FME Form Training

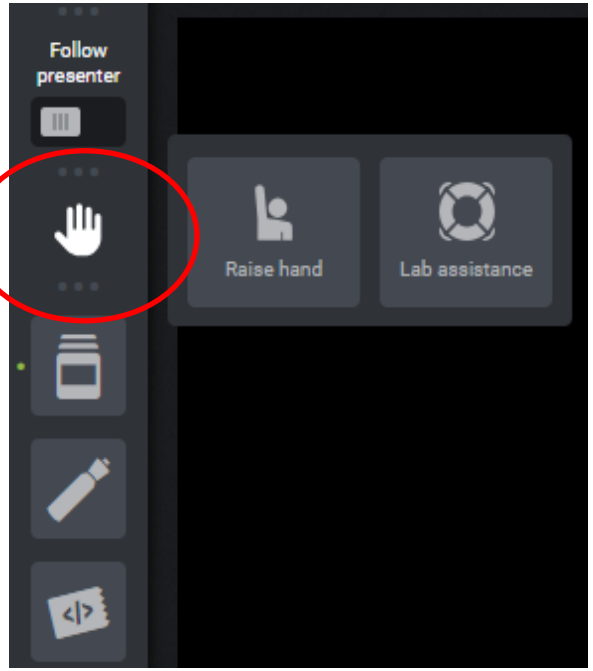
FME Form Training - Module 1

Getting Started with FME Form

Training Environment

< keep '**Follow presenter**' on

< **Lab**



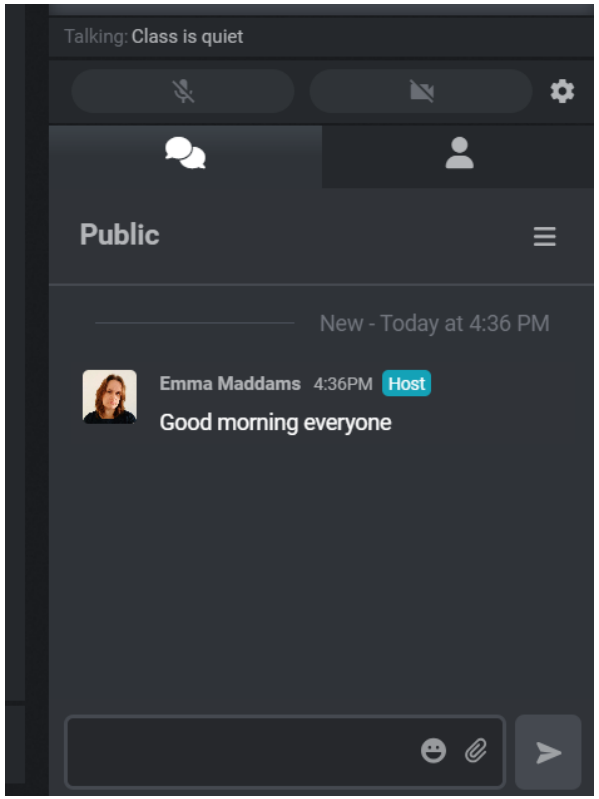
need help when using your Lab

Use either:

- 'Raise hand' or
- 'Lab Assistance'

Chat

- to everyone
- to trainer



Training Environment

- Training Data folders **C:\FMEModularData**
  - Data
  - Output
  - Resources
  - Workspaces
- Slides
- Workbook – you need to download using link sent by the trainer

A little bit of background…

miso

- Based in Birmingham
- Platinum partner
- Spatial data experts
- Provide training and consultancy in FME

Safe Software

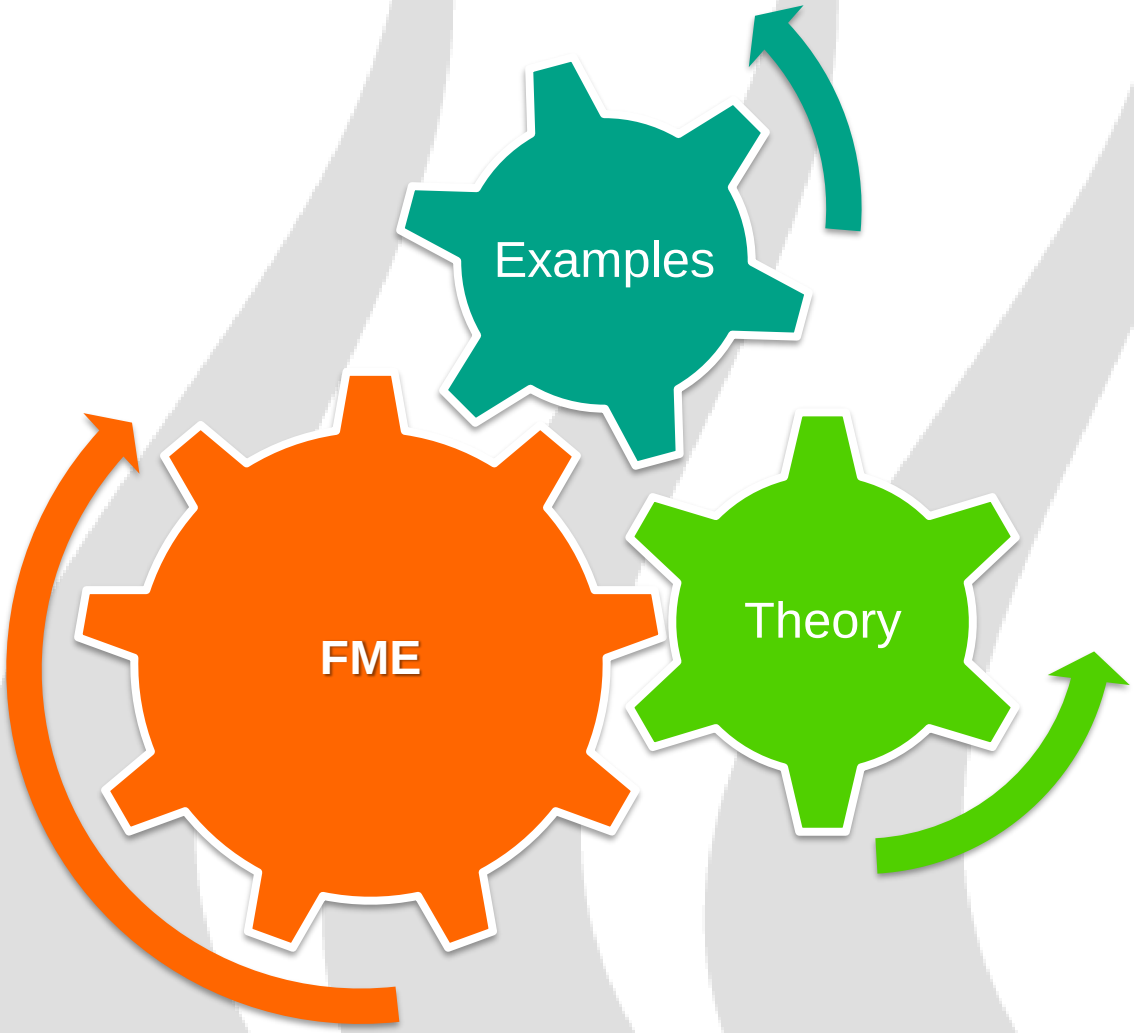
- Based in Canada
- Create FME product suite
- Continuously develop products

What we'll be covering today…

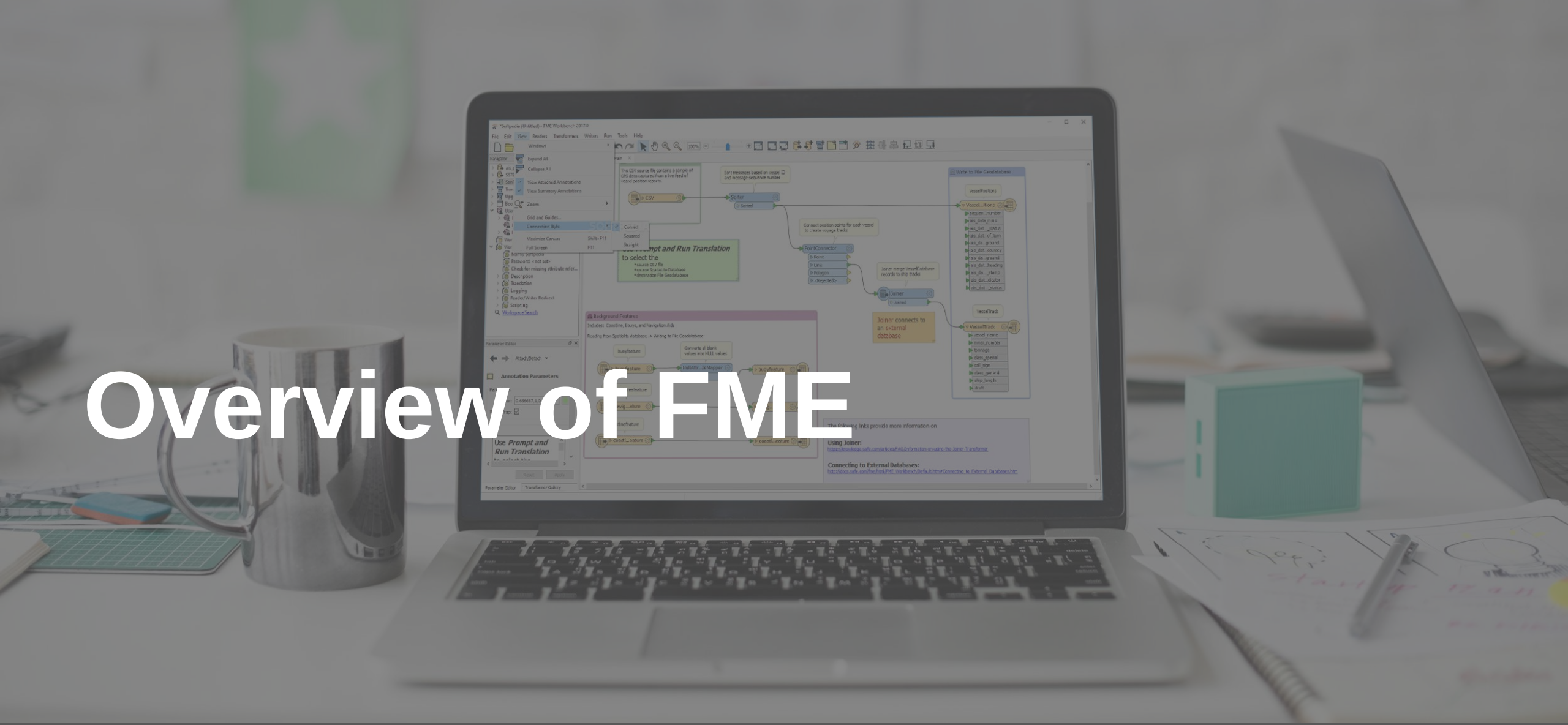
Agenda

- Introductions

- FME Overview
- Inspecting Data
- Workbench Fundamentals
- Generating a Workspace
- Transformers
- FME Components and Hierarchy



Overview of FME



Connect. Transform. **Automate**

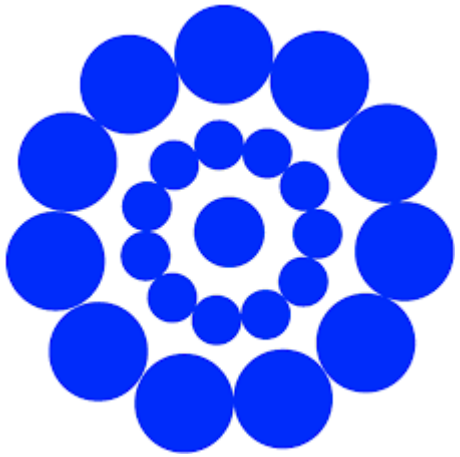
FME Product Suite

FME Form

(formerly FME Desktop)

Authoring environment that enables you to create data integration workflows.

The FME Form Workbench is where these Workspaces are created and locally run.

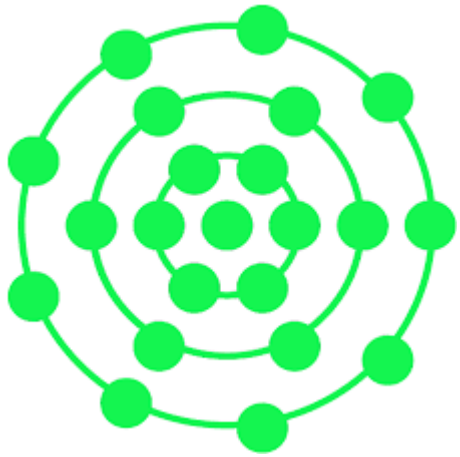


FME Flow

(formerly FME Server)

The enterprise automation environment that enables you to run your data integration workflows on a schedule or in response to events or in real-time.

FME Flow enables users to integrate their data automatically and distribute it to any web, desktop, or mobile application. Users can set up event-driven workflows, send notifications to stakeholders, and provide self-serve data integration.



FME Flow Hosted

(formerly FME Cloud)

FME Flow hosted in the cloud by Safe Software, where users pay only for the computing resources they use. It's scalable and uses a pay-as-you-go model.
Linux based; hosted on Amazon Web Services.

How FME Can Help You

Data Integration

Convert and transform data so you can access it easily from a single source.

Application Integration

Create connections between various applications to allow for direct access to data.

Data Transformation

Alter the structure, content, and characteristics of data to make it more useful for your needs.

Data Conversion

Configure data for use in specific applications by converting the data format or model.

Spatial Data

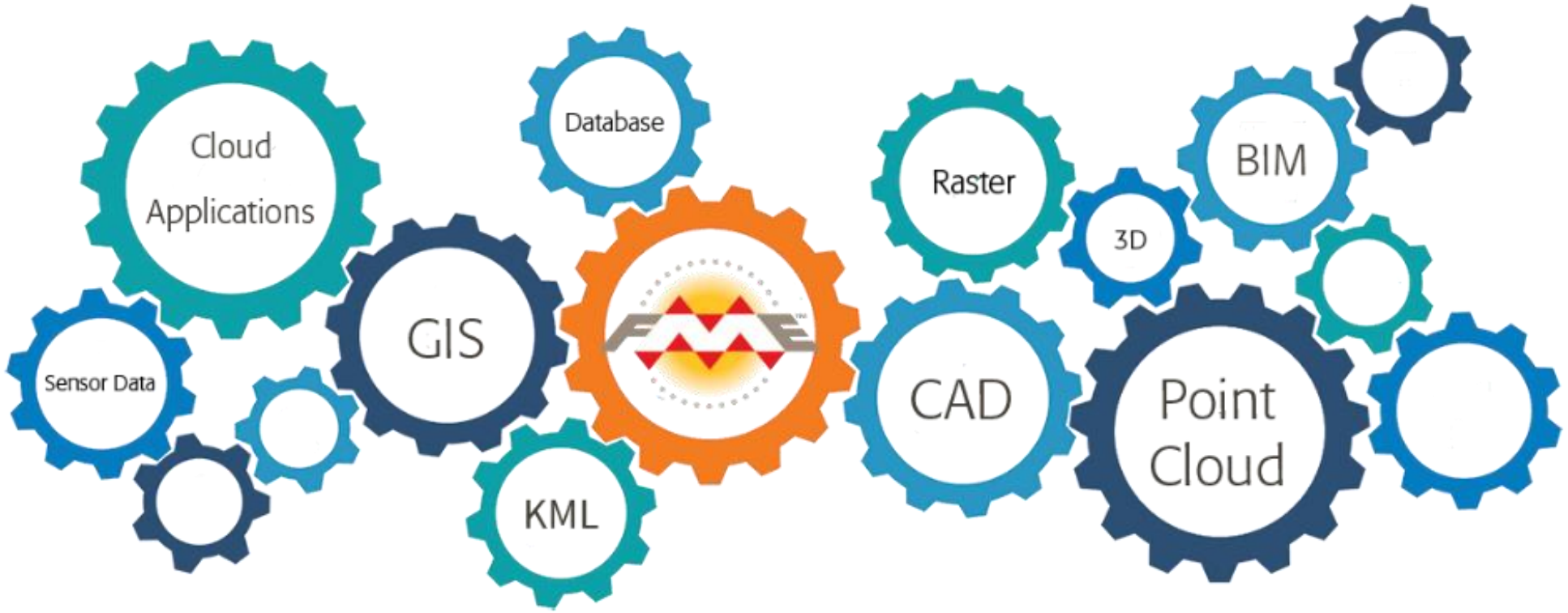
Integrate data with spatial data to gain new knowledge about location intelligence.

Data Validation

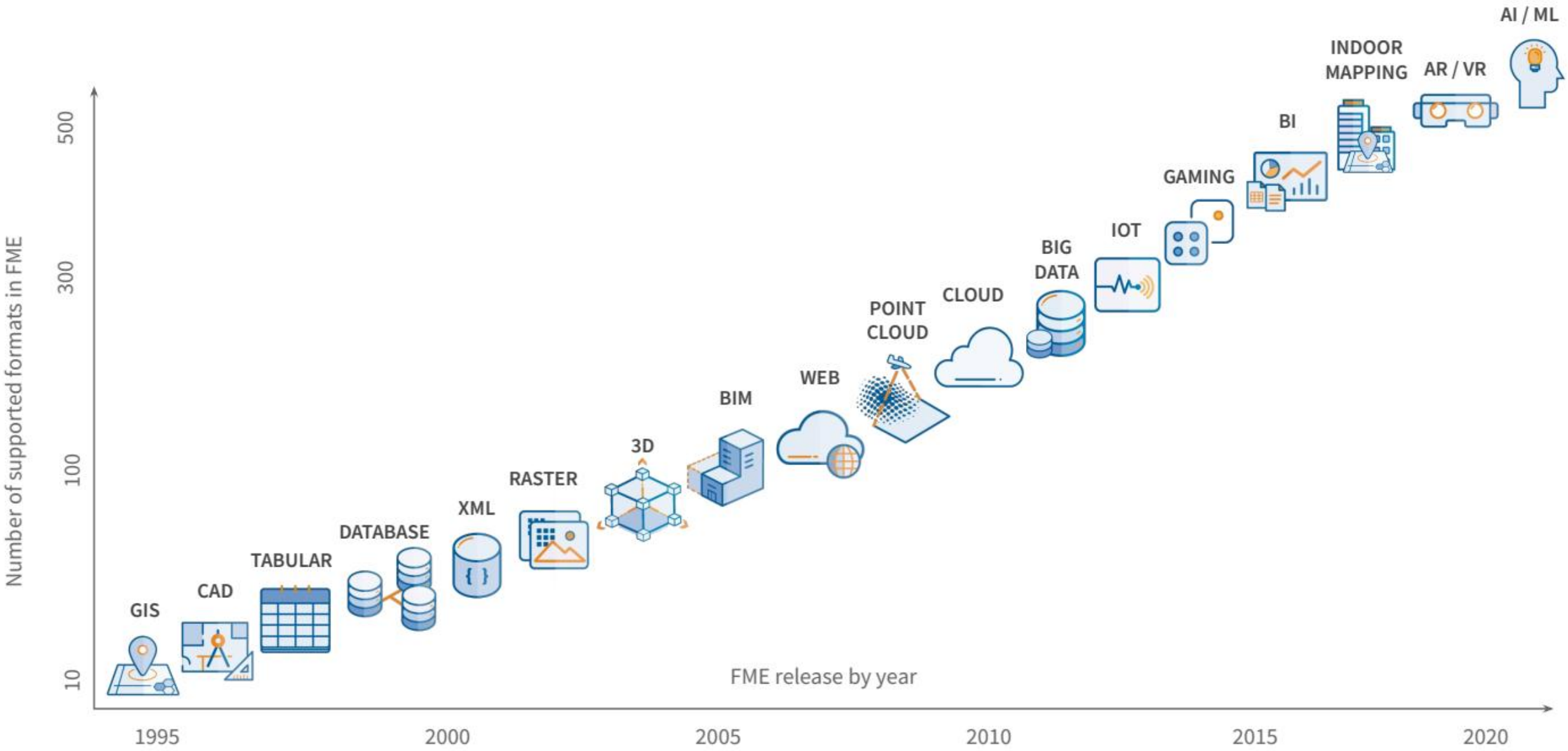
Verify the quality of data to make better, more informed business decisions.

Formats

FME supports over **450** file formats



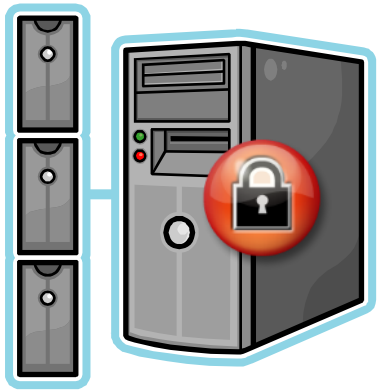
What Data Types Does FME Support?



FME Form Licensing

Fixed License

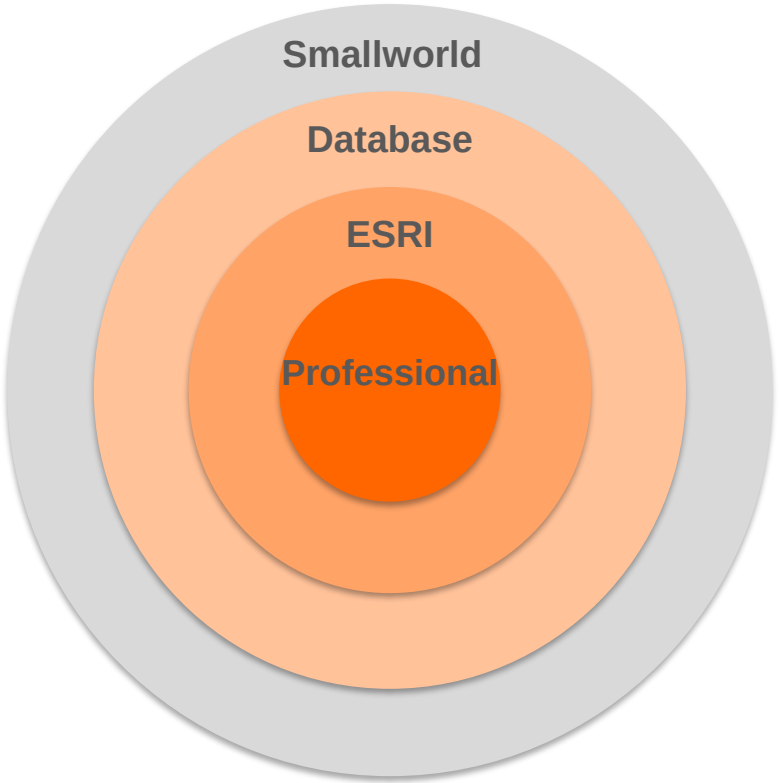
A fixed license allows you to run FME Form on a single computer



