Fill in the details in the subsequent dialog. Actions Action Description **Filter Features** Filter Features FeatureTypeAttr = ArcGISFeatureClass **Filter Features** SecondaryAttrName = SecondaryAttrValue Set New Attributes UNAttrName = UNCode + -

Tip: Domain mappings can be applied to single source feature classes or across all feature classes at once.

Schema Mapping Results





What we don't want

What we want.

Validate Asset Package

Import untools

ap= "Path to gdb"

untools.gptools.tools.AssetPackageToScript.run(ap)

Can also be found via: https://community.esri.com/docs/DOC-13155-validate-asset-package

Validate Asset Package



in(ap)

<u>rs155-validate-asset-package</u>

Wrap-up



Thanks for attending...

Editing the migration workspaces

- If you make *changes*, please share them with us
- *Need help* feel free to contact us

Tomorrow:

• Deep dive into Electric migration

Set-up for Electric

Start Arc Pro and show the data

FME Training for Esri Utility Network Migration Electric Migration Workspace



Safe Software training team: Ryan Cragg Trent Kading Mark Stoakes

Thanks also to John Long and John Alsup from Esri

Asset Packages 101

- Asset Packages deployed through ArcGIS Pro Projects via: <u>https://community.esri.com/message/769190-esri-u</u> <u>tility-network-configuration-and-migration-tool-statu</u> <u>S</u>
- Electric Asset Package found here: <u>https://solutions.arcgis.com/electric/help/electric-util</u> <u>ity-network-foundation/</u>

FME Geodatabase reader/writer licensing using ArcPro

ESU590151892 ArcGIS Pro Advanced Single Use

Thanks to Esri for supplying the training licenses

AGENDA

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Day 2 (Tuesday)

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Day 3 (Wednesday) Trent n' Mark

- Getting started with Utility Network migrations and deep dive into water migration and the schema mapping

Day 4 (Thursday)

Mark n' Trent

Deeper dive into electric migration and the schema mapping

TODAY'S GOALS



- Review the primary transformation tools used in the migration workspaces
- Deep dive into Water migration workspace (Simple migration)
- Deeper dive into Electric migration workspace (Basic migration)
 - $\circ~$ Schema mapping specific to Electric Migration
 - Topology issues
 - Creating Assemblies
 - Assembly definition XML
 - Exercises

By the end of today you should have a good understanding of the electric migration workspace. You should be able to edit the key parts of the electric migration workspace. Day 1:

Introduction to FME Workbench tutorial

RESOURCES

Day 2:

• Continued from Day 1

Day 3:

 Migration Tools PDF located under the following directory: C:\UNTraining\WaterMigration\Documentation\

Day 4:

- Working Folder: C:\FMEData2019\Resources\EsriUN\BasicV3
- Documentation located in:
 - C:\FMEData2019\Resources\EsriUN\BasicV3\Documentation

Resources

FME Training for Utility Networks

https://knowledge.safe.com/articles/72048/utility-network-migration-tools.html

Esri ArcGIS Pro Utility Network Migration

Tools

https://knowledge.safe.com/articles/72048/utility-network-migration-tools.html

Esri GeoNet - Utility Network Migration Status

Page

https://community.esri.com/thread/214206-esri-utility-network-configuration-andmigration-tool-status

• What is Esri Utility Network

http://pro.arcgis.com/en/pro-app/help/data/utility-network/what-is-a-utility-netwo rk-.htm

Introduction to Esri Asset Package

http://solutions.arcgis.com/utilities/help/utility-network-automation/asset-package -reference/an-overview-of-the-asset-package.htm

Documentation

Electric Distribution Utility Network Migration Tools Documentation.pdf Esri Utility Network_ Assembly XML Doc.pdf



Even More Resources

• Find the folder:

C:\FMEData2019\Resources\EsriUN\BasicV3

- Workspaces
 - B Rules Additions.fmw
 - Electric Migration V3.fmw
 - ElectricAssetPackageValidation v3.2.fmw
- Sub-Folders
 - AssemblyBuilder
 - AssetPackageTemplate
 - Documentation
 - Results
 - SampleData
 - SchemaMapper
 - + exercise folders 1-4



Which Version?