Floating License

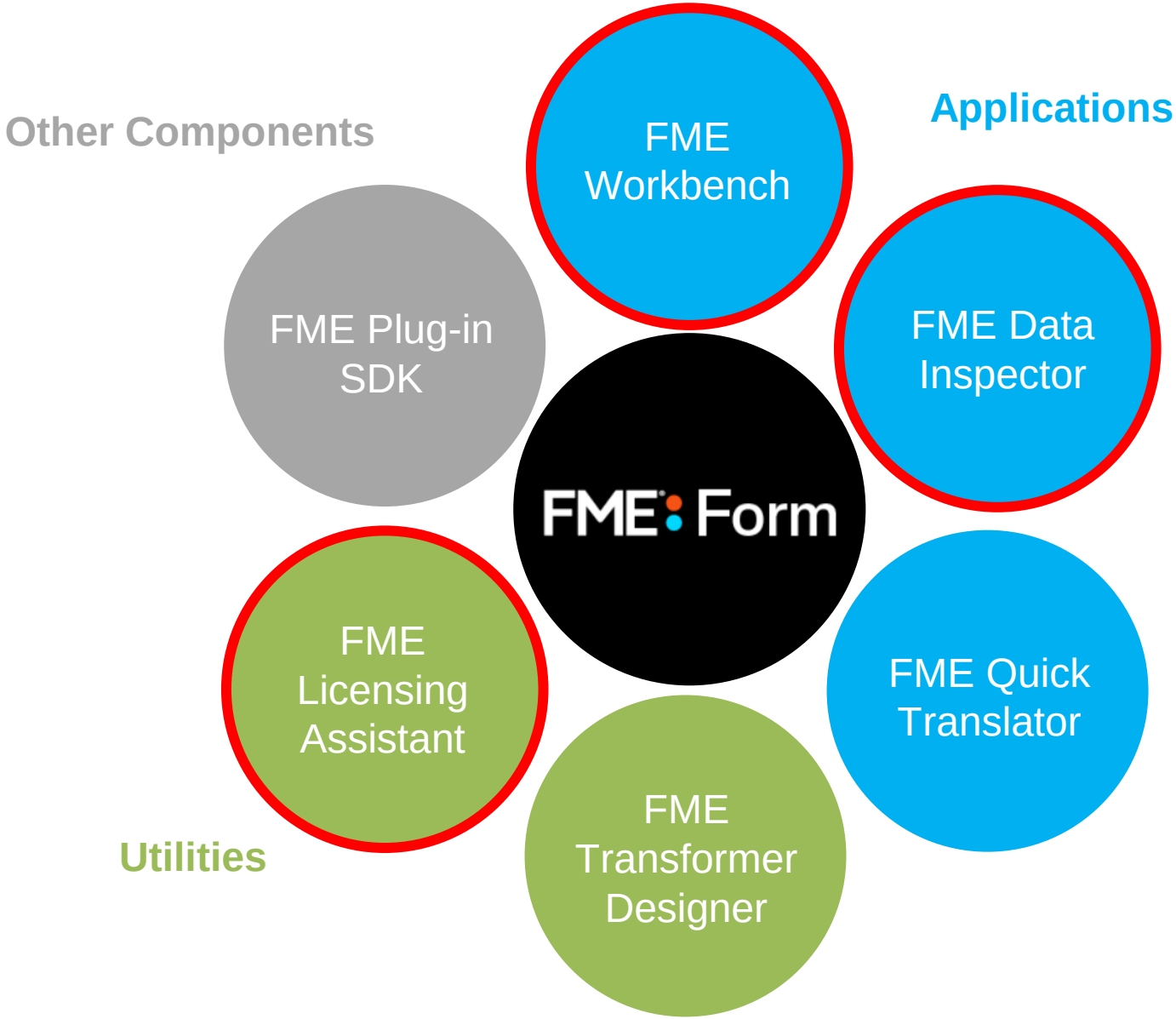
A floating license is shared by multiple people / computers

Old FME Desktop Editions (pre 2023)



Professional Edition	ESRI Edition	Database Edition	Smallworld Edition
Good for reading & writing most data and applications *ESRI SHP, MapInfo TAB, Geopackage, CSV, Excel, DWG/DXF, DGN, PostGIS, plus more*	Added abilities for those working with ESRI's ArcSDE	Write data to popular cloud and on-premises databases *Amazon DynamoDB, IBM, Microsoft SQL, Oracle, SAP, Snowflake, Teradata, plus more*	Read and write data to GE Smallworld
	includes everything in the Professional Edition	includes everything in the ESRI Edition	includes everything in the Database Edition

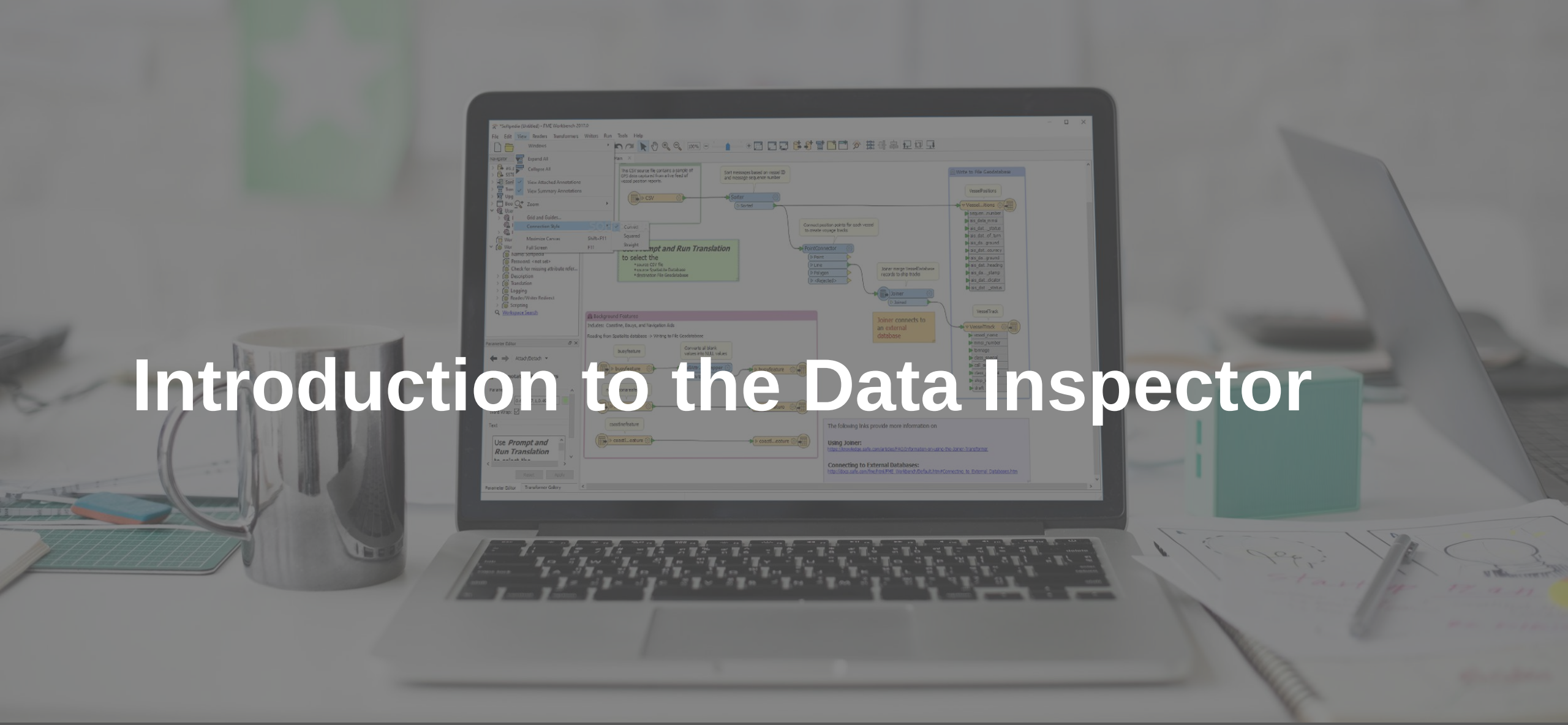
FME Form Components



Terminology

- **FME** - Feature Manipulation Engine
- **Workflow** – the sequence of processes through which a piece of work, data or something else passes from initiation to completion
- **Workbench** – name of the FME application in which a workflow is designed and then saved as a **workspace**.
- **Workspace** – process defined and saved as an **.fmw file** which can be run using the FME Form Workbench, FME Form .EXE or FME Server

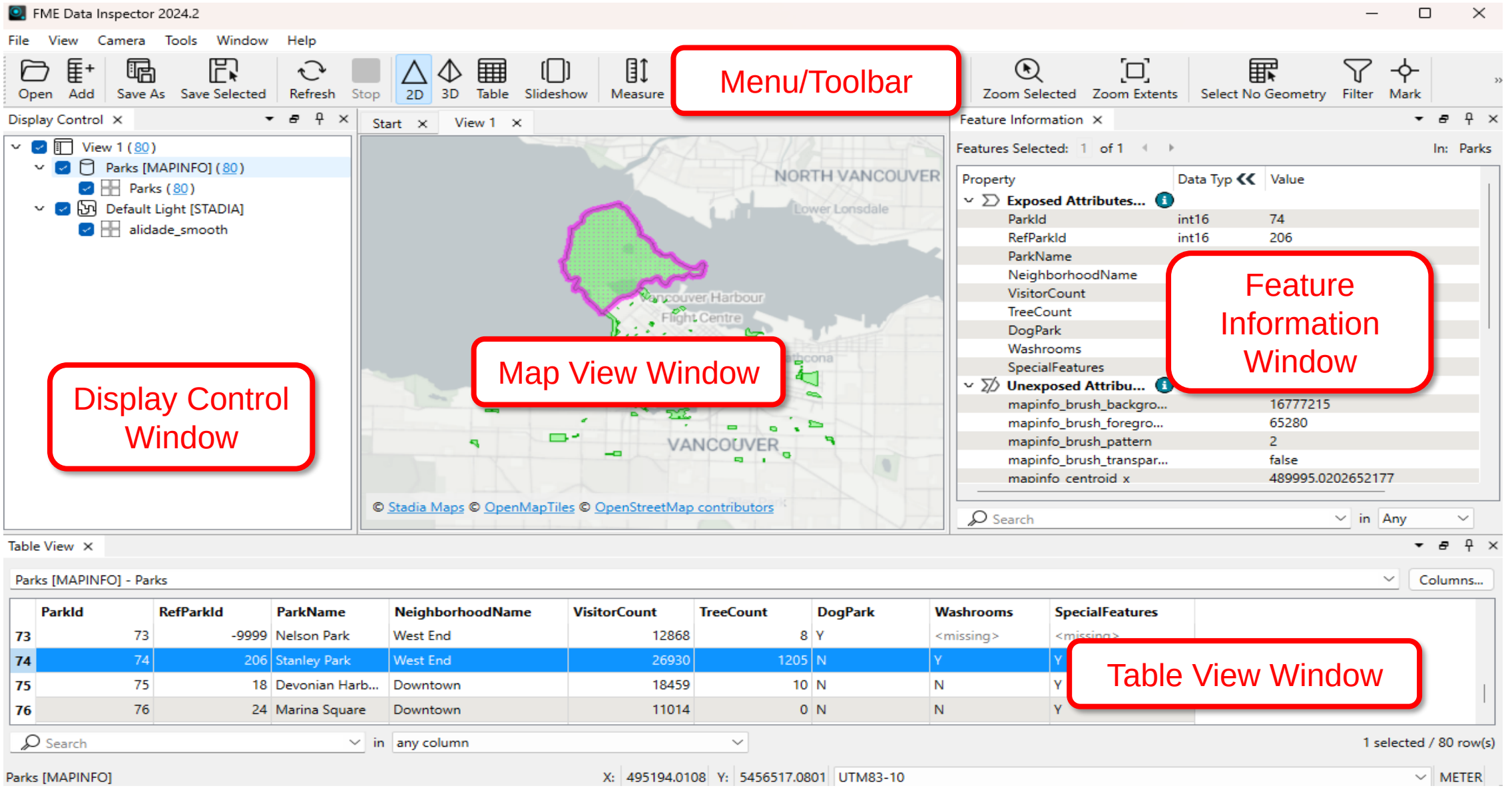
- **Canvas** – where you graphically define a translation.
- **Connector** – line used to connect different items on the canvas.
- **Transformers** – the building blocks / tools used in FME Workbench.
- **Readers –** component in a translation that ‘reads from’ a ‘**source dataset**’
- **Writers –** component in a translation that ‘writes to’ an ‘**output dataset**’
- **Attribute** – field/column of data
- **Feature** – a ‘piece of data’ eg. a row or a record



Introduction to the Data Inspector

Connect. Transform. **Automate**

User Interface - The Data Inspector



Demo – Data Inspector

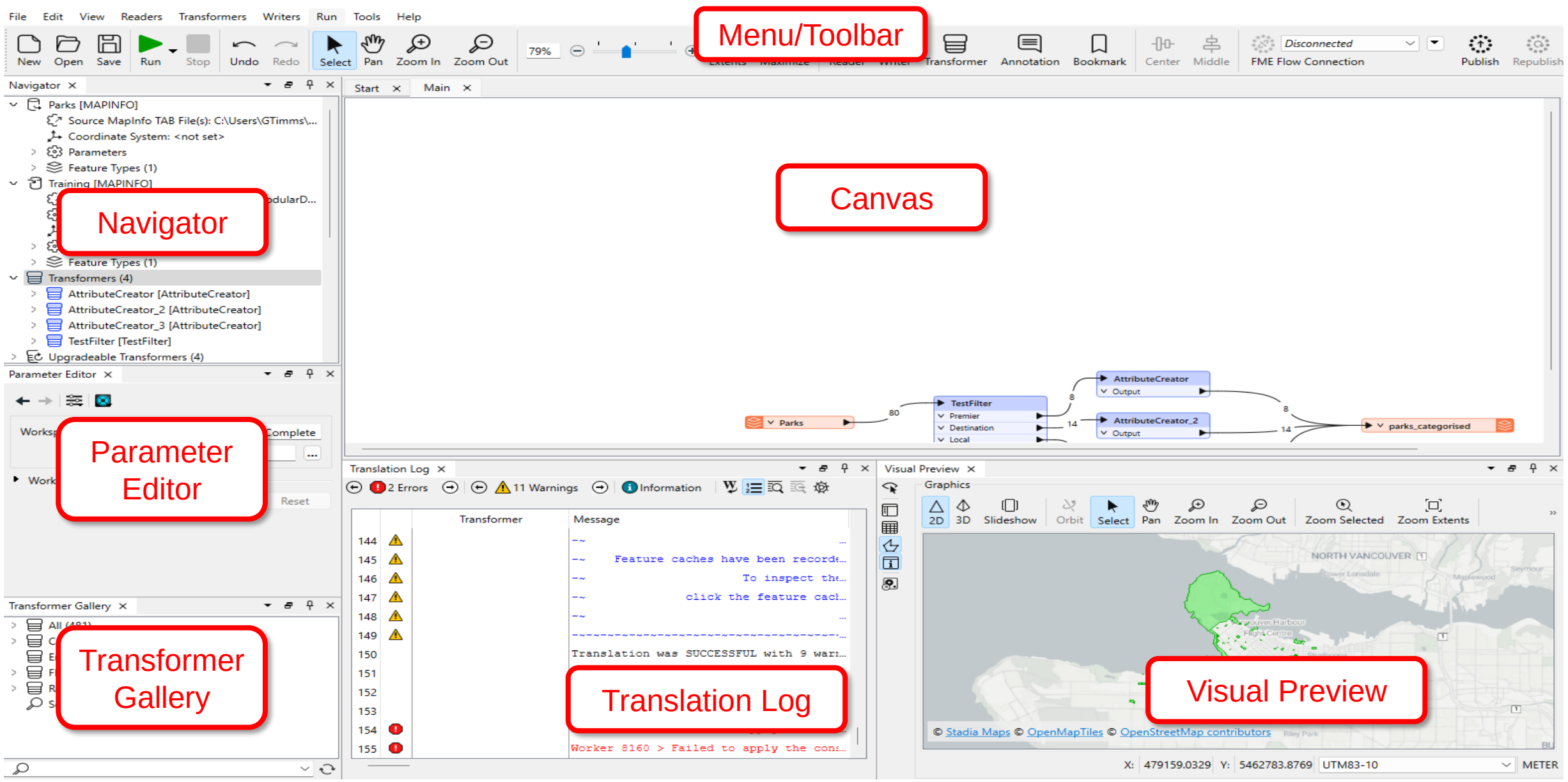
Open ‘Parks.shp’ dataset into Data Inspector to look at:

- Format Gallery
- View map features
- Table view and Attributes
- Selecting features
- Feature Information window
  - Coordinate System
  - Attributes and *properties*
  - Geometry info
- Map Background colour
- Add Background mapping (STAMEN: Terrain)

Introduction to the Workbench

Connect. Transform. **Automate**

User Interface - Workbench

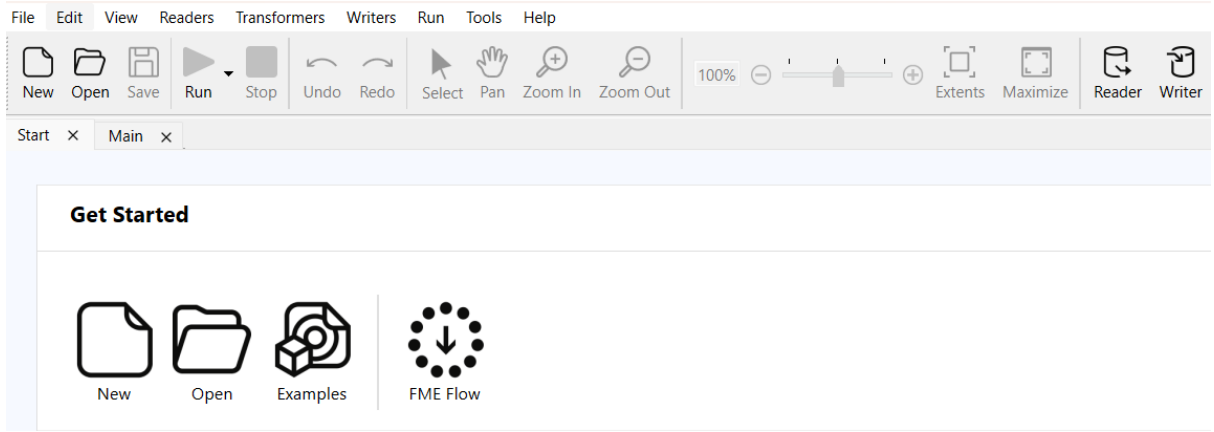


Workspaces

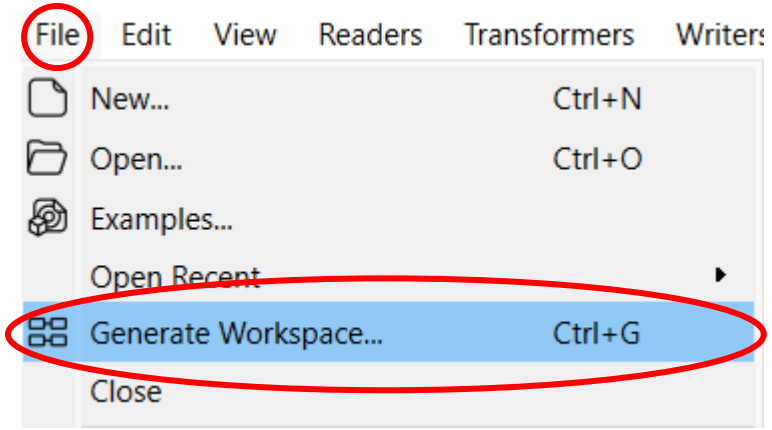
Workspace – a process flow defined and saved as an **.fmw** file

The Workbench application is used to:

- **Open & Run** existing workspaces
- **Modify** existing workspaces
- **Create New** workspaces
  - from scratch (blank)
  - using Generate Workspace Wizard found in File > Generate Workspace

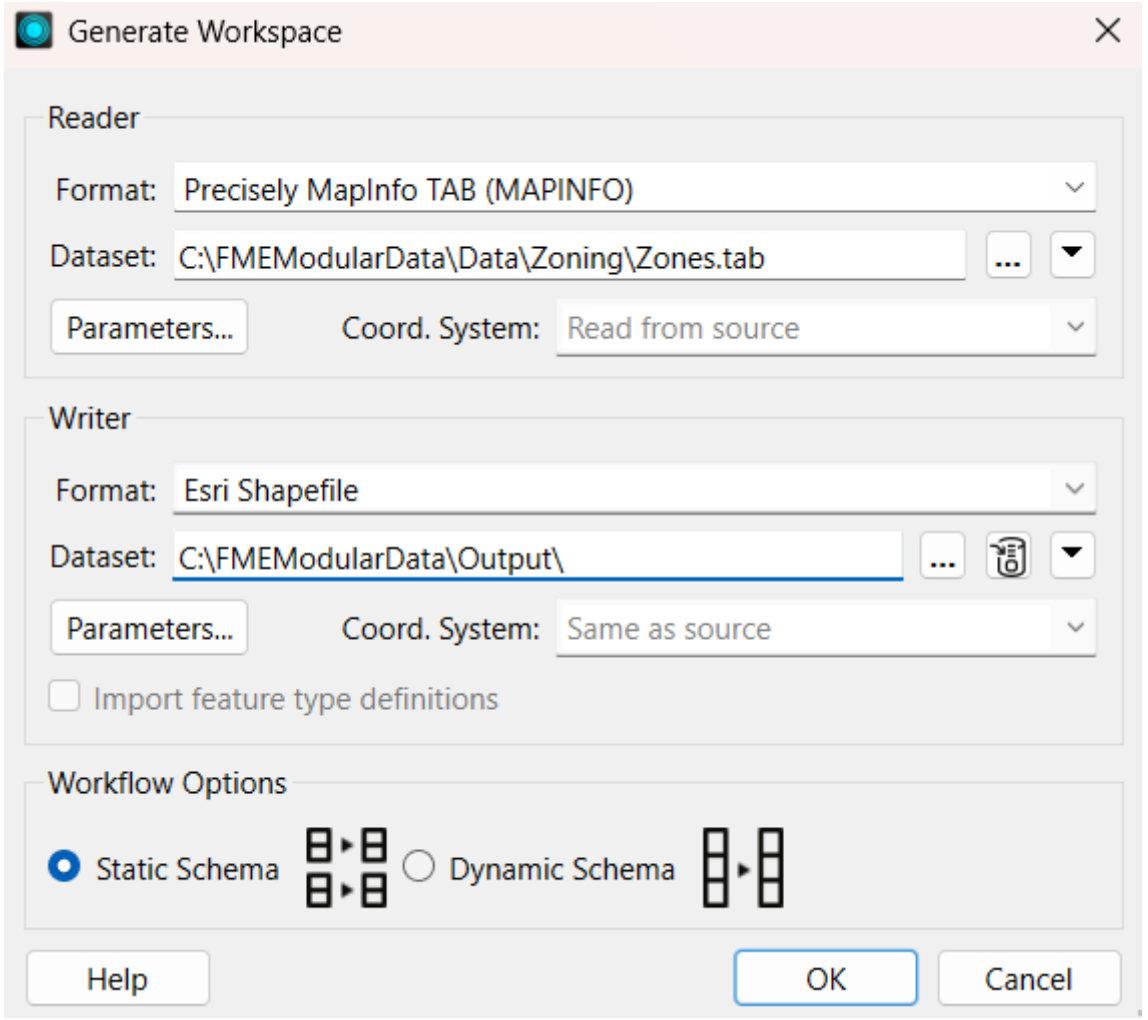


Generate Workspace Wizard



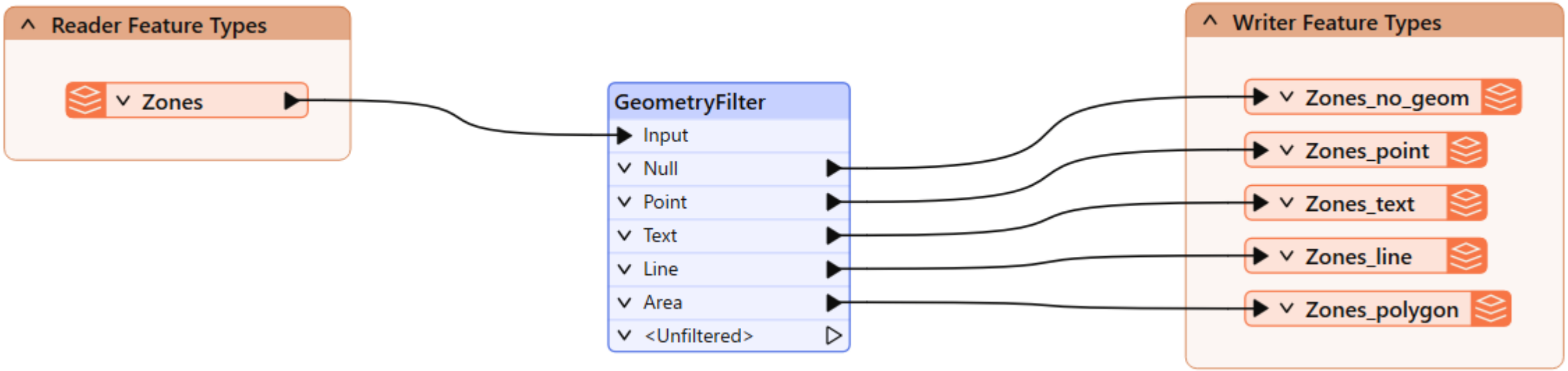
- the Generate Workspace wizards helps you set up a workspace faster – it sets up the readers and writers for us

- you simply need to specify the reader and writer format and dataset locations, and FME does the rest.