Electric Migration

It's very important to ensure you have the correct versions aligned, otherwise you might blow a fuse...:

- ArcPro
 - o **2.4**
- Data Interop extension (with ArcPro 2.4) **OR**
 - FME
 - 2019.0.2.0 Build 19260 or higher
 - WIN64 recommended
- Asset Package
 - Electric Asset Package 3.2

View the data in FME Data Inspector

- Open FME Inspector Data
- Format: Esri Geodatabase (File Geodb)
- Find the folder:

C:\FMEData2019\Resources\EsriUN\BasicV3 **SampleData**

- (geodb is a ZIP file!)
- Select Feature Classes to display: BusBar Fuse PriOHElectricLineSegment PriUGElectricLineSegment SecOHElectricLineSegment SecUGElectricLineSegment SecUGElectricLineSegment_Duct SupportStructure SurfaceStructure Switch SwitchingFacility Transformer UndergroundStructure DynamicProtectiveDevice FuseUnit
- Save table List using: Save as My Defaults
 - Find an object in Data Inspector **Fuse**: {EDCADCC6-A8D5-4348-91CE-268766799D85} **Switch Facility**: {0FE54F47-E32D-441A-ADBB-01167E789028} **Transformer**: {5B14398A-49FB-4E0A-A861-D25BD63566B6}
- Change Display Settings

View Source Data



Run the Electric Migration

- Find the folder: C:\FMEData2019\Resources\EsriUN\BasicV3
- Open the workspace: Electric MigrationV3.fmw
- Set Enable Feature Caching: Off Add toolbar icons...

File Edit View Readers Transform Writers Run Tools Help

- Run the workspace & check the parameters
- Check the results in Data Inspector
 Find Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85}
- Isolate the data with Test Data & Feature Caching : **On** Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85} Switch Facility: {0FE54F47-E32D-441A-ADBB-01167E789028} Transformer: {5B14398A-49FB-4E0A-A861-D25BD63566B6}

Step 1: ³ Run a Migration

Electric Migration Pattern



Basic Migration

Schema Mapping Network topology

- Geometric Network (lines & junctions)
- Explicit network (associations between junctions & devices)

Devices

• More complex objects (devices). An ArcGIS device (point geometry) becomes multiple assets:



Electric Migration

ArcGIS Device



UN Assembly / Support Structure



More complex devices





Electric Migration Results and Testing

- Step 2: Results & Testing
- Check the results in Data Inspector Find Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85}
- Check the Data Errors Excel Spreadsheet or Redline Geodb (disabled)



Electric Migration Results and Testing

Use Fewer Feature Classes

- Test one Feature Class at a time
 - Feature Types to Read, for example: Ο

BusBar Fuse FuseUnit PriOHElectricLineSegment

PriUGElectricLineSegment SecOHElectricLineSegment

SecUGElectricLineSegment

Test Runs & Debugging

Isolate the data with Test Data & Feature Caching : **On** Target Asset Package File Geodatabase: V3\Results\Electric_AssetPackageV3.2_Output.gdb' Fuse: {EDCADCC6-A8D5-4348-91CE-268766799D85} Asset Package Template Geodatabase: ate Electric AssetPackage Template3.2+rules.gdb' Switch Facility: {0FE54F47-E32D-441A-ADBB-01167E789028} Transformer: {5B14398A-49FB-4E0A-A861-D25BD63566B6}



Step 3: Results & Testing

ArcGIS Source File Geodatabase: SampleDataWapervilleElectric_2019_10_22.gdb.zip

Use All Data or Test Data: All Data

Schema Mapper Excel File: apper ElectricSchemaMapper V3_2 2019-11-07.xlsx*

Translation Parameter Values

User Parameters

X

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Electric Migration Workspace