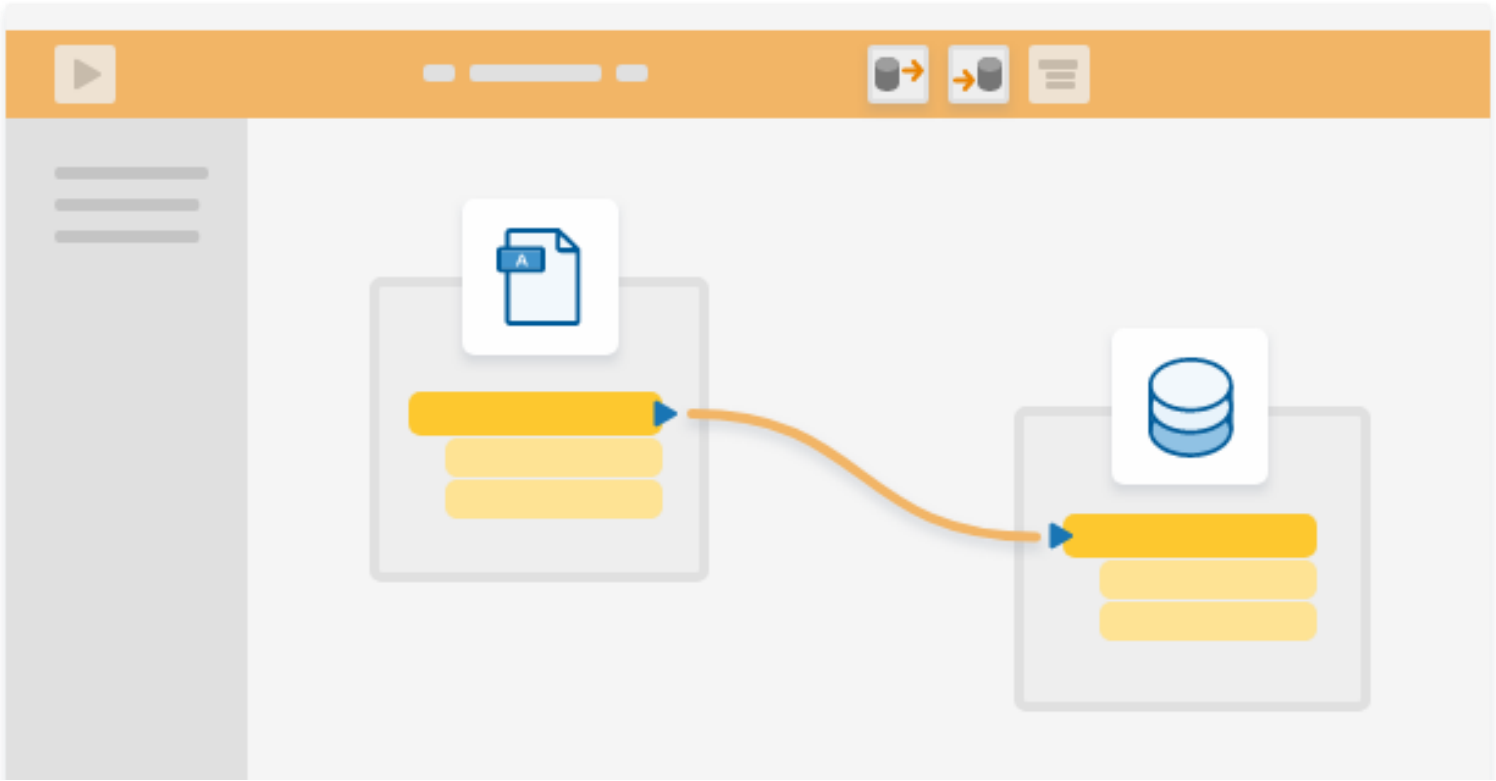
Generate Workspace Wizard

- It will automatically do its best to duplicate the reader schema on the writer, handling differences in data types or restrictions on geometry types or attribute name lengths.



Data Translations

Data Translations simply convert data from one format to another



…….we'll look at data *Transformation* later

Demo – Create Workspace using Generate Wizard

- **Data Translation** convert data from one format to another:
  - convert ‘Trees’ dataset from ESRI Shapefile format to GeoPackage

- Create the workspace using the **Generate Workspace Wizard**
  - Save workspace (creating .fmw file)
  - Run workspace
  - Log file created

Exercise 1.1

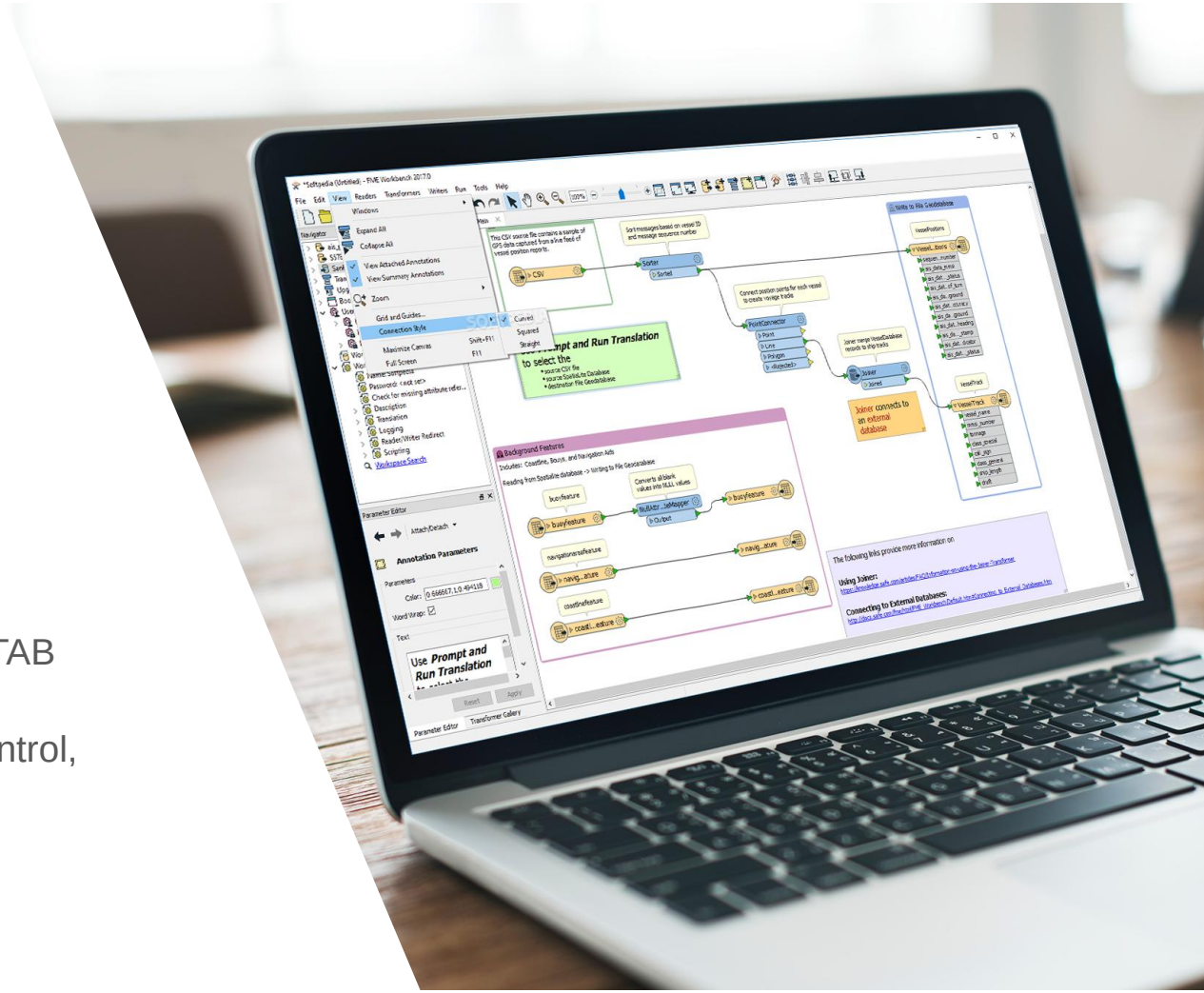
The Data Inspector and Workbench - Generate Workspace wizard

- You have just landed a job as a technical analyst in the GIS department of your local city.
- On your first day, you've been asked to do a simple file format translation.

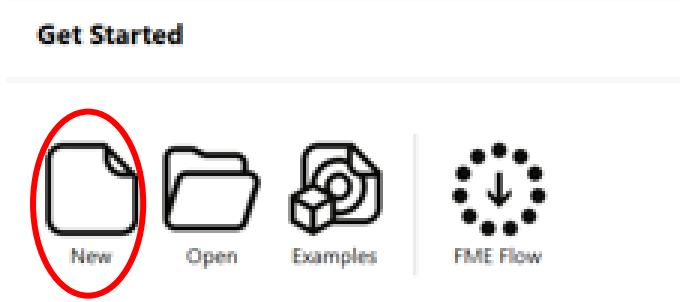
Data - Zoning Data (MapInfo TAB)
Neighborhoods (Google KML)

Goals -

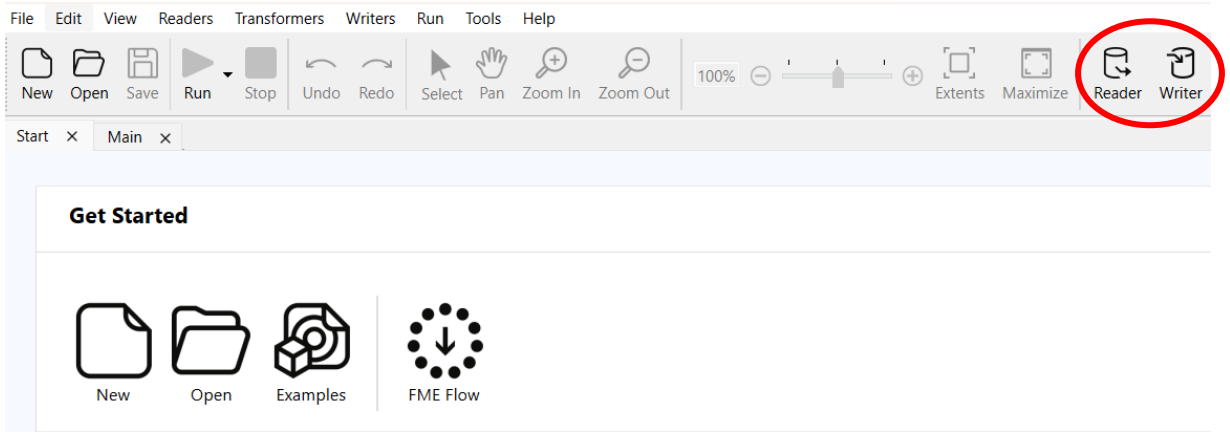
- Inspect the zone data before processing
- Create a workspace to translate the zoning data from MapInfo TAB format to GeoJSON
- Inspect the output of the translation - understand the display control, view multiple datasets together and add background maps

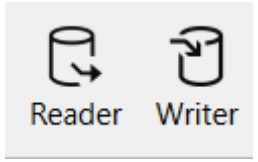


Create Workspace from Blank



- Start with blank canvas
- Manually add the required **Readers** and **Writers**

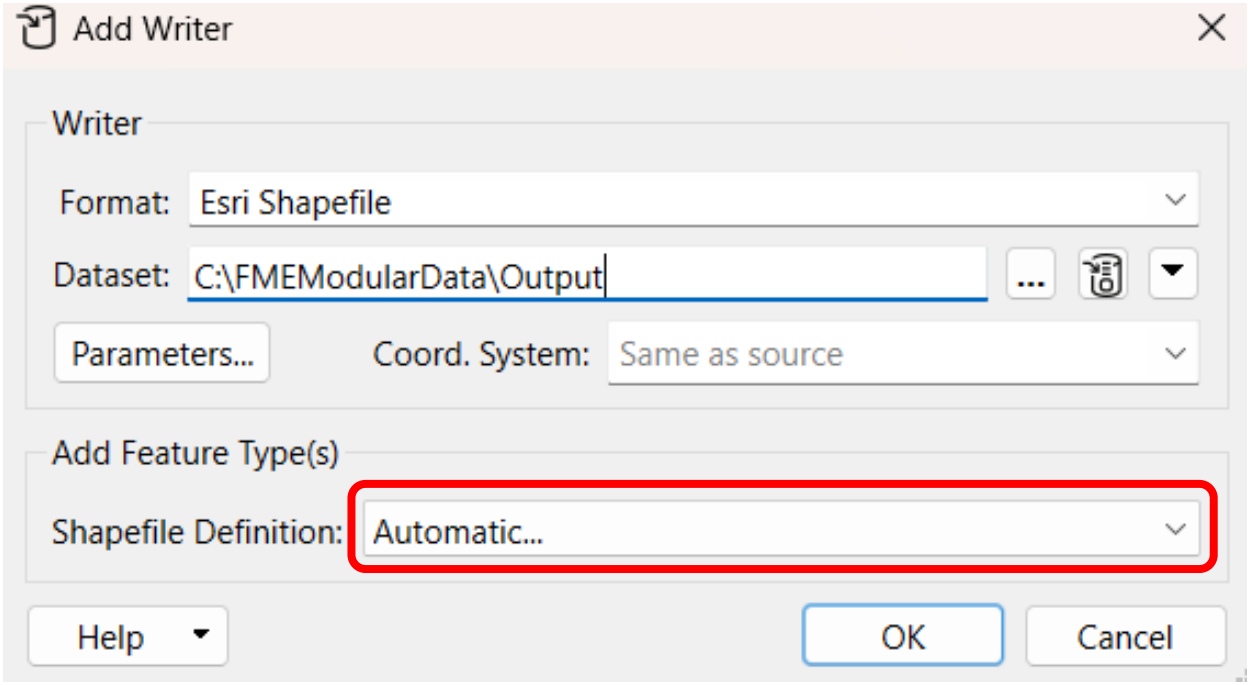




We can actually add Readers / Writers in a number of ways!

Create Workspace from Blank

- specify **Automatic** for the Attribute/Table Definition on Writers
  (don't worry about this for now, we look at the options in here properly in module 2)



Transformers

Connect. Transform. **Automate**

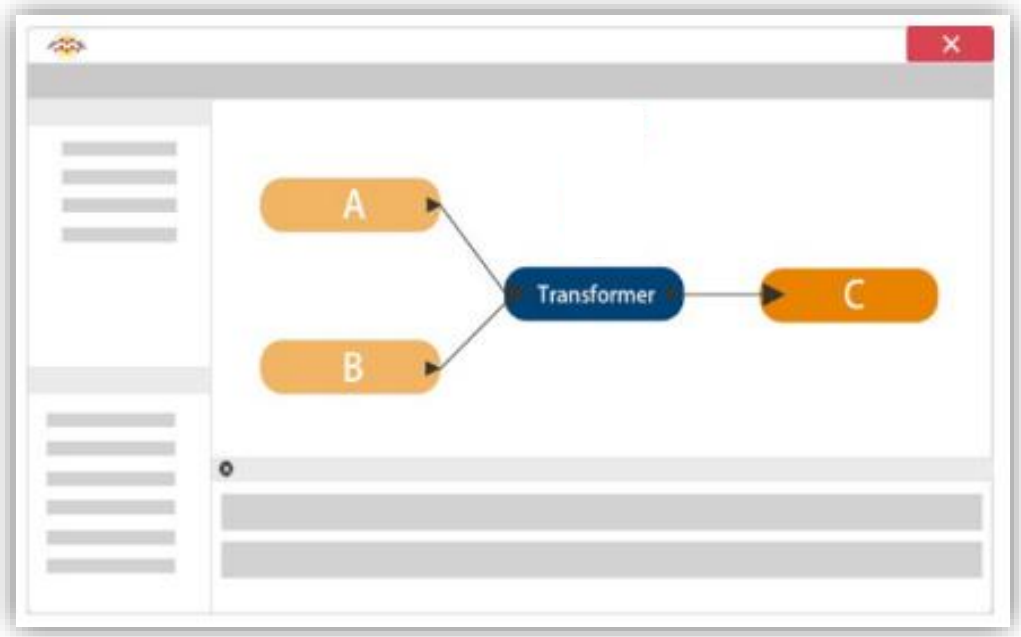
Data Transformation

Two distinct types:

- **Structural Transformation** - changing the data model/schema; this includes the ability to merge data, divide data, reorder data, and define custom data structures: layer names, attribute names, attribute types

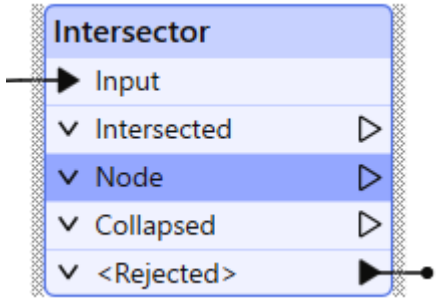
- **Content Transformation** - alter the content of a dataset; manipulation of a feature's geometry or attribute values

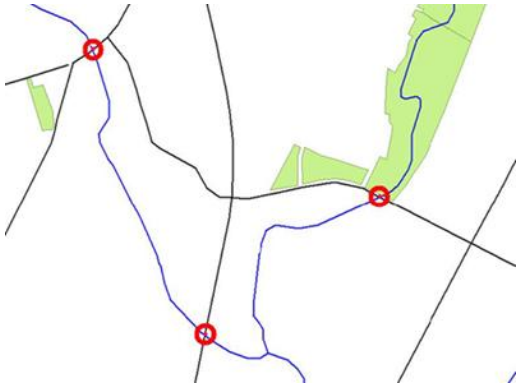
In FME you can manipulate and transform data exactly as needed by using any combination of FME's **Transformers**



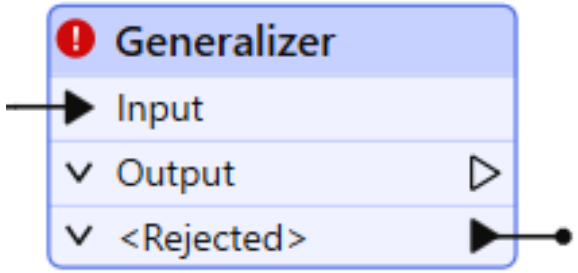
Transformer Examples

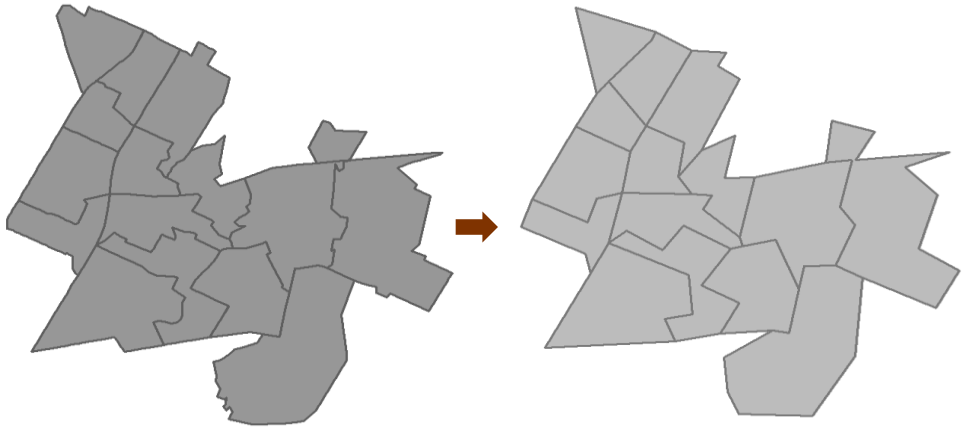
Geometric transformation





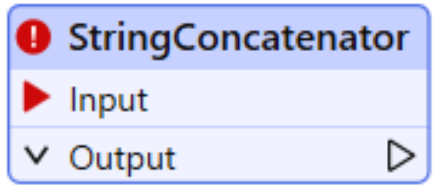
These Roads are intersected with Rivers
To produce a point wherever a bridge would be





Transformer Examples

Attribute transformation



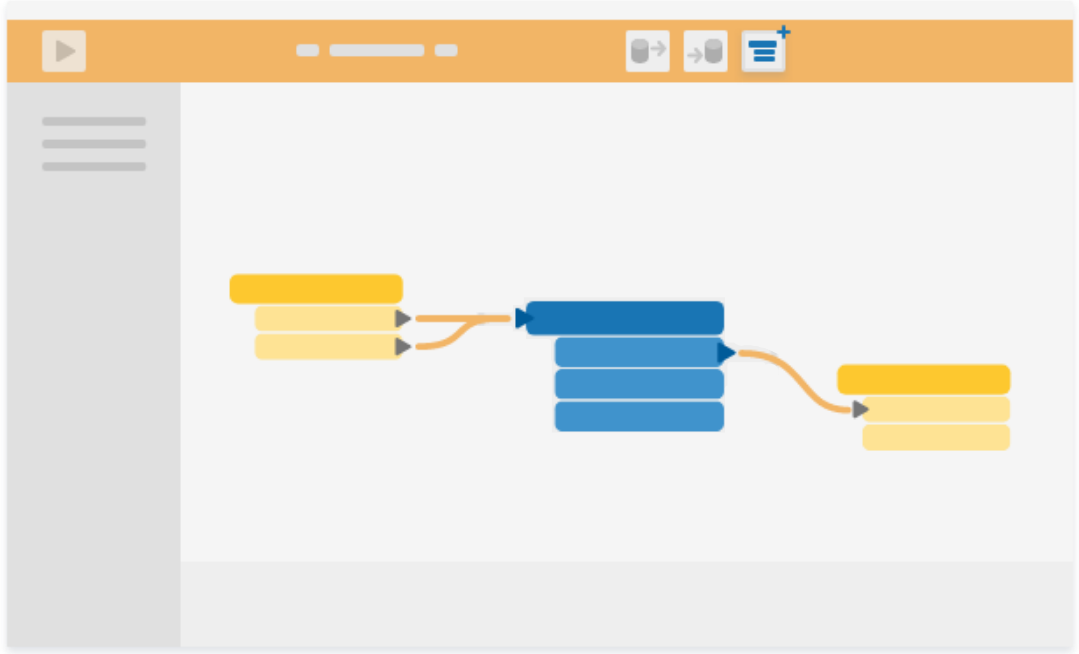
Address1	Address2	City	Postcode
Rutland House	148 Edmund Street	Birmingham	B3 2FD

Concatenate *Address1 + Address2 + City + Postcode*

Concatenated Address
Rutland House, 148 Edmund Street, Birmingham, B3 2FD

Transformers

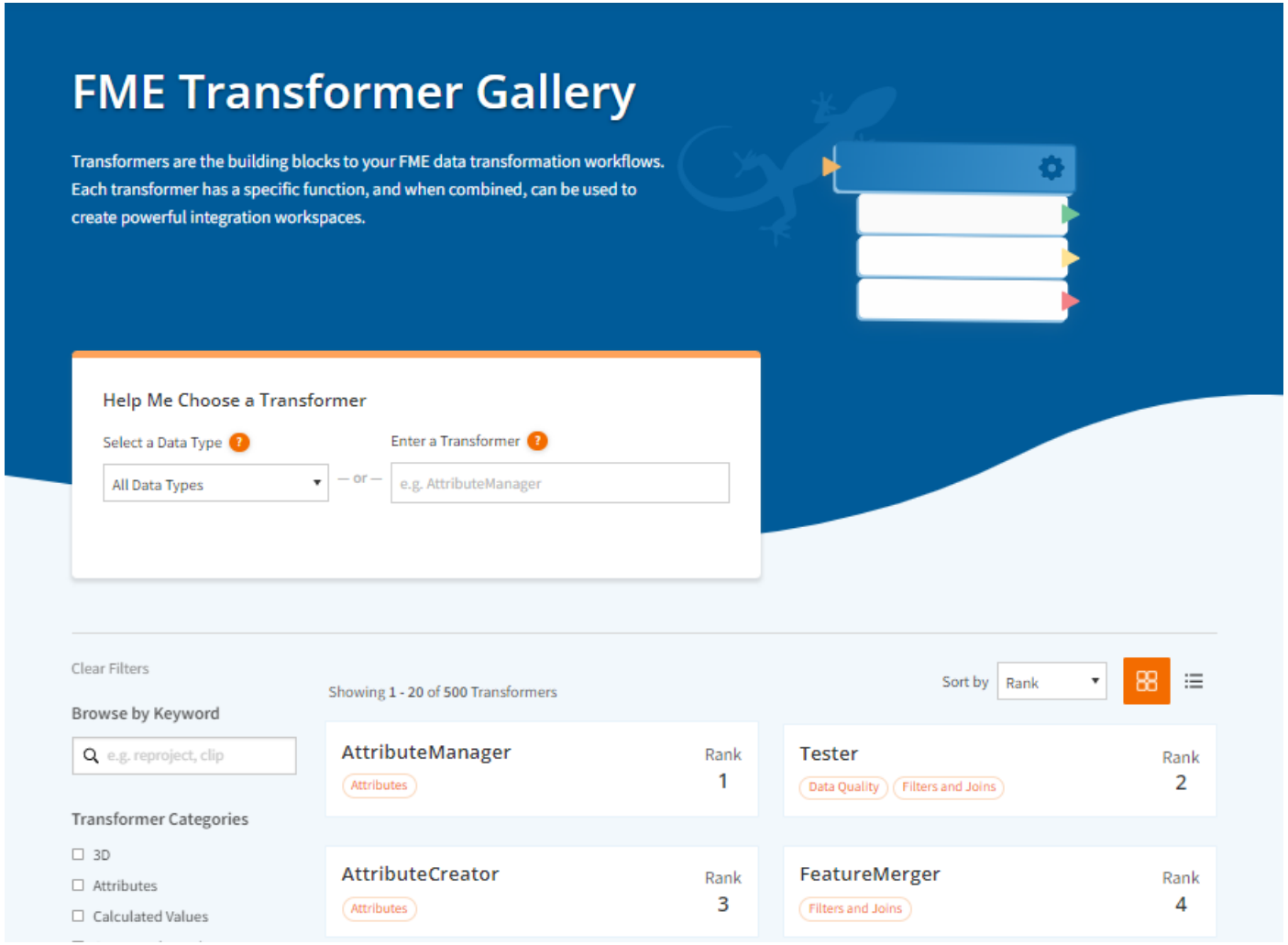
There are many different Transformers to carry out different types of data operations

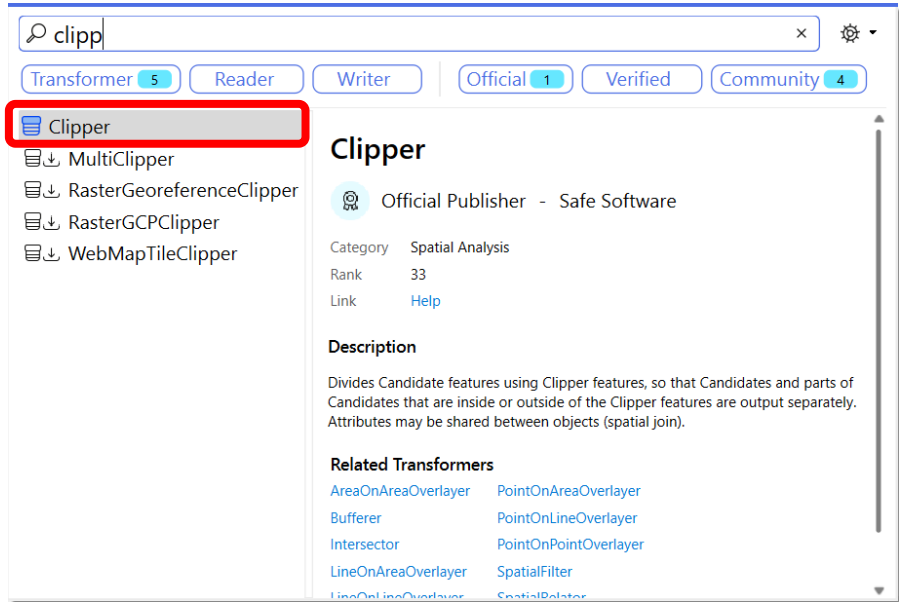


With over 500 transformers, FME possesses a lot of functionality, but how do you find the transformer you really need?

- Although the transformer list can look a bit overwhelming, don't panic!
- The reality is that most users focus on 20-30 transformers.
- You don't need to know every single transformer to use FME effectively.

Locating transformers

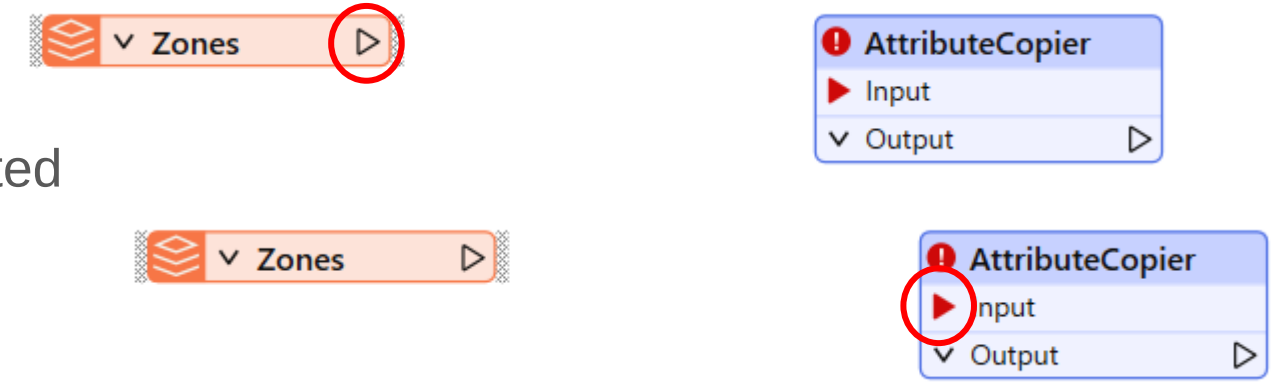




Transformer Gallery, Transformer Categories, Quick Add, Transformer Help, Transformer Searching, FME HUB

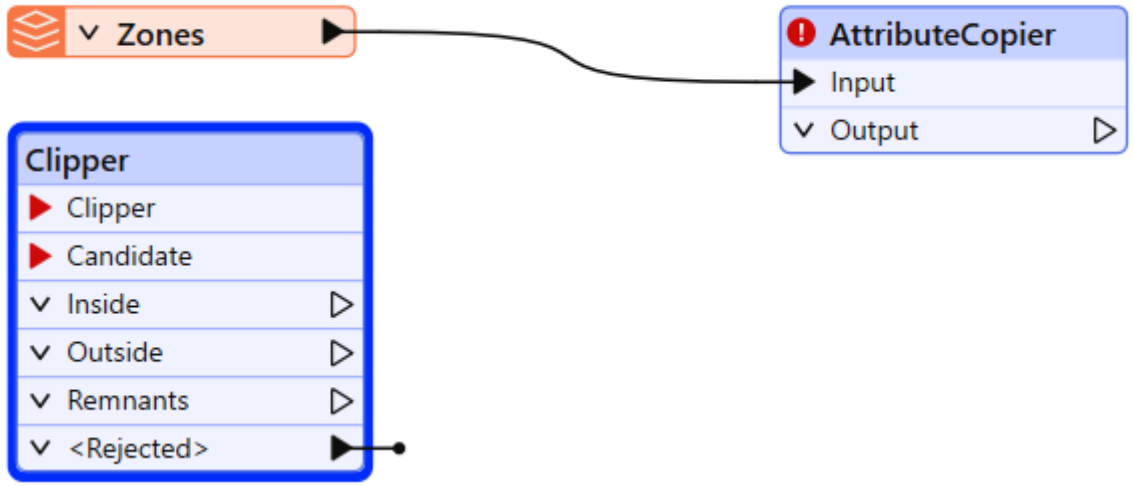
Connecting Transformers

- Quick Connect
  - Click on any output port to be connected
  - Click again on the desired input destination port



- Drag and Insert

  You can "drag and insert" a transformer onto an existing connection. The connection will turn green.

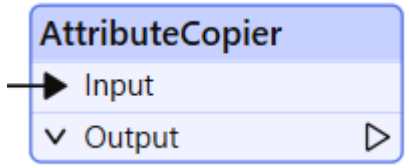


- Manual Connect

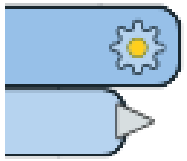
Transformer Parameter Status

Every transformer contains at least one parameter

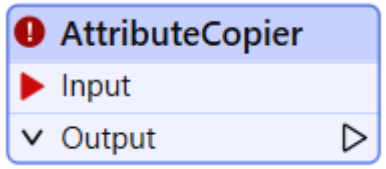
The properties button on a transformer is colour-coded to reflect the status of its parameters:



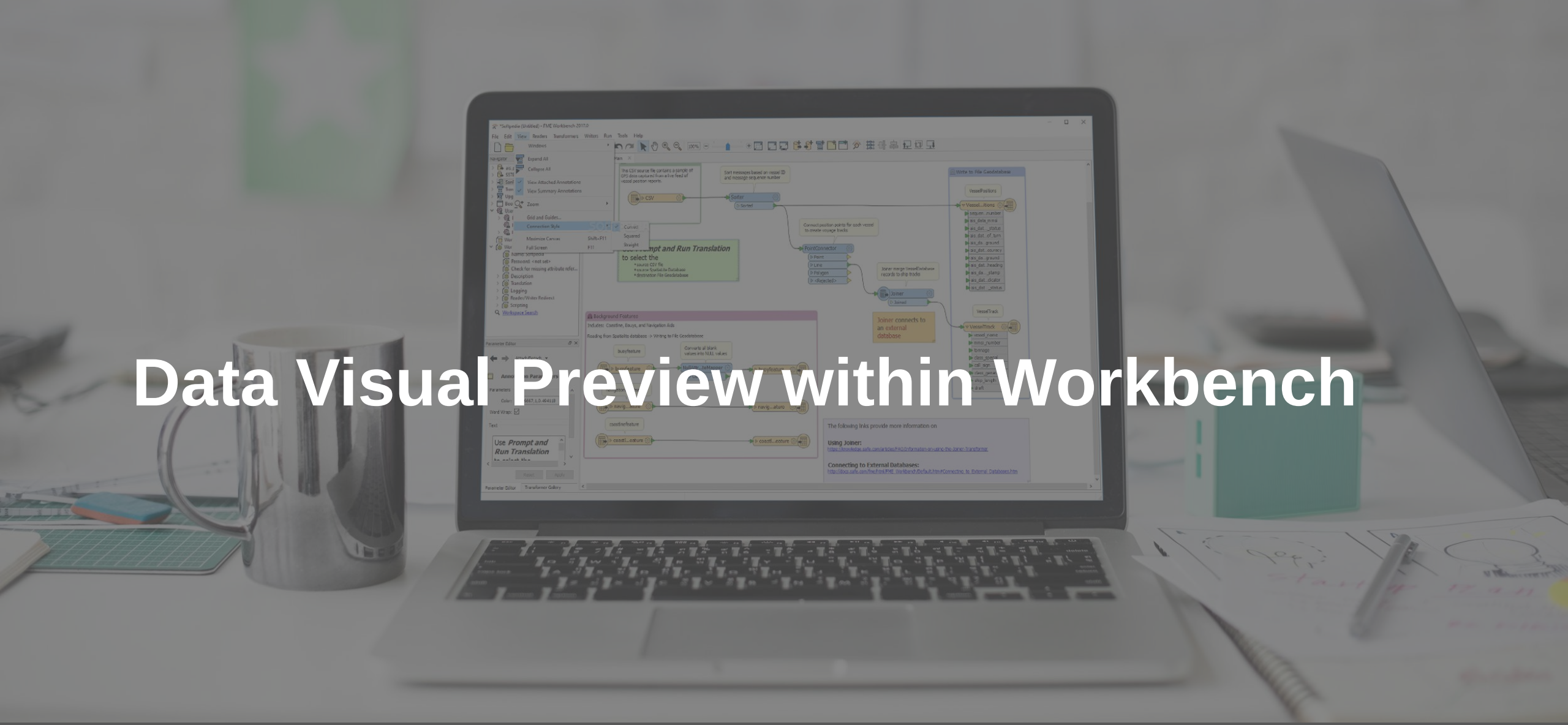
Black indicates that the default transformer parameters have been checked and amended as required, and the transformer is ready to use



yellow indicates that the default parameters have not yet been checked. You can use a transformer that is in this state, but the workspace results may be unpredictable



red indicates that there is at least one setting for which FME cannot supply a default value. You must provide a value for the required parameter(s) before you can use the transformer



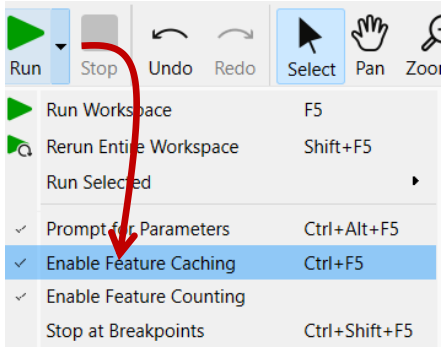
Data Visual Preview within Workbench

Connect. Transform. **Automate**

Feature Caching

Feature caching is the process of storing data to allow it be easily accessed when it is required.

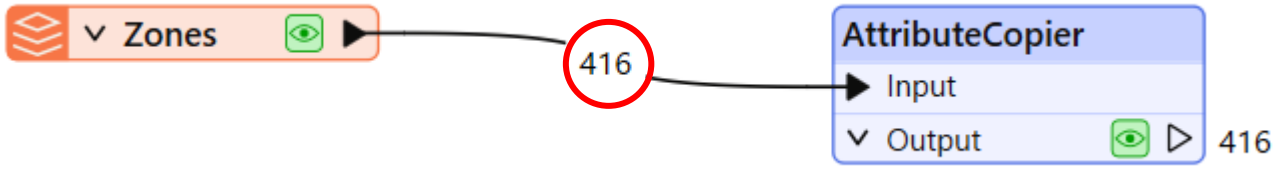
FME workspaces can be run with or without feature caching.



Once activated FME will store your data at each stage of your workflow.

Pros and cons:

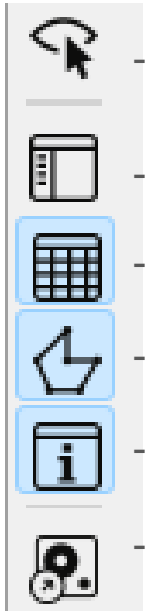
- Your workspace will take longer to run
- Helps when building, testing and debugging workspaces
- Allows partial runs



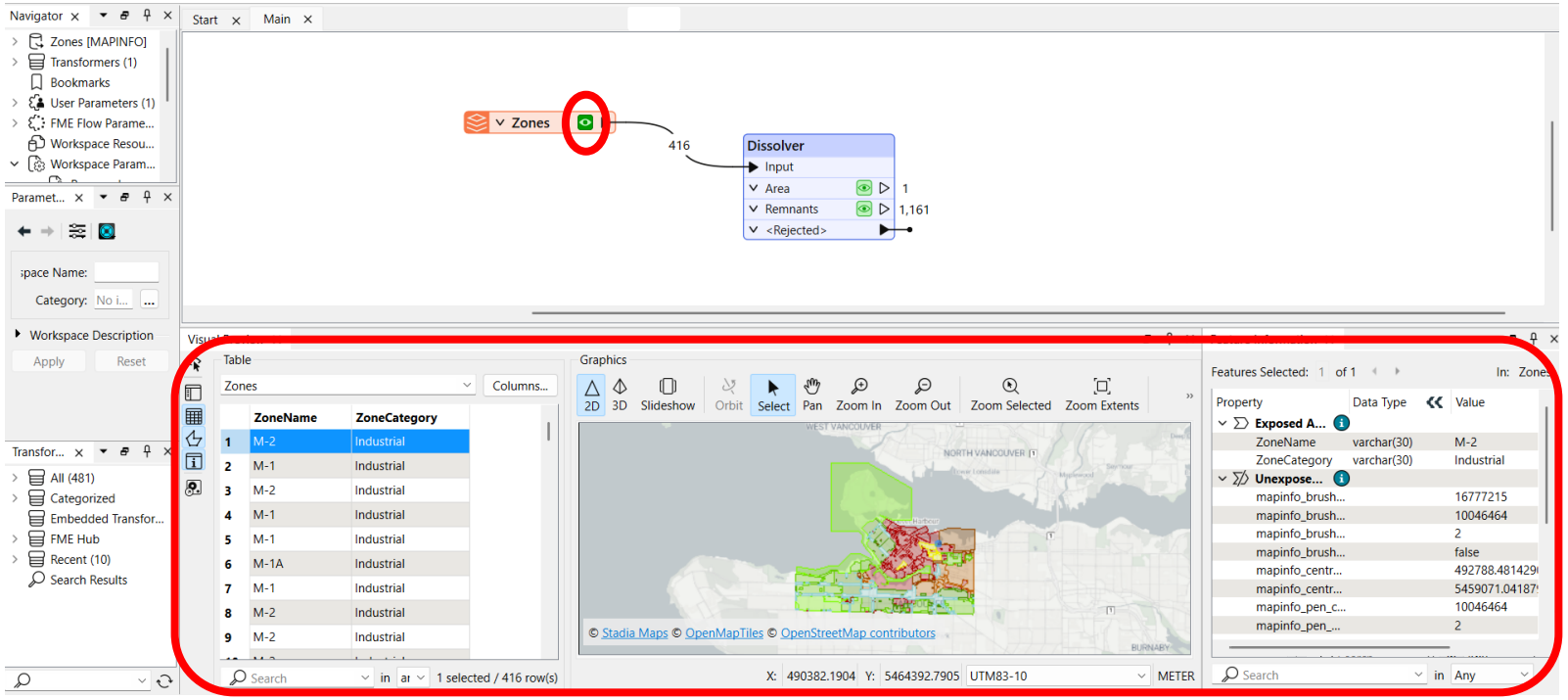
Workbench Visual Preview

Within the Workbench the Visual Preview window contains tools for examining features at each point in the process.

Click on the ‘click to inspect cached features’ icon 



- Automatic Inspect on Selection
- Display Control
- Table View
- Graphics View
- Feature Information window
- Open in Data Inspector



Demo – New Workspace from Blank, Transformer Use and Visual Preview

- Create the workspace from Blank
  - Add Reader - MapInfo TAB, Zones
  - Set Attribute definition to Automatic
  - Manually add Connector line

- Use Visual Preview to examine the Zones data
  – the ZoneCategory value of ‘Comprehensive Development’ is going to be changed to ‘Development’

- Find and add Transformer
  - StringReplacer transformer - find it
  - Connect into workflow
  - Set transformer parameters
    - Attributes: ZoneCategory
    - Text to Replace: ‘Comprehensive ‘
    - Replacement text: *blank*

- Use Visual Preview to examine transformer output

- Add Writer - CSV

Exercise 1.2

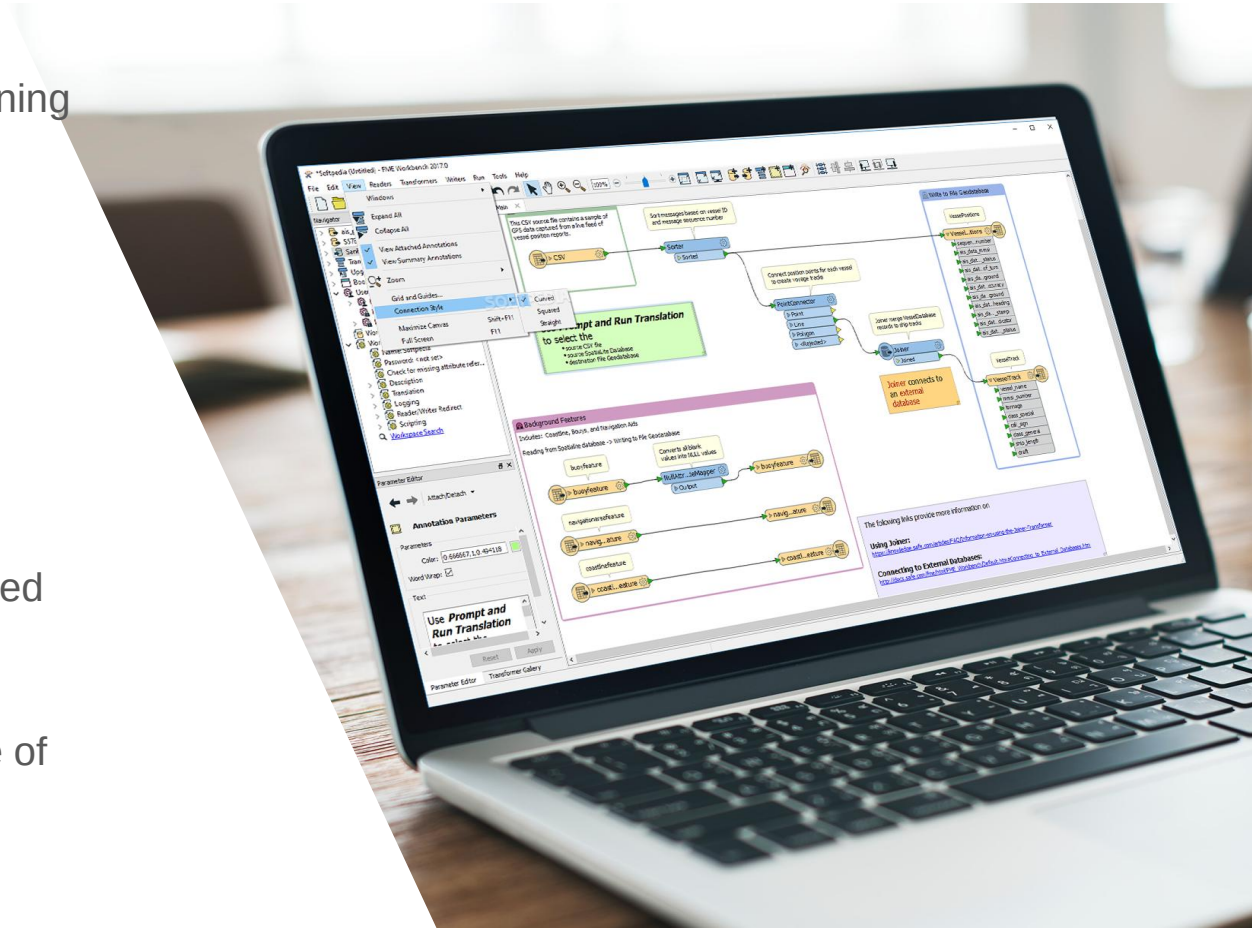
Create a Workspace using Visual Preview and Using Transformers

- In the previous exercise, we inspected and translated some zoning data.
- Now we are going to create a new workspace (from a blank canvas) and use a transformer to merge the zones into new polygons based on their zone category.

Data - Zoning Data (MapInfo TAB)

Goal :

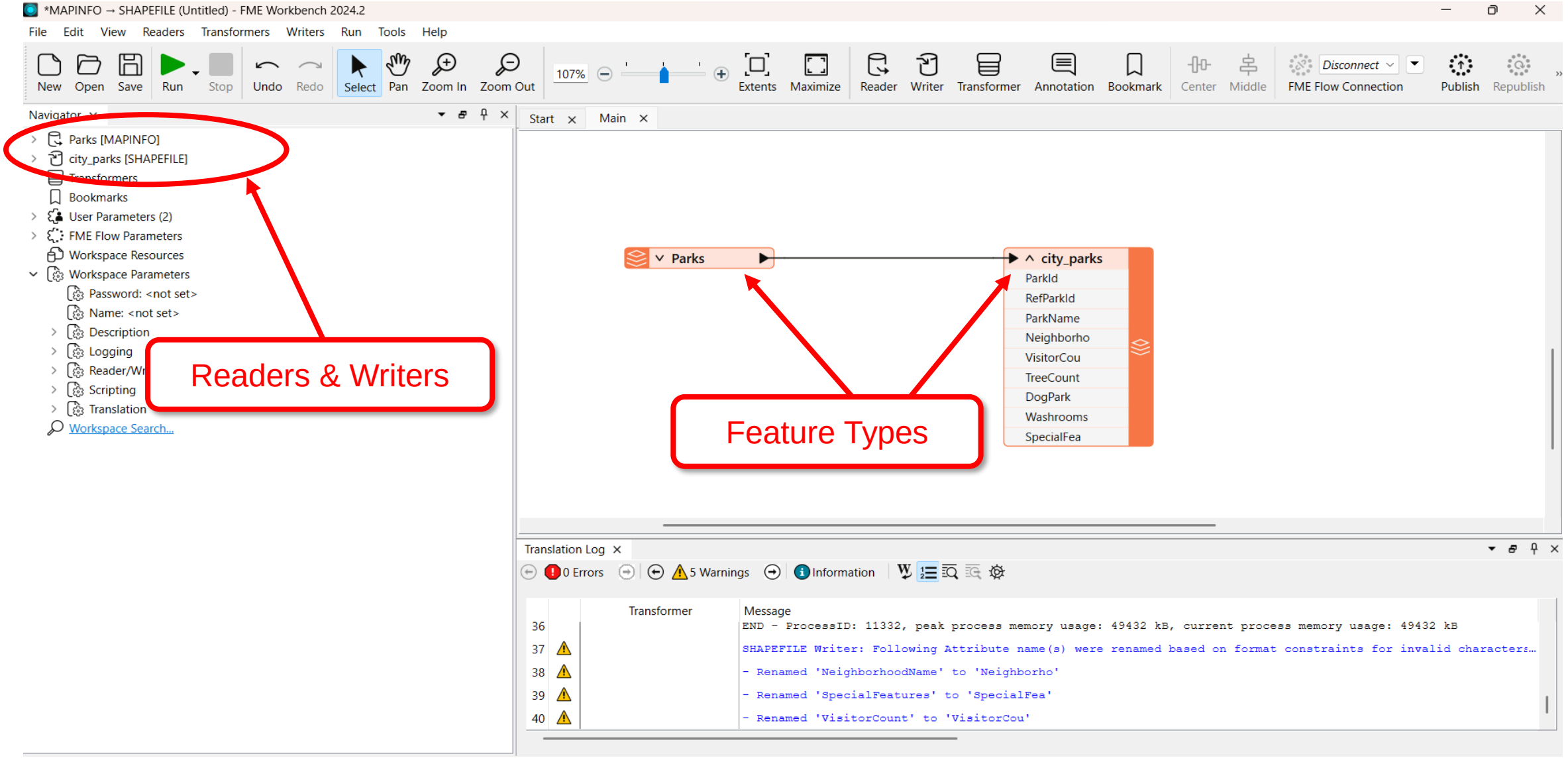
- create a new workspace from a blank canvas, setting up required reader and writer.
- use a transformer to perform data transformation.
- use the Visual Preview tools to examine features at each stage of the workflow.