▼ Source ArcGIS	▼ Schema Mapping	¢		ά.
Line Feature Classes	Clean-up source attrib	utes (AttributeManager)	Topology: Lines • Line cleaning • calculate line en	d angles (for device rotation)
Device Feature Classes + Unit tables	Set uppercase (BulkAt	tributerenamer)	Line / Device co Line Clipping (to Merge complex	onnectivity o accomodate assemblies) edges
Structure Feature Classes	Merge Device & Unit t Asset Group Descriptio (SchemaMapper - Asse	ables (Feature Merger) on & Asset Type Description mapping etGroup&Type sheet)	Topology: Devices • Junction conne • Junction Asset LinetoJunction • Validate Unit tal	ctivity logic type bokups (DatabaseJoiner -> sheet) bles (and assembly phase expansion)
Testing filters	Domain Mapping (Sche Attribute Mapping (Sc sheets)	emaMapper -> Domains sheet) hemaMapper -> Line/Device/etc.	Topology: Structures • Greate Attachm • Offset structure • create structure	ent Junction s a / attachment association
▼Assembly Builder	Ø	♥ Output: Staging Asset Package Database	¢	▼ Errors: Lines & Deviœs Validation
Merge Structuresto Assembly (FeatureMe Create Assembles, associations, internal as (AssemblyBuilder + XML)	erger)	Final lookups: • asset group and asset type code Devices. (SchemaMapper -> Ass • association type lookup (Databs	rs - junctions & etType sheet) eJoiner -> B_rules)	Errors & Warnings: • lines • devices • junctions • assemblies
Special Cases • facility associations (i.e. Switch Fac	ility)	Change case - upper or lower case (Bull	AttirbuteRenamer)	• devices
 create tap junctions create switch facility & busbar asso create UG Pad Mounted XFR junct associations 	ciations tions and	Geodb Writer: Asset Package Feature C	lasse s	

Electric Migration Workspace



Electric Migration Workspace

				etc.
Line Feature Classes	Clean-up source attributes	s (AttributeManager)	Schem	
Device Feature Classes + Unit tables	Set uppercase (BulkAttribu	ut eren amer)	• Close Map	ping Time
Structure Feature Classes	Merge Device & Unit table:	s (Feature Merger)	• Know	Ir source i
	Asset Group Description & (SchemaMapper - Asset Gro	Asset Type Description mapping oup&Type sheet)	• Understar	r source Arccus
Testing filters	Domain Mapping (Schemat	Mapper -> Domainssheet)	model - ass	d your target UN
	Attribute Mapping (Schem sheets)	haMapper-> Line/Device/etc.	Create a wel	ll defined asset type
▼Assembly Builder	(j)	7 Output: Staging Asset Packa	spreadsheet	cross-walk
Merge Structures to Assembly (FeatureMerger)		Final lookups: • asset group and asser	is Kbench!	open
Create Assemblies, associations, internal assets (AssemblyBuilder + XML)		• association type lookup	-> Asso (DatabæJoiner -> ->	
Special Cases • facility associations (i.e. Switch Facility) • create tap junctions		Change case - upper or lower c	ase (BulkAttirbuteRenamer)	
 create switch facility & busbar associatio create UG Pad Mounted XFR junctions associations 	and	Geodb Writer: Asset Package Fe	at ure Classes	

Schema Mapping

Did we mention that schema mapping is:

- Time consuming
- Very detailed
- It's time consuming
- It's very detailed
- You need to understand your existing ArcGIS data model
 - Did you use a non-standard data model?
- You need to understand the target Utility Network data model
 - Understand the Asset Group (Subtypes) & Asset Type (Domains)
 - Did you modify the standard UN Data model? Import new B-Rules

14	В	G H	L 1	L	M	N O	P	Q	R
1	UNFeatureClass	assetGroupCode assetGroupDesc	assetTypeCode assetTypeDesc	ArcGISFeatureClass	PrimaryAttrName	PrimaryAttrValue SecondaryAttrName	SecondaryAttrValue	TertiaryAttrName	TertiaryAttrV
407	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDES	IG 1		
408	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDES	IG 2	1	
409	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDES	IG 4		
410	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDES	IG 7	1	
411	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDES	IG 1		
412	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDES	IG 2	1	
413	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDES	IG 4	•	
414	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDES	IG 7	1	
415	ElectricDevice	37 Medium Voltage Switch	759 Underground Three Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDES	IG 7	PHASEDESIGNATION	
416	ElectricDevice	37 Medium Voltage Switch	760 Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDES	IG 5	PHASEDESIGNATION	
417	ElectricDevice	37 Medium Voltage Switch	760 Underground Three Phase Load Break	SwitchUnit	AGDevice SUBTYPE	5 AGDevice PHASEDES	IG 7	AGDevice CONSTRUCT	C Underground

You need to do the schema mapping whether you use FME or some other migration tool

Consider talking to your Esri support experts.

Schema Mapping: Setting Asset Group & Asset

- 14	В	G H	L	L L	M	NO	Р	Q	R
1	UNFeatureClass	assetGroupCode_assetGroupDesc	assetTypeCode assetTypeDesc	ArcGISFeatureClass	PrimaryAttrName	PrimaryAttrValue SecondaryAttrName	SecondaryAttrValue	TertiaryAttrName	TertiaryAttrValu
407	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDESIG	G 1		
408	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDESIG	3 2		
409	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDESIC	3 4		
410	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDESIC	3 7		
411	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDESIC	G 1		
412	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDESIC	G 2		
413	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDESIC	G 4		
414	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDESIC	3 7		
415	ElectricDevice	37 Medium Voltage Switch	759 Underground Three Phase Disconnect	SwitchUnit	_AGDevice_SUBTYPE	3 _AGDevice_PHASEDESIC	3 7	PHASEDESIGNATION	3
416	ElectricDevice	37 Medium Voltage Switch	760 Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	4 _AGDevice_PHASEDESIC	3 7	PHASEDESIGNATION	7
417	ElectricDevice	37 Medium Voltage Switch	760 Underground Three Phase Load Break	SwitchUnit	_AGDevice_SUBTYPE	5_AGDevice_PHASEDESIC	3 7	_AGDevice_CONSTRUC	TIC Underground
						Actions			
						Action	Descri	otion	
						Filter Features	feature	TypeAttr = ArcGISFeature	Class
						Filter Features	Primar	yAttrName = PrimaryAttr	Value
						Filter Features	Secon	laryAttrName = Seconda	ryAttrValue
						Filter Features	Tertiar	/AttrName = TertiaryAttr\	/alue
						Filter Features	ForthA	ttrName = ForthAttrValue	2
						Filter Features	domai	nNetworkAttr = domainN	letworkName
						Set New Attribute	uNFea	tureClassAttr = <mark>UNFeatur</mark>	eClass
						Set New Attribute	es assetG	roupAttr = assetGroupCo	de
						Set New Attribute	assetTy	peAttr = assetTypeCode	
٦	in: Acc	rurate manning to	asset group &			Set New Attribute	assetG	roupDescAttr = assetGrou	upDesc
	· P·		accer Broah a			Set New Attribute	assetTy	peDescAttr = assetTypeD	esc
-	scot ty	no for both dovice	(accomply) and			Set New Attribute	AGV1 :	assetgroupcodeV1	

Set New Attributes

+. -

Help

ATV1 = assettypecodeV1

< Back

Edit...

Cancel

Finish

unit tables (devices) really helps

Schema Mapping: Mapping Domains

Spreadsheet

ArcGISAttrName	UNAttrName	ArcGISDesc	ArcGISCode	UNDesc	UNCode			
PHASEDESIGNATION	PHASESNORMAL			DeEnergized	0			
PHASEDESIGNATION	PHASESNORMAL	С	1	С	1			
PHASEDESIGNATION	PHASESNORMAL	В	2	В	2			
PHASEDESIGNATION	PHASESNORMAL	BC	3	BC	3			
PHASEDESIGNATION	PHASESNORMAL	A	4	A	4	Parameters		
PHASEDESIGNATION	PHASESNORMAL	AC	5	AC	5			
PHASEDESIGNATION	PHASESNORMAL	AB	6	AB	6	action, click Add, alog.	and select an action type. Fill in the details in the	
PHASEDESIGNATION	PHASESNORMAL	ABC	7	ABC	7			
					Action Filter Featur	es	Description ArcGISAttrName = ArcGISCode	
					Set New Att	ributes	UNAttrName = UNCode	
ip: Domain map	pings can be	applied	to		+, -		Edit	
ngle source feat eature classes at	ture classes o once.	or across	all	[Help		< Back Finish Car	ncel