FME Components & Hierarchy

Connect. Transform. **Automate**

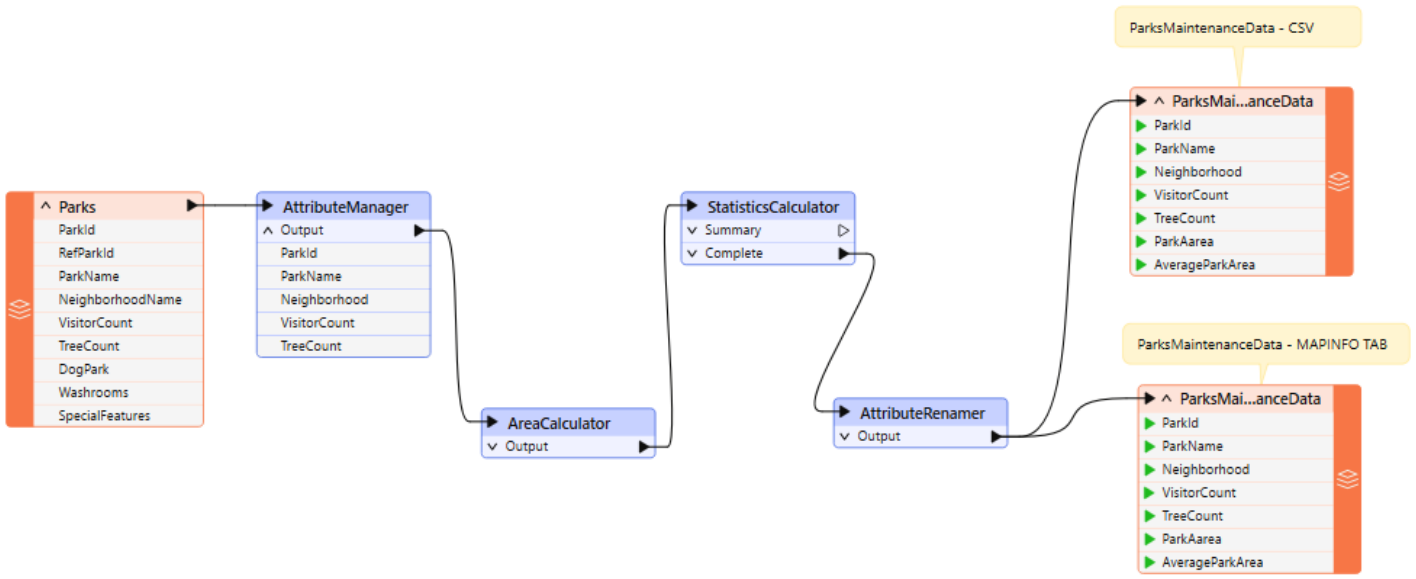
FME Components and hierarchy

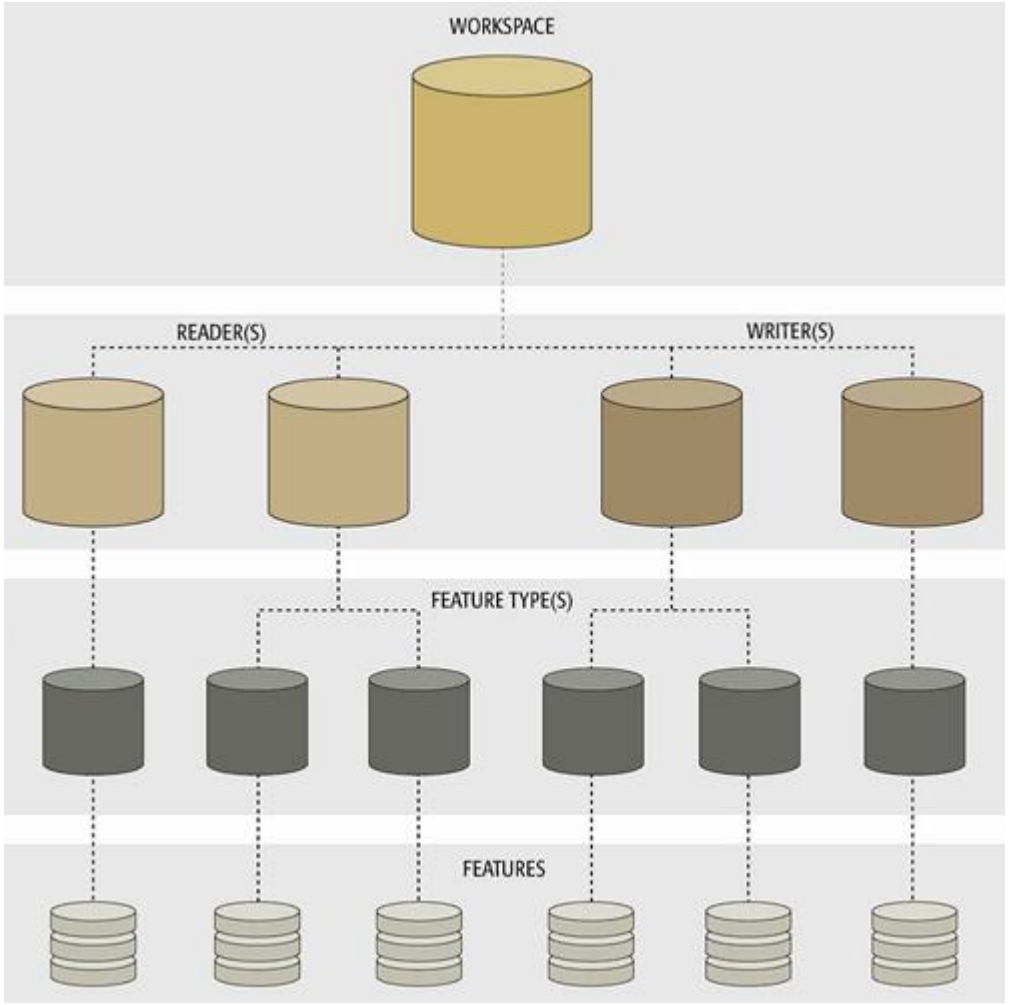


Translation components

The key components in an FME translation:

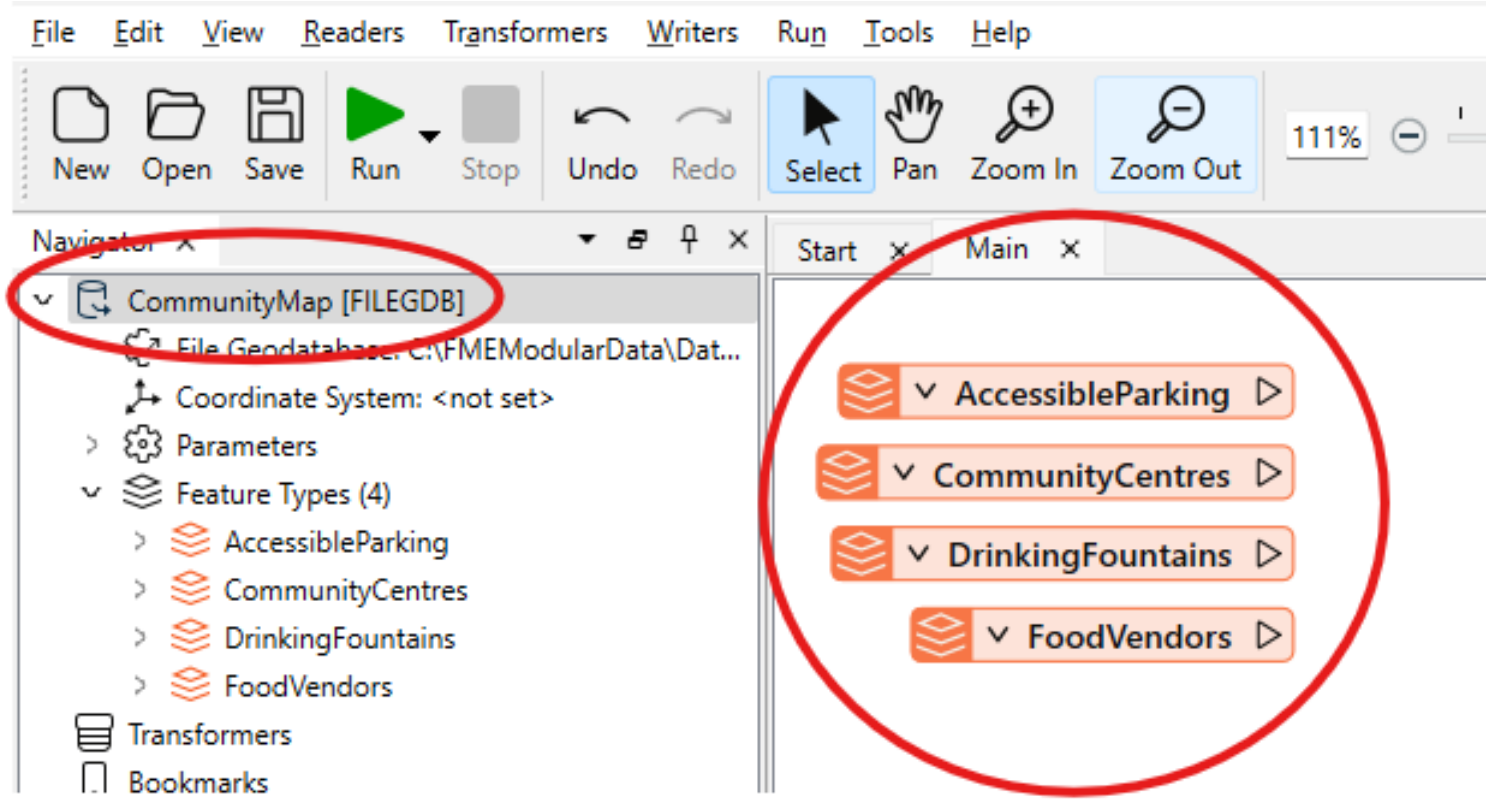
- Workspace
- Readers and Writers
- Feature Types
- Features





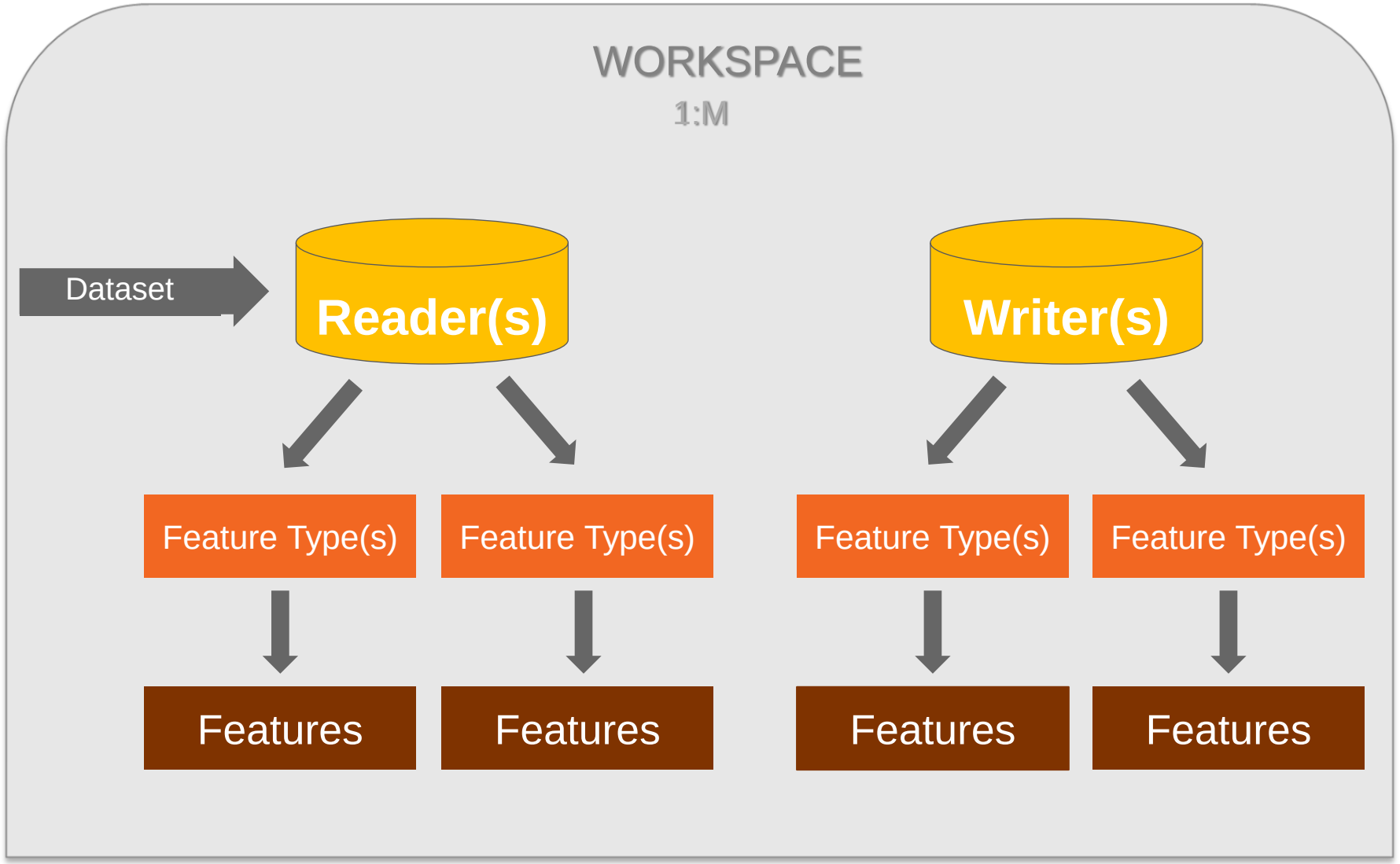
Readers, Writers and their Feature Types

Each Reader/Writer will have one or more Feature Types

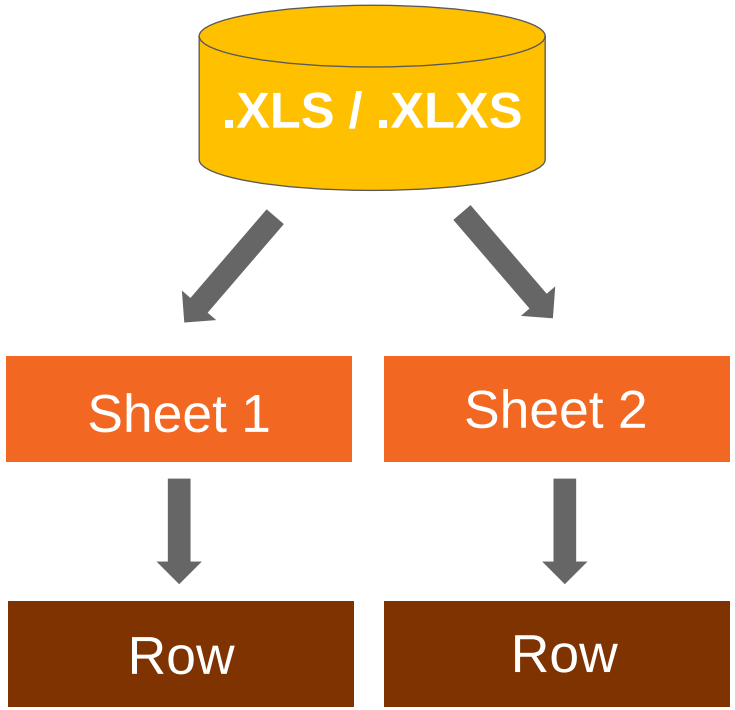


This ESRI Geodatabase Reader has four Feature Types

FME components and hierarchy



EXAMPLE: Excel



Reader / Writer

Feature Type

Features

PublicArt.xlsx

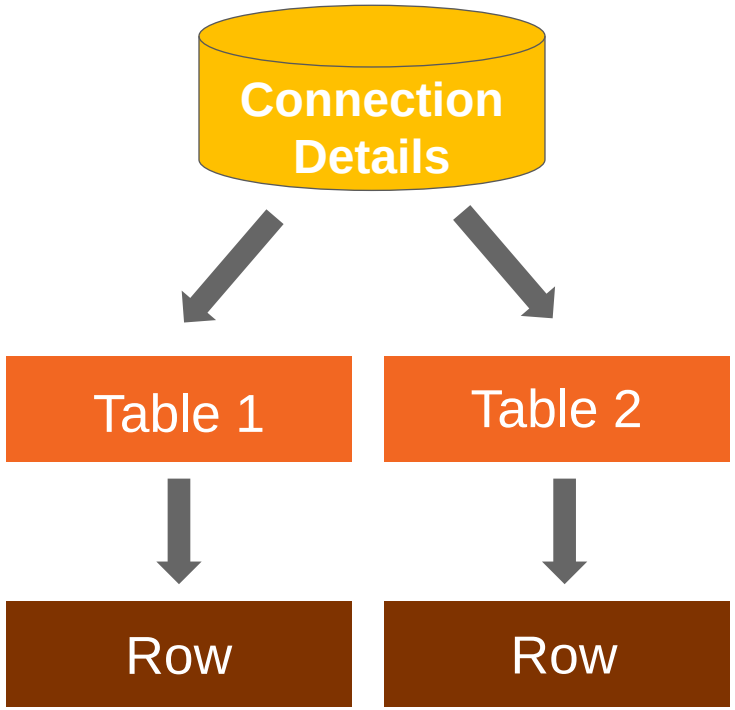
File Home Insert Page Layout Formulas Data Review View Help Tell me what you want to

K52

	B	C	D	E
1	**Title**	**Longitude**	**Latitude**	
2	The Belonging Action	-123.1100977	49.28378068	
3	The Belonging Action	-123.110029	49.28373217	
4	China Gate	-123.1032823	49.27975613	
5	Moving Pictures	-123.1250401	49.27705517	
6	Suan Phan: Abacus	-123.1055799	49.27977613	
7	Untitled (light work)	-123.1180593	49.28855627	
8	Untitled (light work)	-123.1178331	49.28839592	
9	Scopes of Site	-123.127174	49.29058951	
10	Untitled	-123.1128704	49.28022166	
11	Untitled	-123.1128704	49.28022166	
12	Untitled	-123.1178337	49.28573477	
13	Untitled	-123.1182869	49.28571828	