Schema Mapping: Line to Junction lookup

1	LineAssetGroupDesc	LineAssetTypeDesc	JunctionAssetGroupDesc	JunctionAssetTypeDesc	
2	Low Voltage Conductor	Unknown	Low Voltage Line End	Unknown	
3	Low Voltage Conductor	Overhead	Low Voltage Line End	Overhead Line End	
4	Low Voltage Conductor	Overhead	Low Voltage Line End	Overhead Line End	Representation Parameters
5	Low Voltage Conductor	Overhead	Low Voltage Line End	Overhead Line End	Transformer
6	Low Voltage Conductor	Underground	Low Voltage Line End	Underground Terminator	Transformer Name: DatabaseJoiner_10
7	Low Voltage Conductor	Underground	Low Voltage Line End	Underground Terminator	Reader
8	Low Voltage Conductor	Underground	Low Voltage Line End	Underground Terminator	French Minner & French
9	Medium Voltage Conductor	Unknown	Medium Voltage Line End	Unknown	
10	Medium Voltage Conductor	Overhead Single Phase	Medium Voltage Line End	Overhead Line End	
11	Medium Voltage Conductor	Overhead Three Phase	Medium Voltage Line End	Overhead Line End	Parameters Coord. System: Unknown
12	Medium Voltage Conductor	Overhead Two Phase	Medium Voltage Line End	Overhead Line End	Join
13	Medium Voltage Conductor	Underground Single Phase	Medium Voltage Line End	Underground Terminator	Table: LineToJunctionLookup
14	Medium Voltage Conductor	Underground Three Phase	Medium Voltage Line End	Underground Terminator	Feature Attribute Table Field
	-				Lunction 1 Asset Group Desc. Junction Asset Group Desc.

Spreadsheet

Tip: Determines the type of Junction attached to a conductor Line.



DatabaseJoiner Pa	rameters		
ransformer			
Transformer Name:	DatabaseJoiner_10		_
leader			
Format:	Microsoft Excel		~
Dataset:	\$(SchemaMappingTables)		•
Parameters	Coord. System: Unknown		~
oin			
Table:	LineToJunctionLookup		•
	Feature Attribute	Table Field	^
	Junction1AssetGroupDesc	JunctionAssetGroupDesc	
loin On:	_lines_0_assetgroupdesc	LineAssetGroupDesc	
Sourcent	_lines_0_assettypedesc	LineAssetTypeDesc	~
	+ - % © ů		
Fields to Add:	JunctionAssetTypeDesc		•
Cardinality:	Match First (1:01+)	~	•
Multiple Matches:		~	*
Joined List Name:			-
Merge Attributes			
Accumulation Mode	Merge Joined	~ [•
Conflict Resolution	Use Joined	~	•
Prefix			Ŧ

Schema Mapping: UN Feature Class & Domain Network

Source Feature Type \Rightarrow AttributeManager \Rightarrow BulkAttributeRenamer \Rightarrow AttributeCreator \Rightarrow ...

Advanced: Attribute Value Handling ttributes To Create			
New Attribute	Attribute Value		
ORIGINAL_GLOBALID	d GLOBALID	Parameter Condition Definition	×
_AGFeatureClass	fme_feature_type	Condition Statement	
UNFEATURECLASS	5 Possible Values		
_domainNetworkName	2 Possible Values	Test Condition If @Value(SUBTYPECD) IN 1,2	Attribute Value
assemblykeyz		Else If @Value(SUBTYPECD) IN 3,4	StructureJunction
		Else If @Value(SUBTYPECD) = 5 AND @Value(CONSTRUCTIONTYPE) = Overhead	ElectricAssembly
+ - * * * * X	» Filter:	Else If @Value(SUBTYPECD) = 5 AND @Value(CONSTRUCTIONTYPE) = Undgerground	StructureJunction
		Else If	
Help	UK	Else <all conditions="" other=""></all>	/聲 <no action=""></no>
Schema Mapping: AG Device & Unit Table



Tip: Unit Tables integrity really really helps

14	В	G H	1 J	L L	M	NO	Р	Q	R
1	UNFeatureClass	assetGroupCode assetGroupDesc	assetTypeCode assetTypeDesc	ArcGISFeatureClass	PrimaryAttrName	PrimaryAttrValue SecondaryAttrName	SecondaryAttrValue T	ertiaryAttrName	[ertiaryAttrValue
07	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disc	onnect SwitchUnit	_AGDevice_SUBTYPEC	3 _AGDevice_PHASEDESI	G 1		
08	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disc	onnect SwitchUnit	_AGDevice_SUBTYPEC	3 _AGDevice_PHASEDESI	G 2		
09	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disc	onnect SwitchUnit	_AGDevice_SUBTYPEC	3 _AGDevice_PHASEDESI	G 4		
10	ElectricDevice	37 Medium Voltage Switch	755 Underground Single Phase Disc	onnect SwitchUnit	_AGDevice_SUBTYPEC	3 _AGDevice_PHASEDESI	G 7		
11	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load	Break SwitchUnit	_AGDevice_SUBTYPEC	4 _AGDevice_PHASEDESI	G 1		
12	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load	Break SwitchUnit	_AGDevice_SUBTYPEC	4 _AGDevice_PHASEDESI	G 2		
13	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load	Break SwitchUnit	_AGDevice_SUBTYPEC	4 _AGDevice_PHASEDESI	G 4		
14	ElectricDevice	37 Medium Voltage Switch	758 Underground Single Phase Load	Break SwitchUnit	_AGDevice_SUBTYPEC	4 _AGDevice_PHASEDESI	G 7		
15	ElectricDevice	37 Medium Voltage Switch	759 Underground Three Phase Disco	onnect SwitchUnit	_AGDevice_SUBTYPEC	3 _AGDevice_PHASEDESI	G 7 P	HASEDESIGNATION	7
16	ElectricDevice	37 Medium Voltage Switch	760 Underground Three Phase Load	Break SwitchUnit	_AGDevice_SUBTYPEC	4 _AGDevice_PHASEDESI	G 7 P	HASEDESIGNATION	7
17	ElectricDevice	37 Medium Voltage Switch	760 Underground Three Phase Load	Break SwitchUnit	_AGDevice_SUBTYPEC	5 _AGDevice_PHASEDESI	G 7_	AGDevice_CONSTRUCTIC	Underground

Schema Mapping: Created Objects



AttributeCreator Parameters

OK Cancel

X

X

Electric Migration Workspace



What Topology?

Devices

- Device Attributes
 - AssetGroupDesc / AssetTypeDesc
 - GlobalID
 - _ohug / _voltagelevel
 - _AG<original attrs>
 - o _unit_table{}.<attrs>
 - Junction<n>AssetGroupDesc
 - STRCT_<attrs>
- Connected Lines
 - _lines{}.AssetGroupDesc / AssetTypeDesc
 - _lines{}.GlobalID
 - _lines{}._assembly_rotation
 - _lines{}._clip_flag

Topology

	Device / Line Topology How many conductors are attached to this device and their details
All Devices	Here we have the device with the _lines{} list of conductor info. We can use this list to help identify the type of device if needed lines : add the device{} details & split complex edges
	PointUnLineOverlayer (0)

What Topology?