Downtown | Mount Pleasant | Strathcona | Fairview | Kitsilano | West End

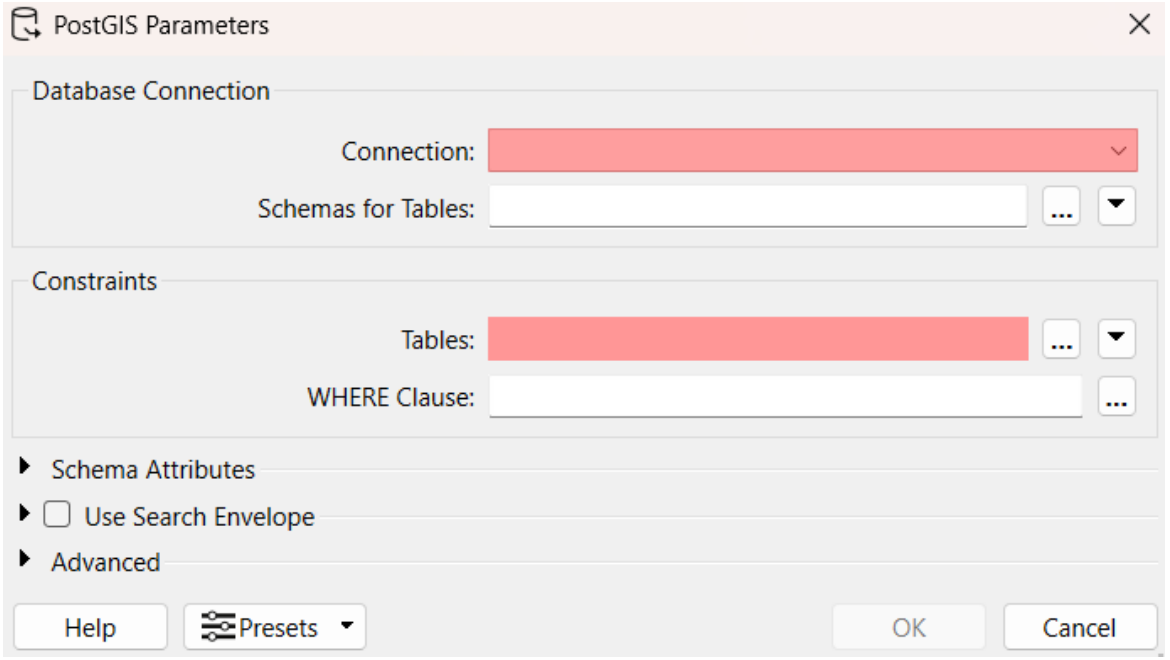
EXAMPLE: Database



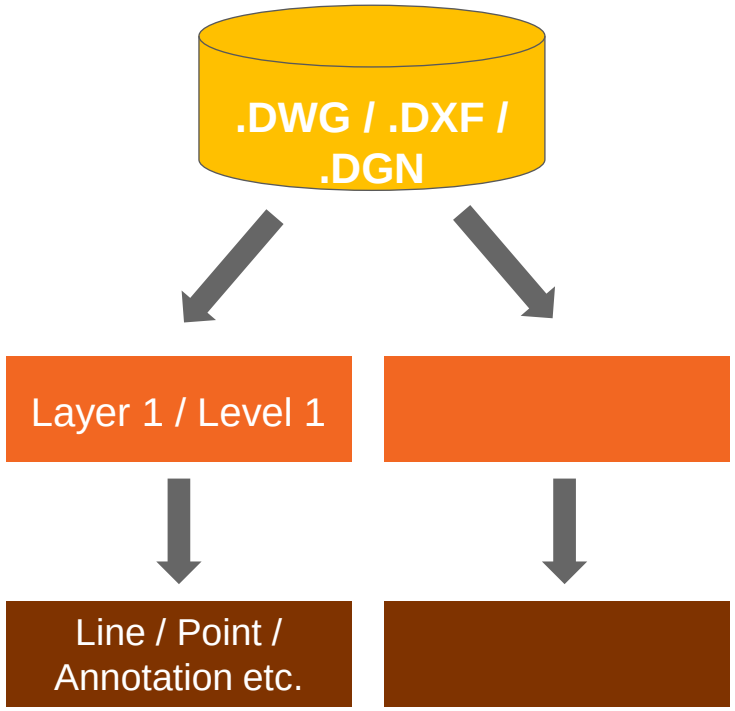
Reader / Writer

Feature Type

Features



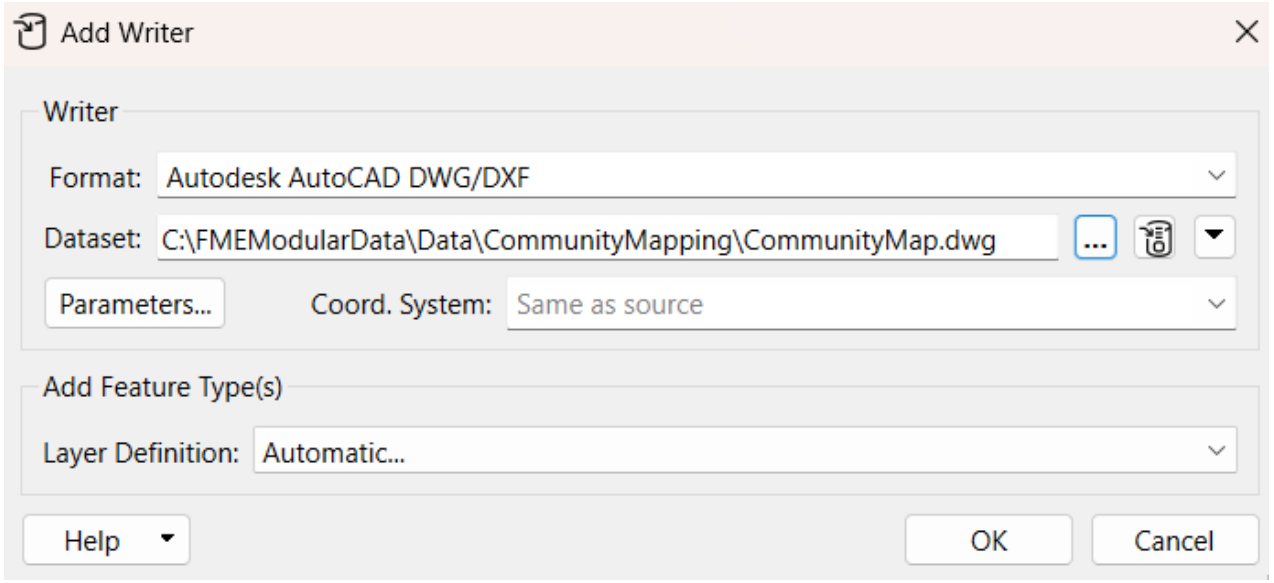
EXAMPLE: CAD files



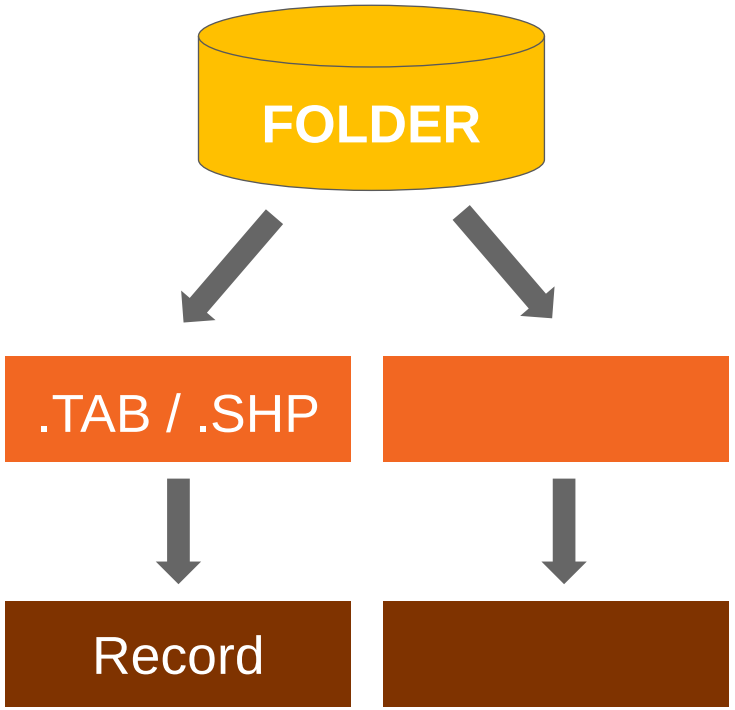
Reader / Writer

Feature Type

Features



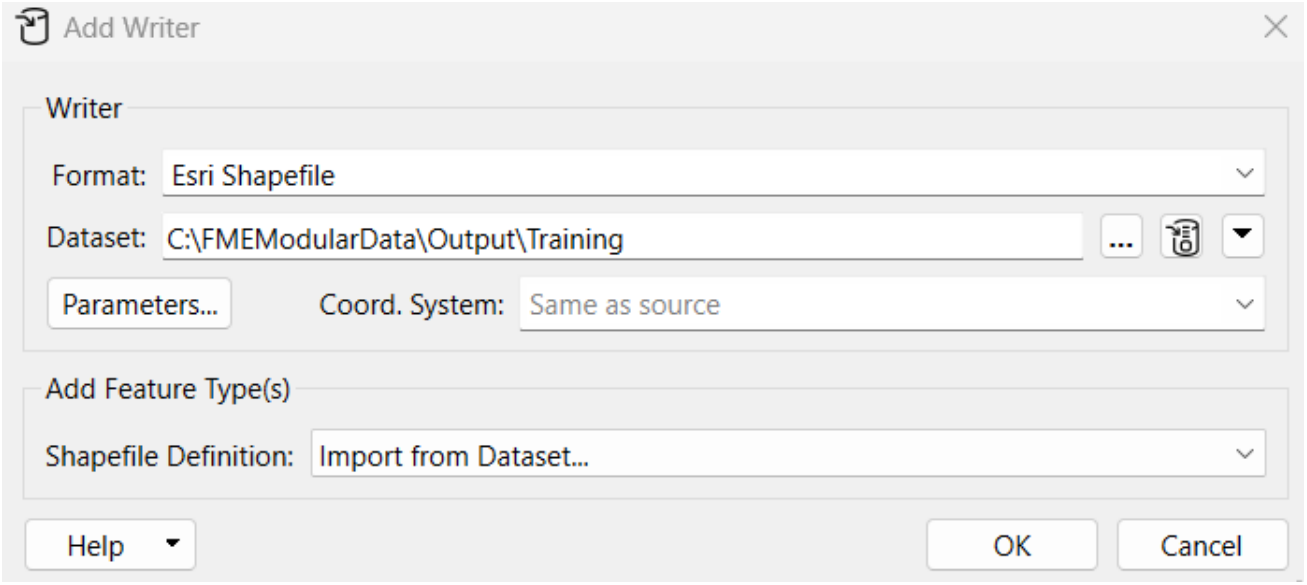
EXAMPLE: MapInfo TAB, ESRI SHP, CSV



Reader / Writer

Feature Type

Features



Demo – Readers/Writers and Feature Types

- Data Inspector:
  - Open the ‘CommunityMapping’ ESRI Geodatabase
  - Examine the Feature Types & Features

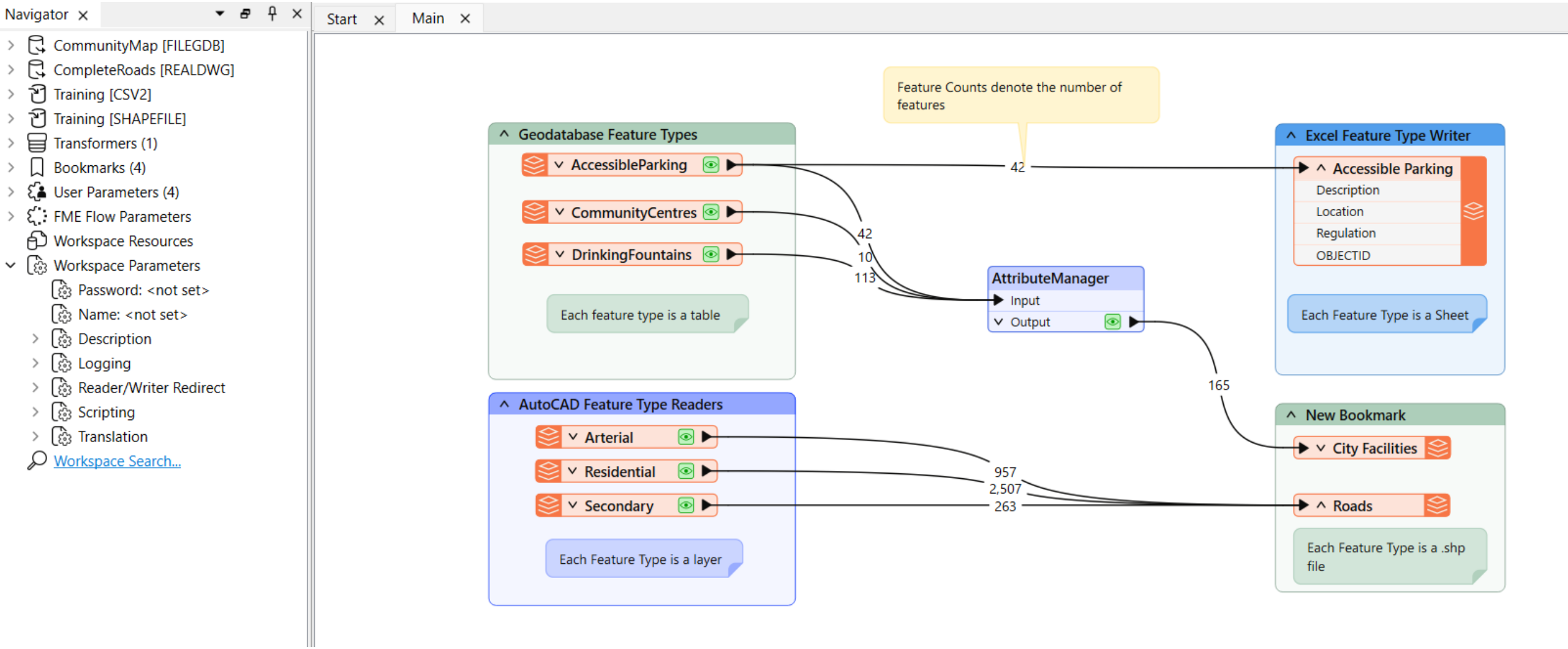
- Workbench:
  - Add a Reader for ‘CommunityMapping’ ESRI Geodatabase
  - Examine Reader in Navigator panel
  - Examine Feature Types on Canvas

File based v Folder based datasets

	ESRI SHP	MapInfo TAB	CSV	AutoCAD	KML	OGC GeoPackage	Excel	ESRI Geodatabase	Database	Raster
Reader/ Writer	Folder	Folder	Folder	DWG File	KML File	GPKG File	XLS File	GDB File	Connection Details	Raster Folder
Feature Type	SHP File	TAB File	CSV File	Layer	Layer	Layer	Worksheet	Dataset/Table	Table	Raster File
Feature	Record	Record	Row	Object	Record	Record	Row	Record	Row	Raster File
	Folder Based File Systems			**File Based File System**						

Multiple Readers & Writers

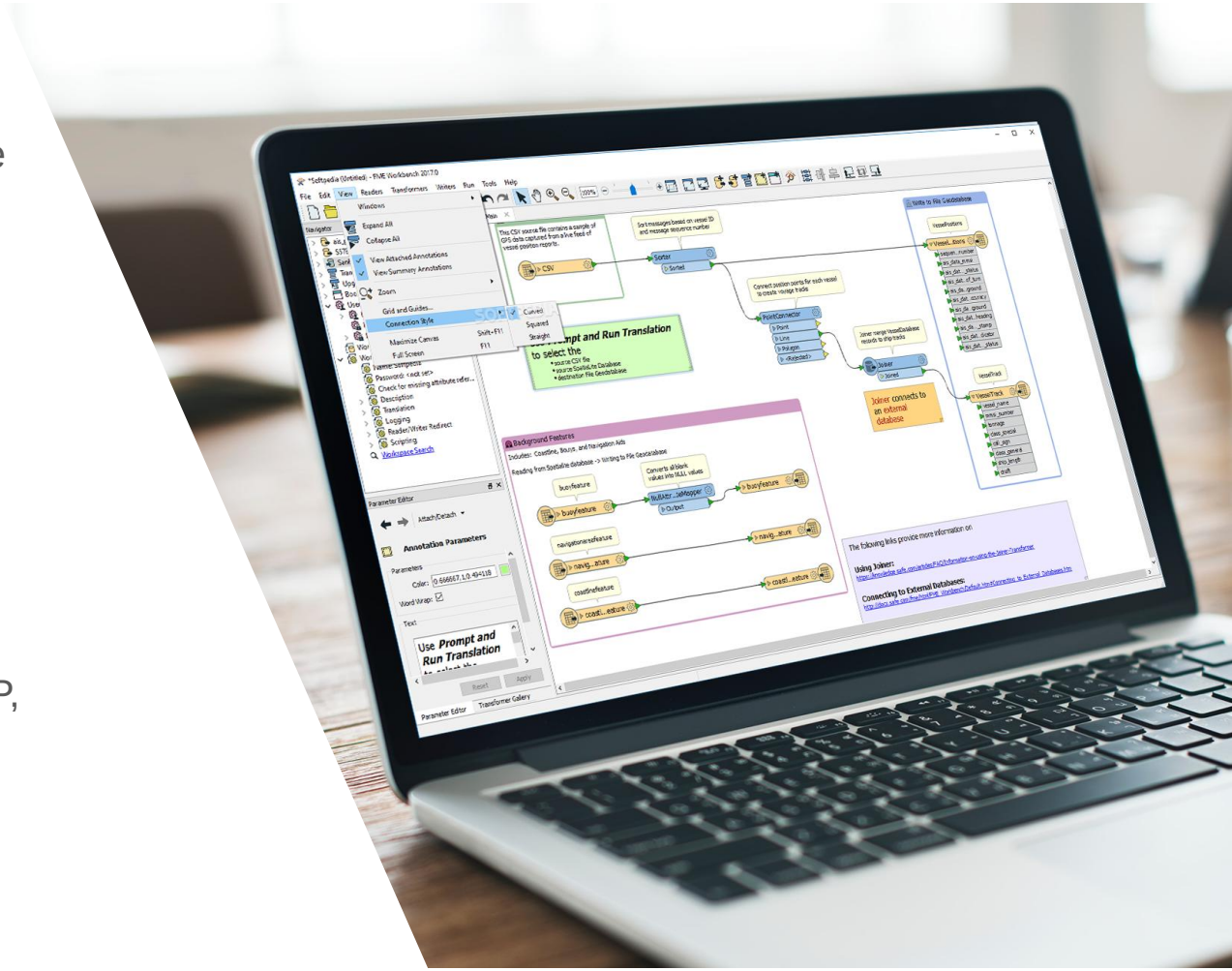
A workspace with multiple readers and writers might look like this



Exercise 1.3

FME Components and Hierarchy

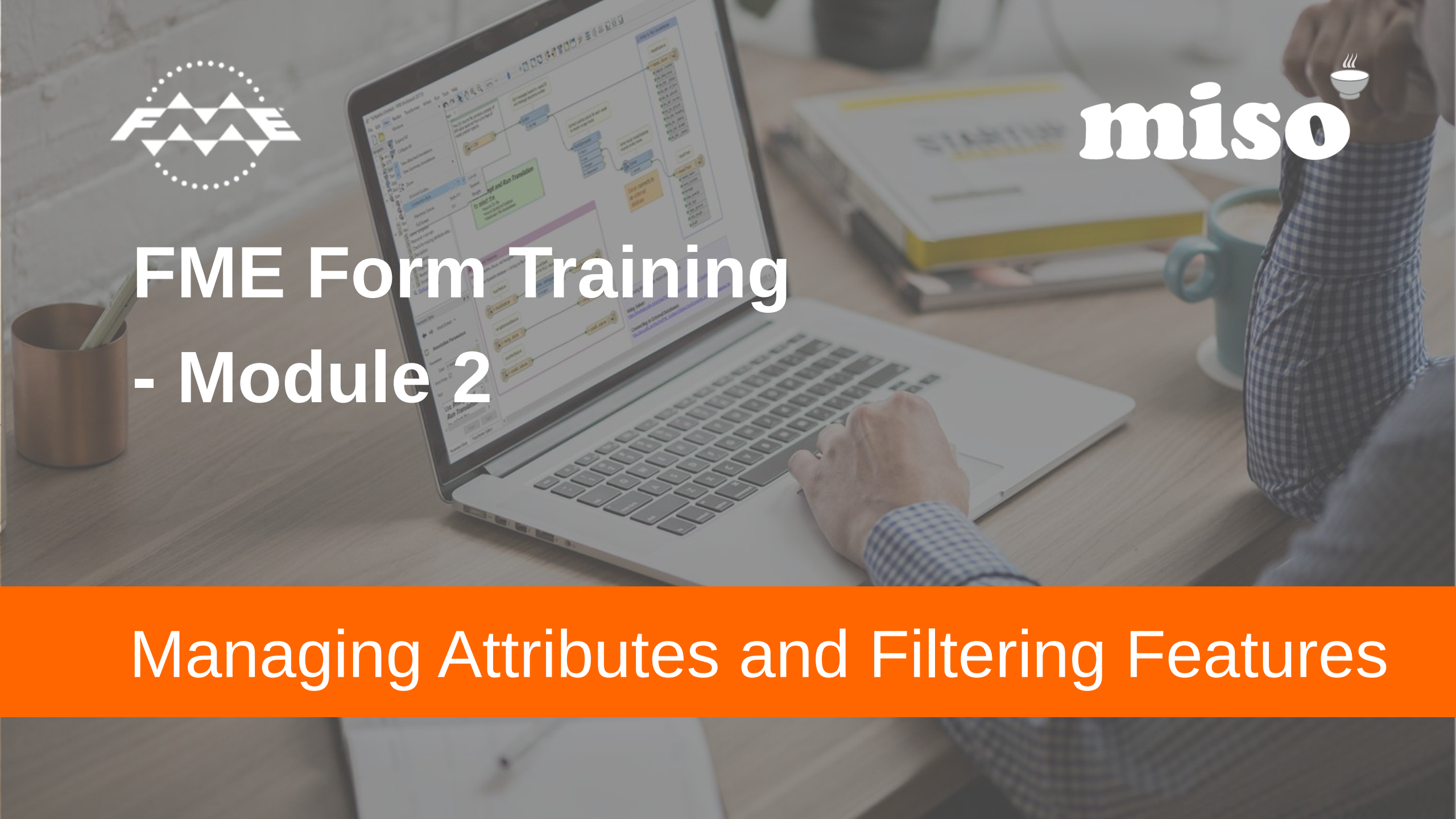
- Understand the differences in FME hierarchy regarding the Readers, Writers and Feature Types of different formats
- Learn the difference between folder based and file based formats



Data - CommunityPlanMap (Bentley MicroStation Design V8)

Goal - Create a workspace to translate from DGN to ESRI SHP, working with multiple feature types


Thanks for watching!
Any questions?



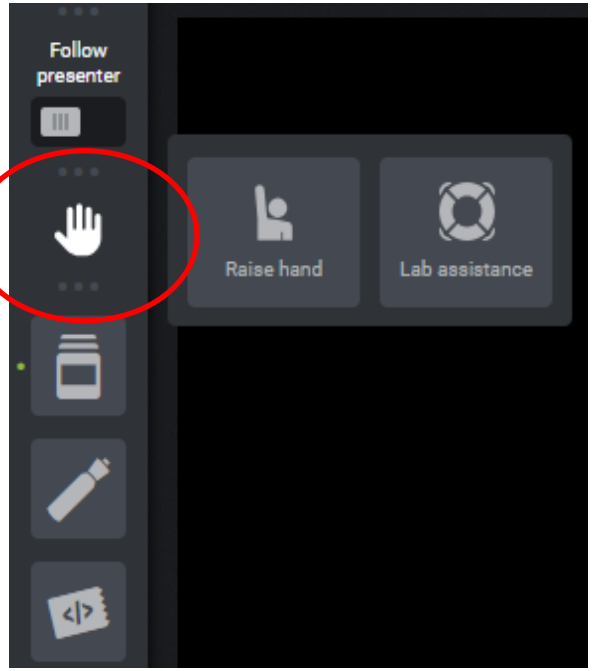
FME Form Training - Module 2

Managing Attributes and Filtering Features

Training Environment

< keep '**Follow presenter**' on

< **Lab**



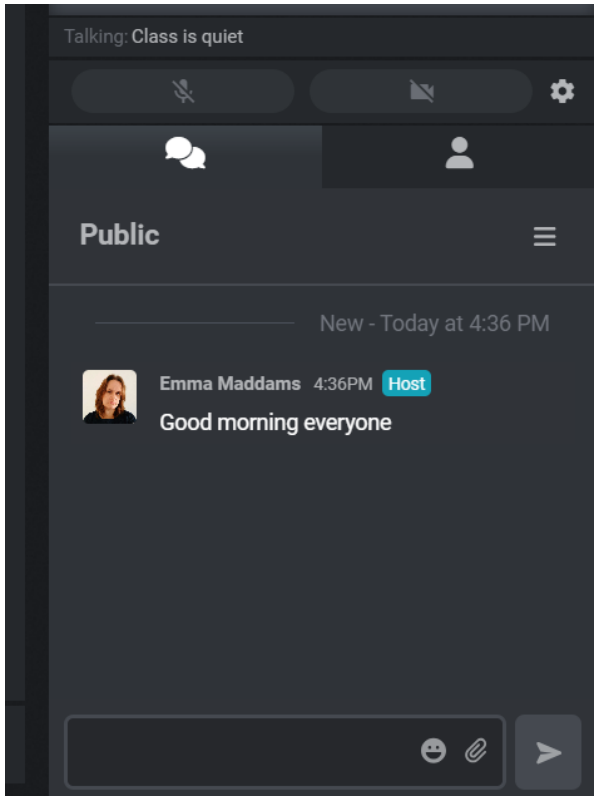
need help when using your Lab

Use either:

- 'Raise hand' or
- 'Lab Assistance'

Chat

- to everyone
- to trainer



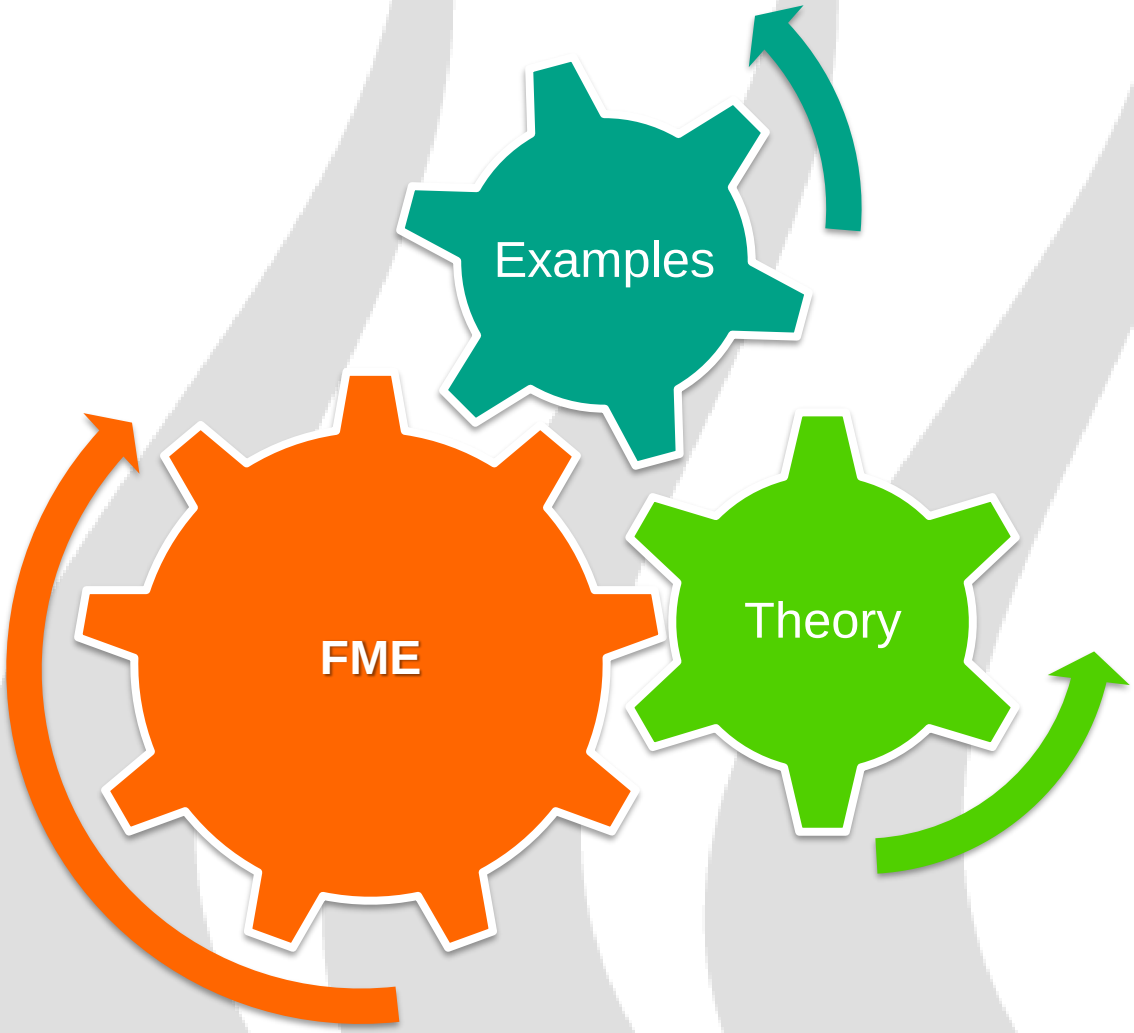
Training Environment

- Training Data folders **C:\FMEModularData**
  - Data
  - Output
  - Resources
  - Workspaces
- Slides
- Workbook – you need to download using link sent by the trainer