Lines

- Line Attributes
 - AssetGroupDesc / AssetTypeDesc Ο
 - GlobalID \bigcirc
 - PhasesNormal Ο
 - 0 _ohug / _voltagelevel
- **Connected Devices**
 - _devices{}.AssetGroupDesc / AssetTypeDesc Ο
 - _devices{}.GlobalID Ο

Line Clipping

Clip appropriate lines for assembly *Warning* - very short lines (<0.1 ft) can cause assembly placement errors

Topology

Transformer				
Transformer Name:	PointOnLineOverlayer			
Group By:	No items selected.	I		
Parallel Processing:	No Parallelism 👻			
Input Ordered:	No 👻			
Parameters				
Overlap Count Attribute:	_linecount			
Point Tolerance:	0.1			
Aggregate Handling:	Deaggregate 👻			
Attribute Accumulation				
Accumulation Mode:	Merge Incoming			
Conflict Resolution:	Use Original			
Prefix:		line in		
❤ 🗹 Generate List On O	utput 'Point'			
'Point' List Name	:: _lines	•		
Add To 'Point' Lis	t: Selected Attributes 👻	•		
Selected Attributes	SNORMAL SHAPE_LENGTH _assembly_rotation0	•		
✓ 🗹 Generate List On O	utput 'Line'			
'Line' List Name	:: _devices	•		
Add To 'Line' List	:: Selected Attributes 👻	•		
Selected Attributes	ESC ASSETTYPEDESC GLOBALID _dip_type_flag	•		

What Topology? Junction Connectivity Logic

- Lines
 - AssetGroupDesc / AssetTypeDesc
 - GlobalID
 - Make a guess at the junction...
- LineToJunctionLookup table (in the schema mapping spreadsheet)
 - LineAssetGroupDesc / LineAssetTypeDesc/JuncitonAssetGroup
 - ▷ JunctionAssetType

Electric Migration Workspace



Assembly Builder

Merges:

- **Device Features**
- XML Assembly Definitions

Keys:

ASSETGROUPDESC	<assemblygroupdesc></assemblygroupdesc>
ASSETTYPEDESC	<assemblytypedesc></assemblytypedesc>
assemblyKey2	<assemblykey2></assemblykey2>

Documentation:

Esri Utility Network Assembly XML Doc.pdf



Output:

- Device
- Assembly / StructureJunction
- Associations
- Junctions
- AssemblyCenterPoint
- Error / Inform

Assembly scale parameter...



Electric Mign tion Workspace



Electric Migration Workspace



migration testing tips...

Create Test Dataset

- Small Sample Dataset
- Test Each Device Type... be patient

Run FME Migration Workspace on Sample Data

- Check Migration Reports
- Use Feature Types to Read for a single device
- Use the Test Data option

Use Feature Caching

• Only use on sample or 'test' data!

Geodatabase writer parameters might help...

- Ignore Failed Features: Yes
- Validate Feature to Write: Yes

Va	viga	tor			0	125	×
~	-9	Ele	ctric.	As	setPackageV3 [GEODATABASE_FILE]		1
		\$P	File	Geo	odatabase: D:\Dropbox (Safe Software I		Ì
		\$	Fan	out	Dataset: No		
		*	Cod	ordi	nate System: <not set=""></not>		
	~	ŝ	Para	ame	eters		
			ŝ	Ove	erwrite Existing Geodatabase: Yes		
			£3	Ten	nplate File Geodatabase: D:\Dropbox (S	•	
			ŝ	Imp	oort XML Workspace Document (Sche		
			ŝ	Tra	nsaction Type: Edit Session		
			ŝ	Sim	plify Geometry: No		
			ŝ	Cor	ntains Z Values: Auto Detect		
		~	ŝ	Ad	vanced		
				(j)	Geod tabase Version: CURRENT		
			1	6	Default Z Value: 0		
				(i)	Writer Mode: Insert		
				ŝ	Transaction Number: 0		
			1	ŝ	Features Per Transaction: 1000		
				ŝ	Ignore Failed Features: Yes		
			1	ŝ	Max number of features to ignore: -1		
				(i)	Dump Failed Features to File: No		
			1	ŝ	Failed Feature Dump filename: < not s		
				ŝ	Annotation Units: unknown_units		
			1	ŝ	Contains Measures: No		
			1	ŝ	Compact Database When Done: No		
				ŝ	Validate Features to Write: Yes		
				ŝ	Simplify Network Features: No		
			1	ŝ	SQL To Run Before Write: <not set=""></not>		
				ŝ	SQL To Run After Write: <not set=""></not>		
	>	X	Feat	ture	Types (11)		-

migration testing tips...

There are two data models...

- Source ArcGIS Geometric Network Data Model
- Target Utility Network Asset Package Data Model

Source GN: Two Places the Schema is Defined

- Schema Mapping Spreadsheet
- Workspace (labeled SchemaMapping)

Target UN: Four Places the Schema is Defined

- Schema Mapping Spreadsheet
- LineToJunctionLookup
- Assembly XML
- Workspace (labeled SchemaMapping)
 We'll try and keep this schema up-to-date

Exercise - Fuse data error

Open workspace: "..\BasicV3\1.Fuse_Exercise\FuseExample.fmw"

Configure to test a single Fuse:

Fuse GlobalID:{DA309538-67AA-4CC2-8185-145D75E2DA8E}Structure GlobalID:{185A715D-FEEA-4533-A922-D3763DEF224C}

Run workbench with Feature Caching ON + Test Data only (also using Feature Types to Read)

Check error Excel - InvalidDevices tab - note error transformer: TestFilter_21

Open NapervilleElectric_Fuse.gdb and check the data: ArcGIS feature class list for easy viewing in Data Inspector: BusBar Fuse FuseUnit PriOHElectricLineSegment PriUGElectricLineSegment SecOHElectricLineSegment SecUGElectricLineSegment What's wrong with the offending Fuse or FuseUnit?

Re-Run with corrected data: NapervilleElectric_2019_03_27.gdb.zip

SubtypeCD: 1 PhaseDesignation: 7 ConstructionType = Overhead



Exercise - new source Feature Class: DynamicProtectiveDevice

- Update the **Schema Mapping** Spreadsheet AssetGroup&Type tab, etc.
- Update the Assembly Builder XML <assemblyDefNum>8</assemblyDefNum>
- Open workspace: "..BasicV3\2.DynamicProtectiveDevice_Exercise\DynamicProtectiveDevice Begin.fmw"
 - Import Feature Types: DynamicProtectiveDevice RecloserUnit SectionalizerUnit Connect them. Add fme_feature_type
 - Copy transformers from similar objects switches?

Cont... - new source Feature Class DynamicProtectiveDevice

Add tests:

Recloser GlobalID: {CD229437-CEA2-4225-85F6-CBFB0A272C35} Support Structure: {D406A179-64C5-42F9-B991-AB4390C0CA5F}



Assembly XML Definitions



Exercise - Updating Assembly XML Definitions

Open workspace: "..\EsriUN\BasicV3\3.Recloser_Exercise\Recloser_Example.fmw"

Set-up for testing with the Test Filter Recloser GlobalID: {320E0040-04E4-4E0D-B5BA-09253A19E3C3} Switch Gear GlobalID: {B732B5E5-3D7D-478D-A795-774CFF49F32B}

Check results and error reports.

Update XML definitions - check documentation Open XML definition in NotePad++ & search for "Recloser" PadMountRecloser_definition - Begin.xml Create new assembly definition Re-run with either fixed XML or PadMountRecloser_definition - End.xml

SubtypeCD = 7 PhaseDesignation = 7 Unit tables = 3 i.e. one per phase GangOperated = NA

Exercise - missing target Feature Class

- Update the Schema Mapping Spreadsheet as needed
- Open workspace: "..BasicV3\2.DynamicProtectiveDevice_Exercise\SubnetController Begin.fmw"
- Import Feature Types: ElectricDeviceUnit ElectricWireData C_SubnetworkControllers Connect them.
- Copy transformers from similar objects switches?
- Update the Assembly Builder XML if needed





Thanks for attending...

Editing the migration workspaces

- If you make *changes*, please share them with us
- *Need help* feel free to contact us

Next steps:

- Release the Electric migration workspace
- Esri UN <u>Reader/Writer</u> Feature Service
- Validation Workspace

That's all folks!

Safe Software Ryan Cragg Mark Stoakes mark@safe.com Trent Kading trent.kading@safe.com

Thanks also to John Long & John Alsup at Esri