What we'll be covering today…

Agenda

- Schema Mapping
- Managing Attributes
- Format Attributes
- Lists
- Filtering Features
- Key-based Joins



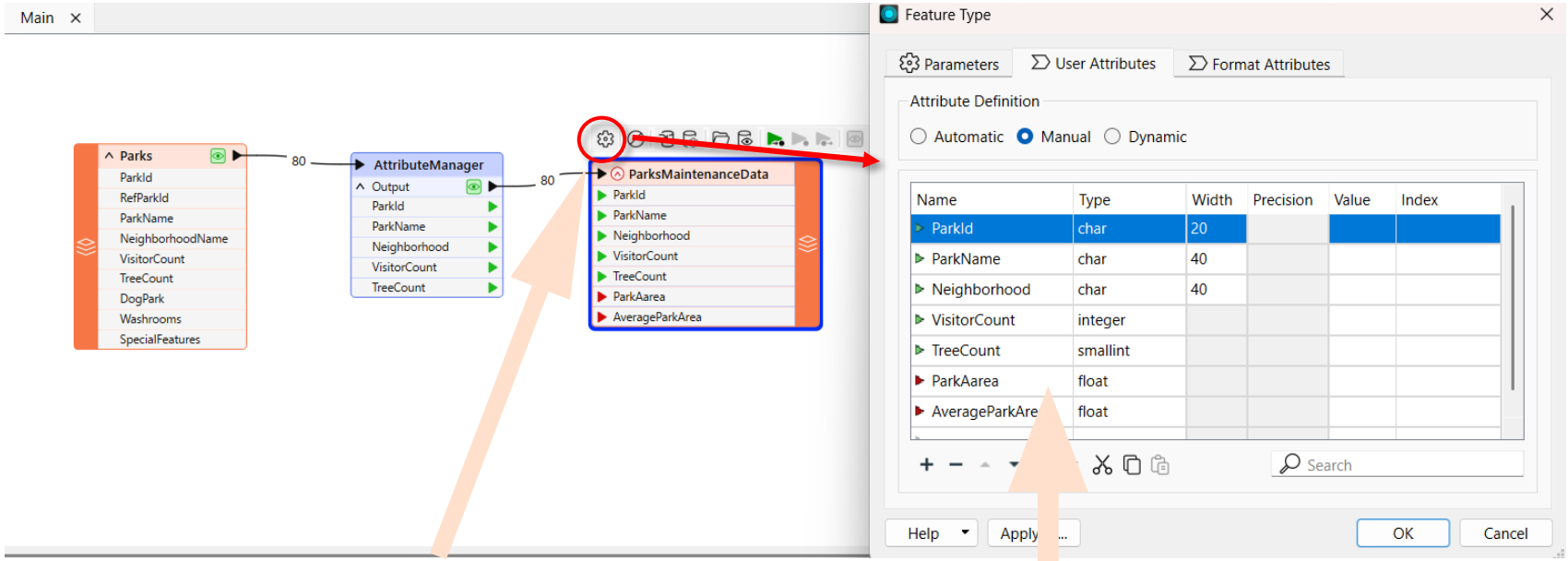
How do I handle attributes in FME?

Connect. Transform. **Automate**

Schema Mapping

Reader Feature Type Attributes
– 'What We Have'

Writer Feature Type Attributes
– 'What We Want'



We can manage attribute mapping using **Transformers**

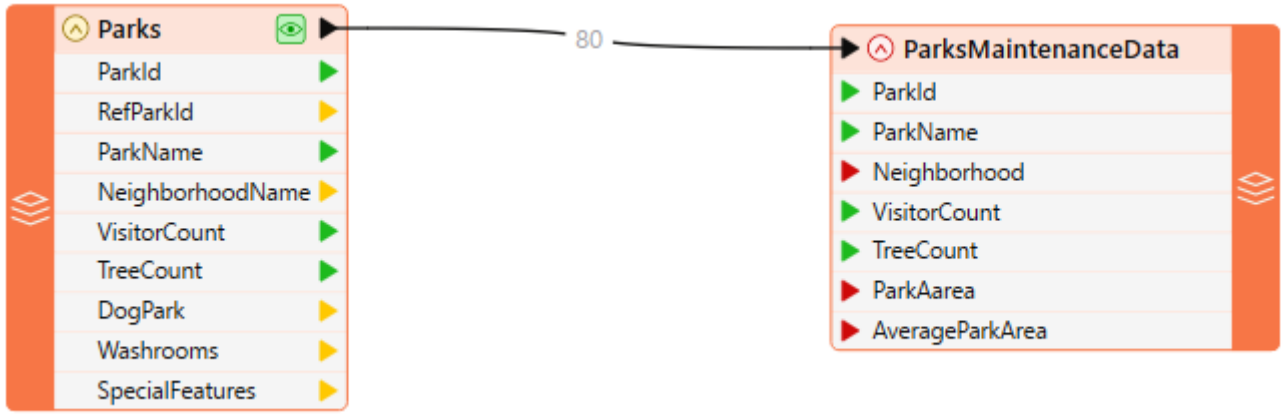
- Rename attributes
- Create attributes
- Remove attributes
- Order attributes

We can edit Writer **Schema**

- Attribute naming
- Attribute order
- Add/Remove attributes
- Attribute Data Types

Attribute Routing

- Attributes are **name-driven** through the workspace
- Attribute names are **Case Sensitive**
- Attribute port colours - indicate if the attribute is being successful routed, or not:



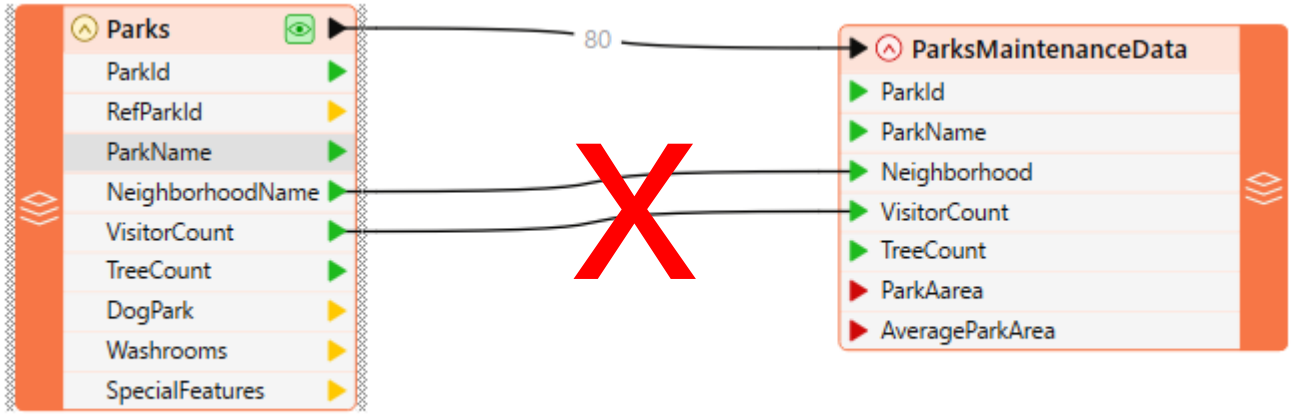
Green – the attribute is being successful routed out/in

Yellow – the attribute is not being routed beyond this point of the workspace

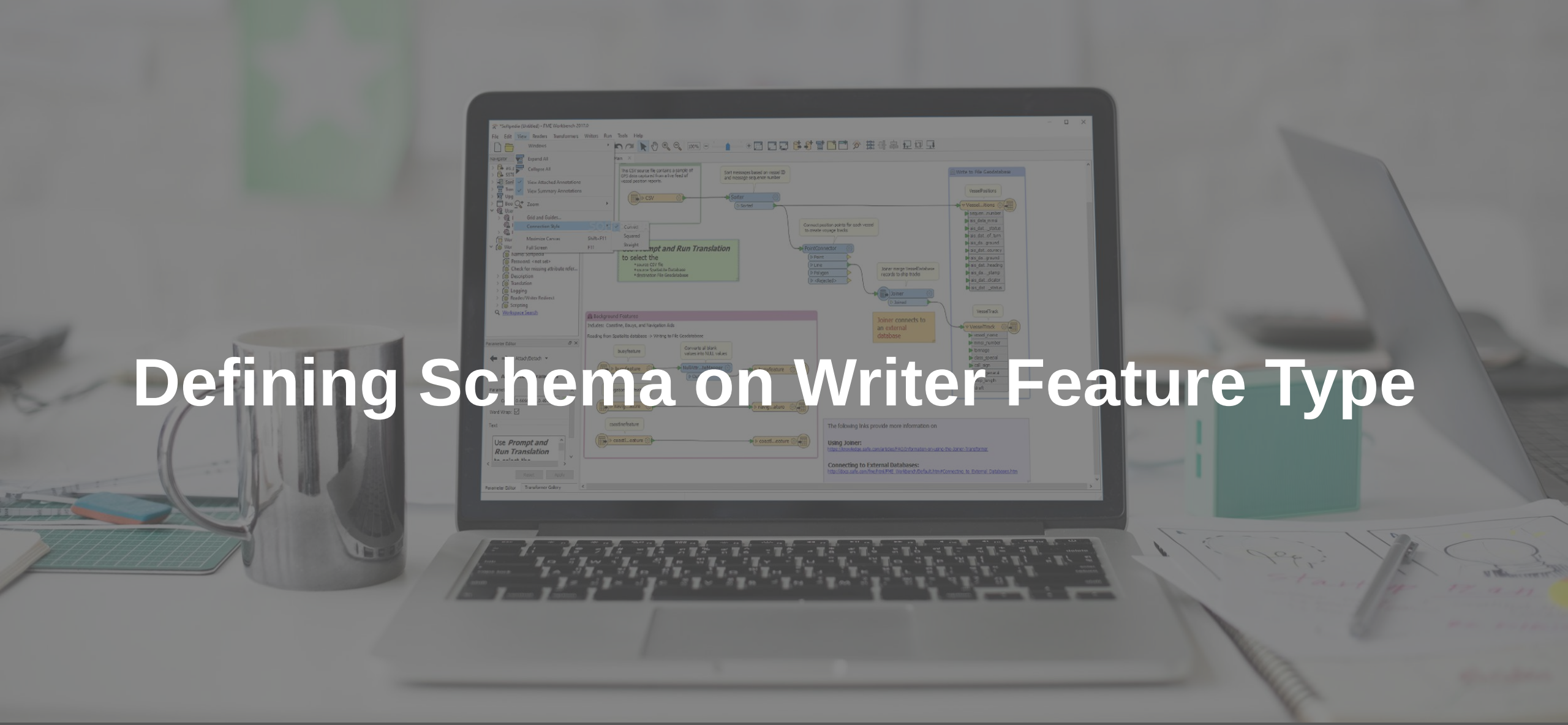
Red – the attribute has no input. It will be an empty attribute on written data

Attribute Routing

It is possible to manually connect attributes, but **don't** - it's bad practice and these connector lines can easily be corrupted if changes are made to the workflow or source data. Leading to attributes being incorrectly connected and routed!



Instead, **use Transformers** to manage your attribute routing



Defining Schema on Writer Feature Type

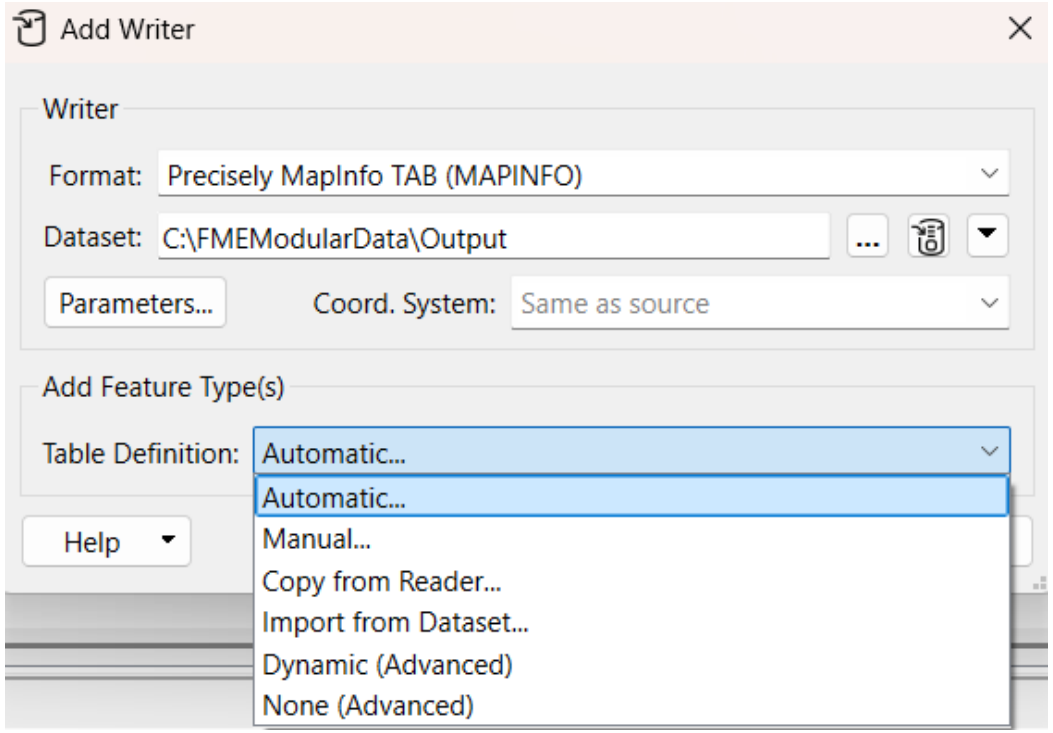
Connect. Transform. **Automate**

Attribute Definition – When Adding Writer

The attributes on your Writer Feature Types can be defined in a number of ways:

- **Copy** from a Reader, another Feature Type or Transformer
- **Manually**
- **Automatic**
- Dynamic (advanced)

These options are available when **adding a Writer**

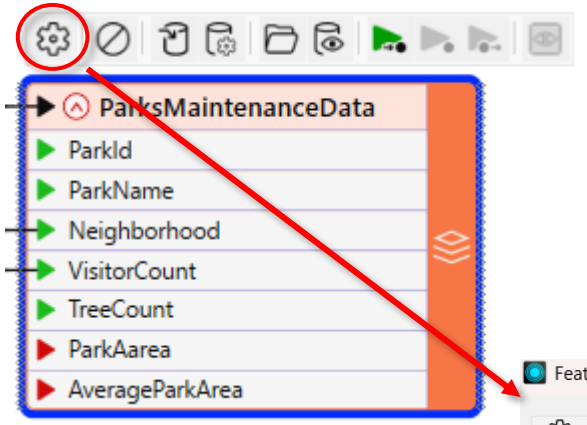


But we can also switch between Automatic/Manual later if we change our mind!

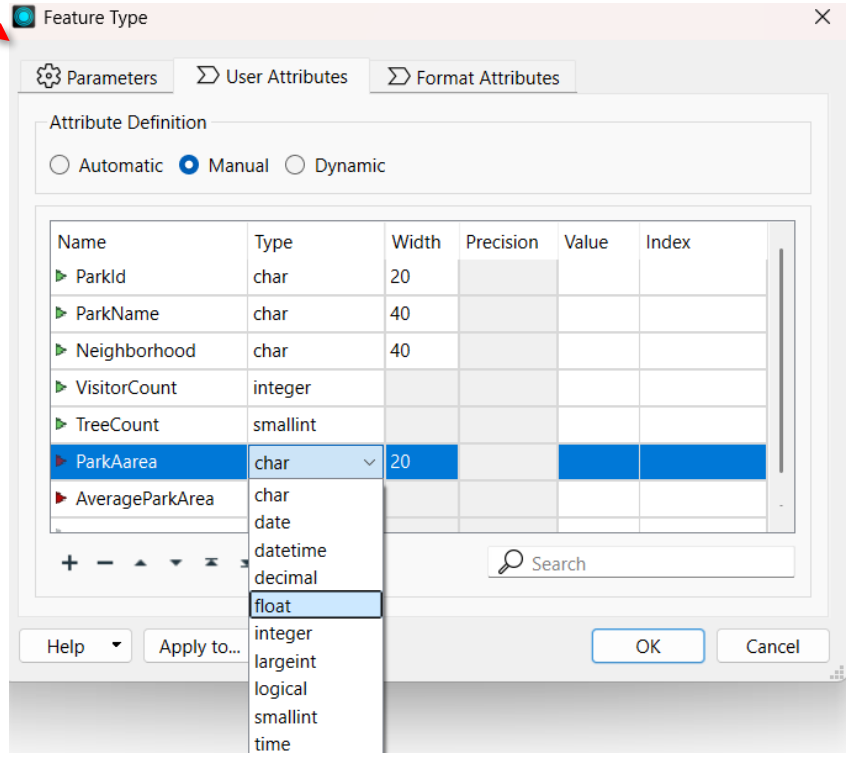
- in the Writer Feature Types parameters

Schema editing on the Writer Feature Type

- Attribute definition:
  - Automatic
  - Manual



- Schema editing on writer Feature Type:
  - Attribute renaming
  - Attribute order
  - Attribute Data Types:
    - The data type of attributes are set at the end of the workflow on the Writer Feature Types
    - The Data Types available will be determined by the format being written to



Managing Attributes

Connect. Transform. **Automate**

Managing Attributes

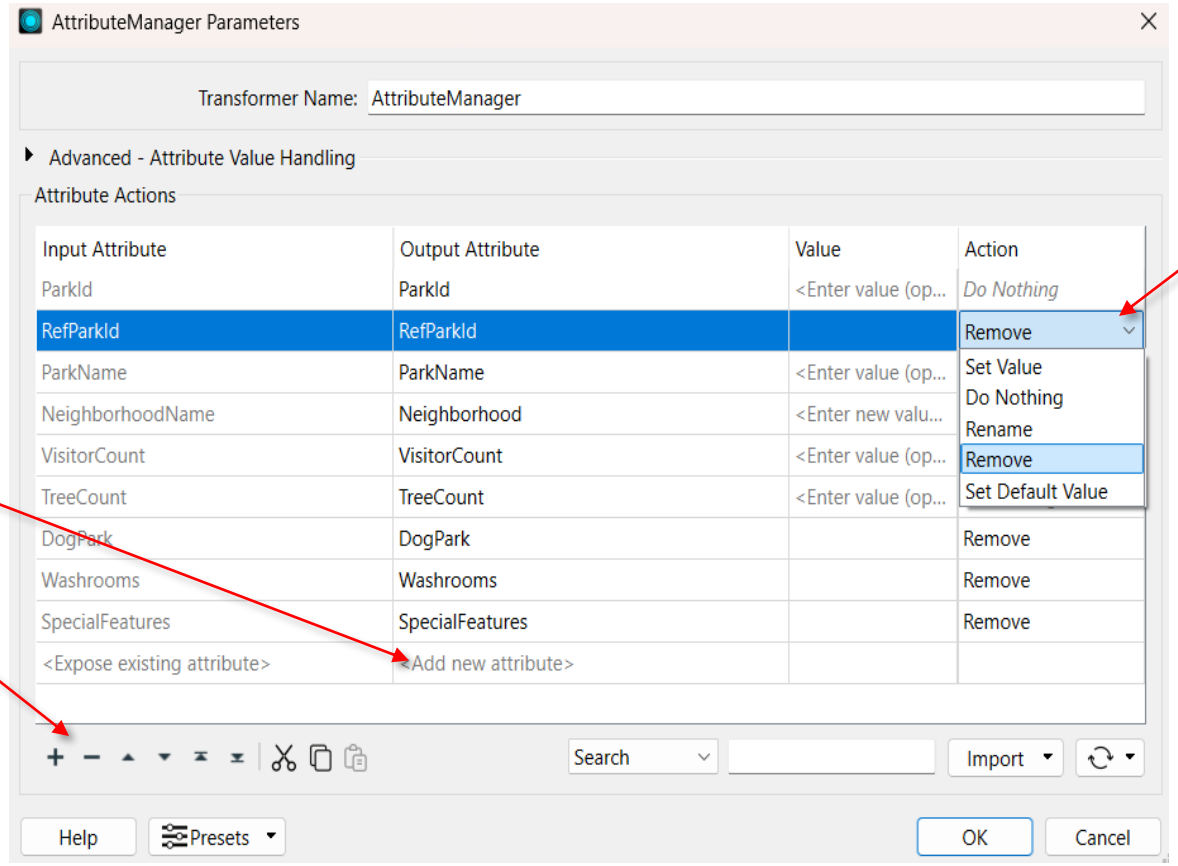
There are numerous attribute management transformers. Here are the most popular:

Task	Transformers
Create Attributes	AttributeCreator, AttributeManager
Set Attribute Values	AttributeCreator, AttributeManager
Remove Attributes	AttributeKeeper, AttributeManager, AttributeRemover, BulkAttributeRemover
Rename Attributes	AttributeManager, AttributeRenamer, BulkAttributeRenamer
Copy Attributes	AttributeCopier, AttributeCreator, AttributeManager
Sort Attributes	AttributeManager
Change Attribute Case	BulkAttributeRenamer
Add Prefixes/Suffixes	BulkAttributeRenamer

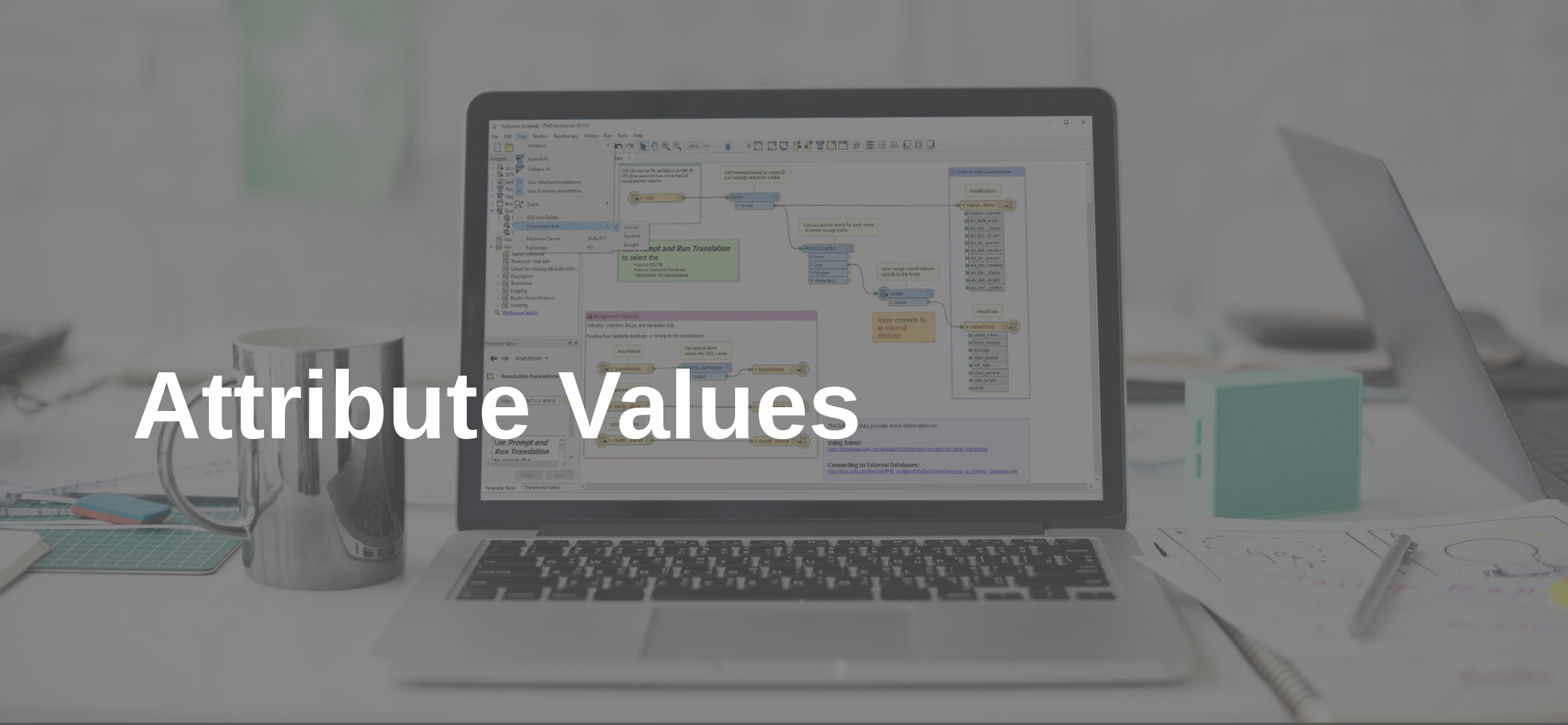
- They **create** new attributes, **rename** them, **copy**, **sort** them, **set** values, and **delete** them
- Useful for the purposes of schema mapping
- Bulk - tasks allow the user to perform the same operation on a large number of attributes

The Attribute Manager

- Create New attributes
- Reorder attributes



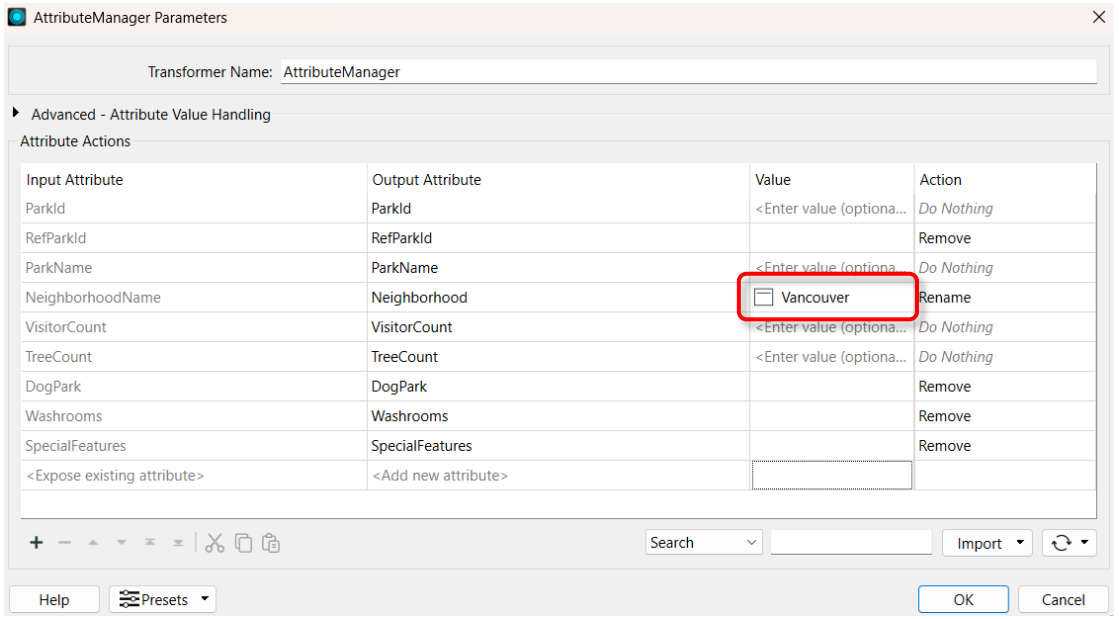
- Rename attributes
- Remove attributes

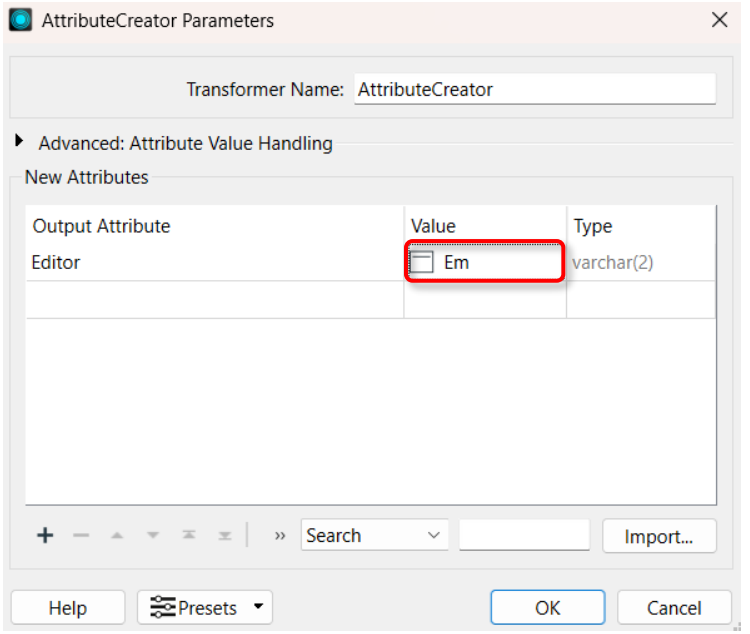


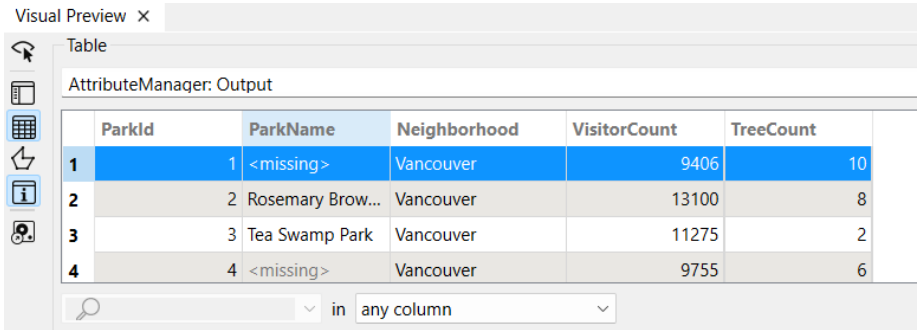
Connect. Transform. **Automate**

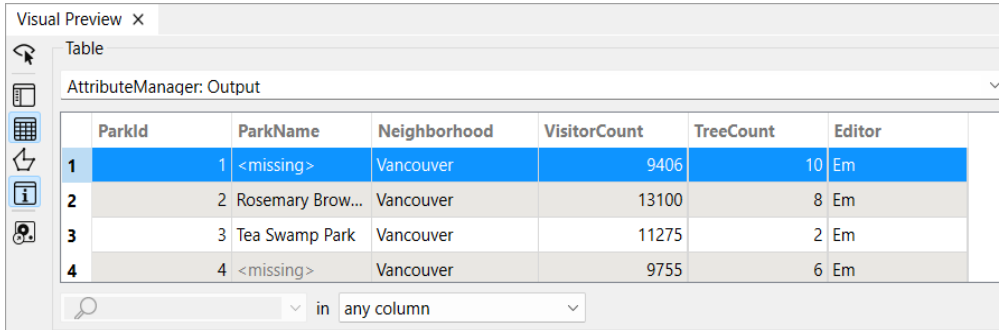
Set a Fixed Attribute Value

- A fixed (or *constant*) value for an attribute can be created by simply entering the required value into the **Attribute Value field** of an attribute, within an attribute management transformer:





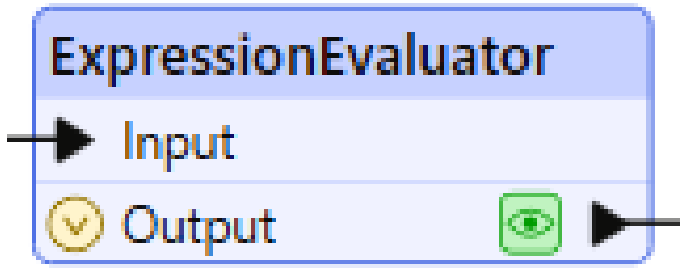


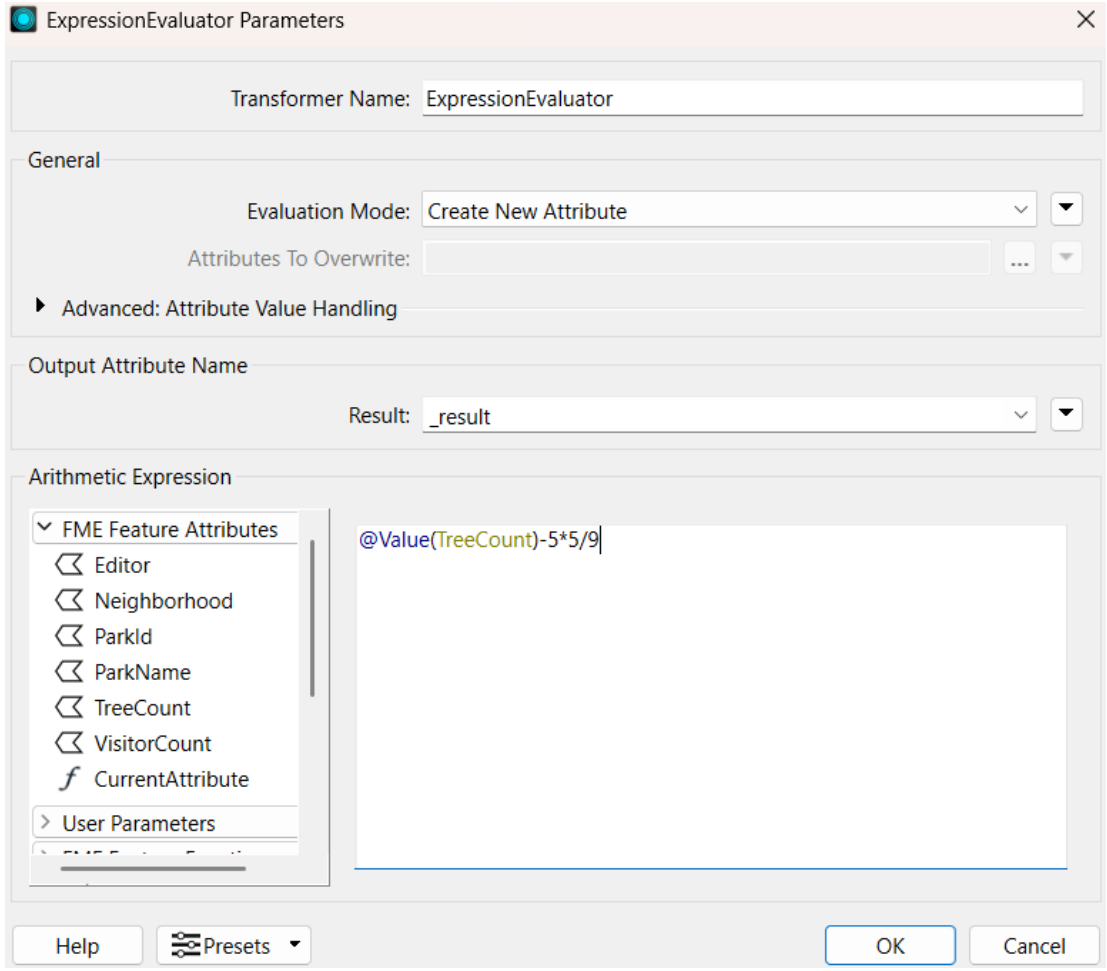


Calculate Numeric attribute values

There are a couple of ways to perform mathematical calculations to create new attributes (or update existing attributes).

One method is to use the ExpressionEvaluator transformer:





Exercise 2.1

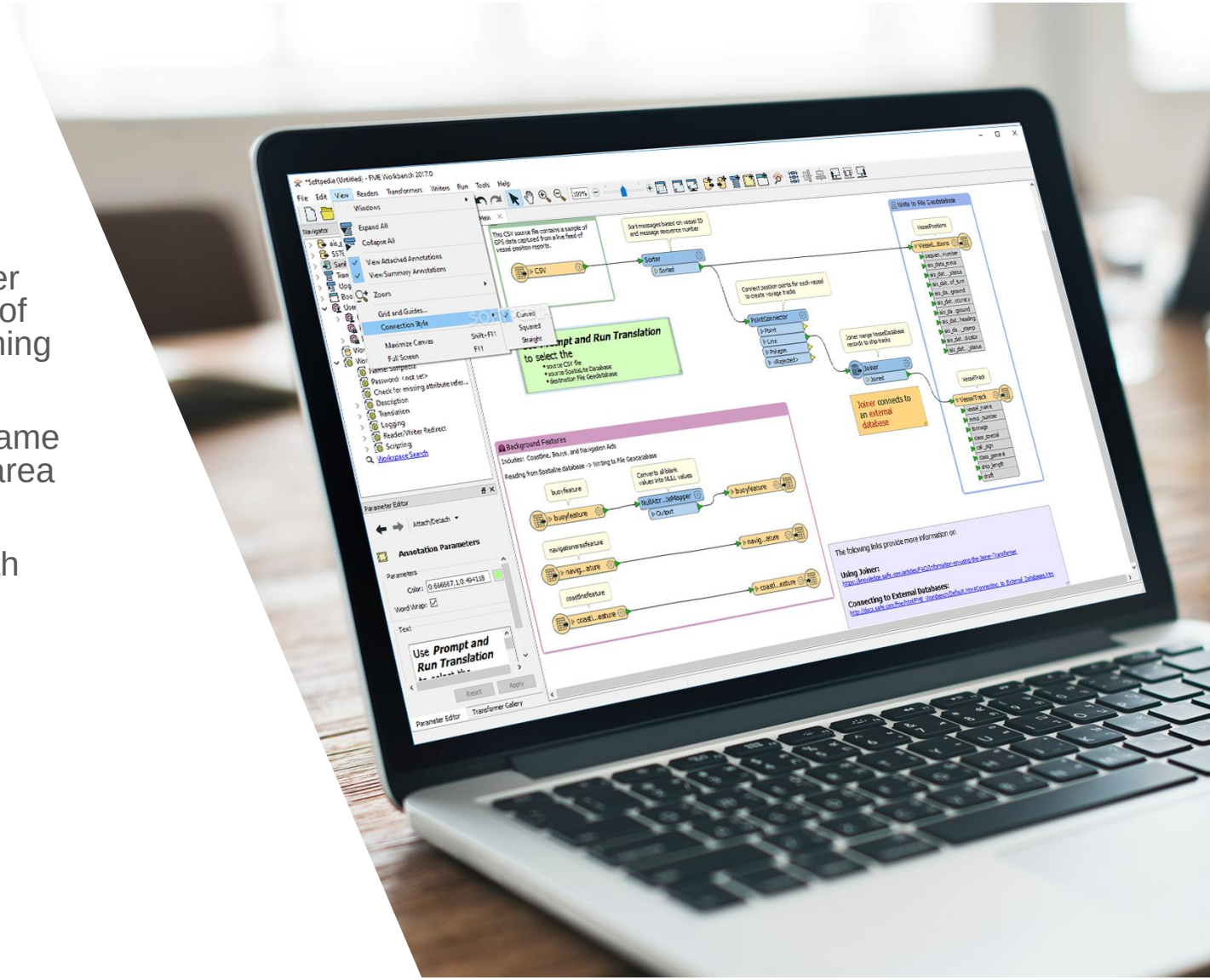
Managing Attributes

- You are working as a technical analyst in the GIS department of your local city.
- The team responsible for maintaining parks and other grassed areas needs to know the area and facilities of each park in order to plan their budget for the upcoming year.
- You will need to remove unnecessary attributes, rename existing attributes and create new ones – including area calculations.
- The grounds maintenance team want the data in both spatial and CSV format.

Data - City Parks (MapInfo TAB)

Goals:

- Update the schema for grounds maintenance data
- Calculate the average area of parks in the city
- Output results to multiple formats



More Constructing Attribute options

On our ***Advanced Attribute Handling and Lists*** module we explore more options for constructing and manipulating attribute values:

- string manipulation - Text Editor
- arithmetic calculations - Arithmetic Editor
- Working with Date and Time:
  - Date/Time stamps
  - Date/Time formatting
  - Date/Time converting and calculations
- Functions - both text and arithmetic
- Conditional Values
- *…plus more…*

Exercise 2.2

Summary Statistics

- The parks team has decided that they want to know the average size of parks in each neighborhood. They also want to know the smallest and largest park size for each neighborhood. Let's generate these summary stats for them.

Data - City Parks (MapInfo TAB)

Starter workspace –
C:\FMEModularData\Workspaces\2.02-Attributes-SummaryStatistics-Begin.fmw

Goal – Calculate summary statistics for the city parks at neighborhood level.

Useful Transformers for Attribute Value Manipulation

There are many transformers to construct, manipulate and format attribute values, but here are a few to get you started:

- **StringReplacer** - replaces substrings matching a string or regular expression in the string contained in the source attribute. (you can use it like Find & Replace)
- **StringCaseChanger** - changes the case of text attribute values to UPPERCASE, lowercase, Title case, or Full Title Case
- **StringConcatenator** - bring multiple attribute values together into one attribute
- **SubstringExtractor** - extracts a substring from the source attribute - using the range of characters specified.
- **AttributeSplitter** - splits attribute values into parts, based on a delimiter or fixed-width pattern
- **AttributeRounder** - Rounds numeric attribute values to the specified number of decimal places.

Format Attributes

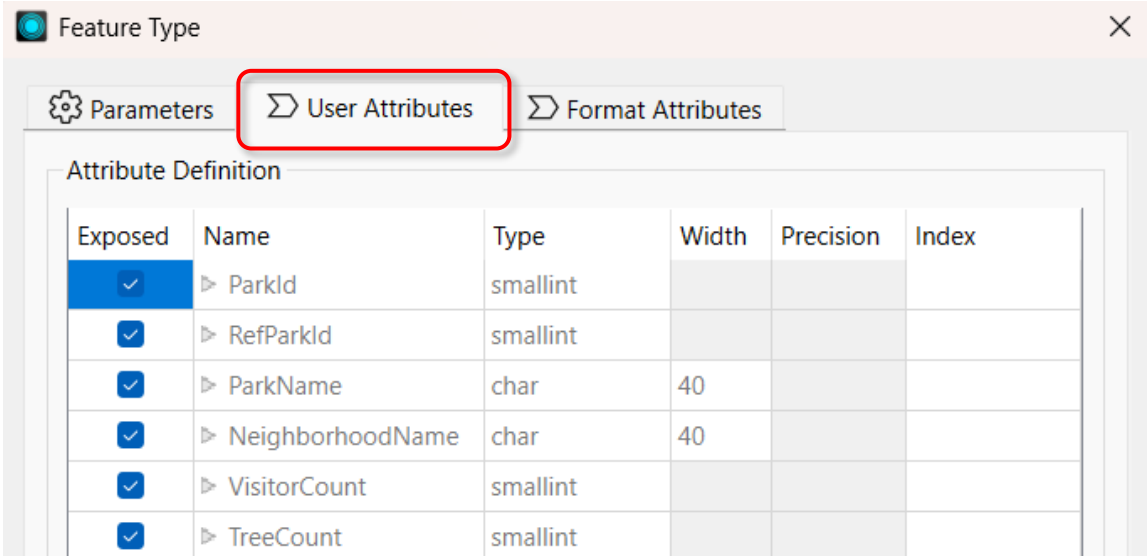
Connect. Transform. **Automate**

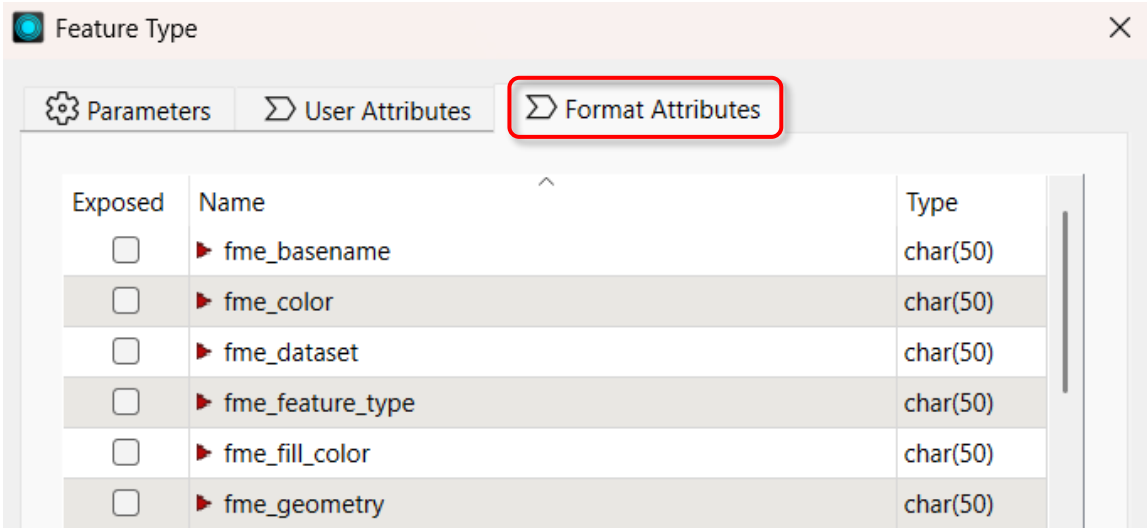
Attributes in FME

There are two main types of attributes in FME:

- **User Attributes**
  - These are the main attributes, and are always part of the feature.
  - Typically these are what ‘end-users’ will see when working with the data in their systems.
  - They are visible on the canvas (in attribute lists) and within the Table view of the Workbench Visual Preview and Data Inspector.

- **Format Attributes**
  - FME reads the source data and stores information about its features and properties of the dataset as format attributes
  - Format attributes are specific to your format's schema.
  - A particular set of Format Attributes has the prefix **fme_**. These attributes represent the data as it is perceived by FME and are sometimes also known as *FME attributes*





Format Attributes

The most commonly used FME Format Attributes are:

- **fme_feature_type** - identifies a feature's original feature type (e.g. file, feature class, or table)
- **fme_basename** - identifies the dataset's filename without the path or extension.
- **fme_dataset** - contains path of the dataset, a URL, or the name of a database.
- **fme_geometry** - indicates the geometry type of the actual coordinates (e.g. *fme_aggregate*)
- **fme_type** - specifies how that geometry is to be interpreted (e.g. *fme_area*)

fme_basename	fme_dataset	fme_feature_type	fme_type
CompleteRoads	C:\FMEModularData\Data\Transportation\CompleteRoads.dwg	Secondary	fme_line
CompleteRoads	C:\FMEModularData\Data\Transportation\CompleteRoads.dwg	Secondary	fme_line
CompleteRoads	C:\FMEModularData\Data\Transportation\CompleteRoads.dwg	Other	fme_line
CompleteRoads	C:\FMEModularData\Data\Transportation\CompleteRoads.dwg	Arterial	fme_line

We'll see how these can be useful during our ***Workflow Design*** module!

List Attributes

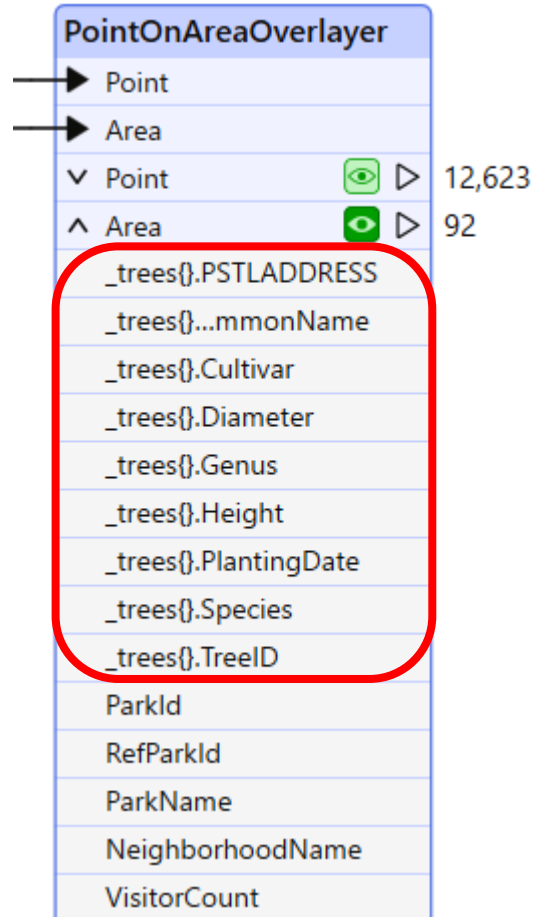
Connect. Transform. **Automate**

List Attributes

- FME's way of allowing **multiple values per attribute**

- List attributes are denoted using curly brackets after the list name. e.g. *_trees{}.CommonName*

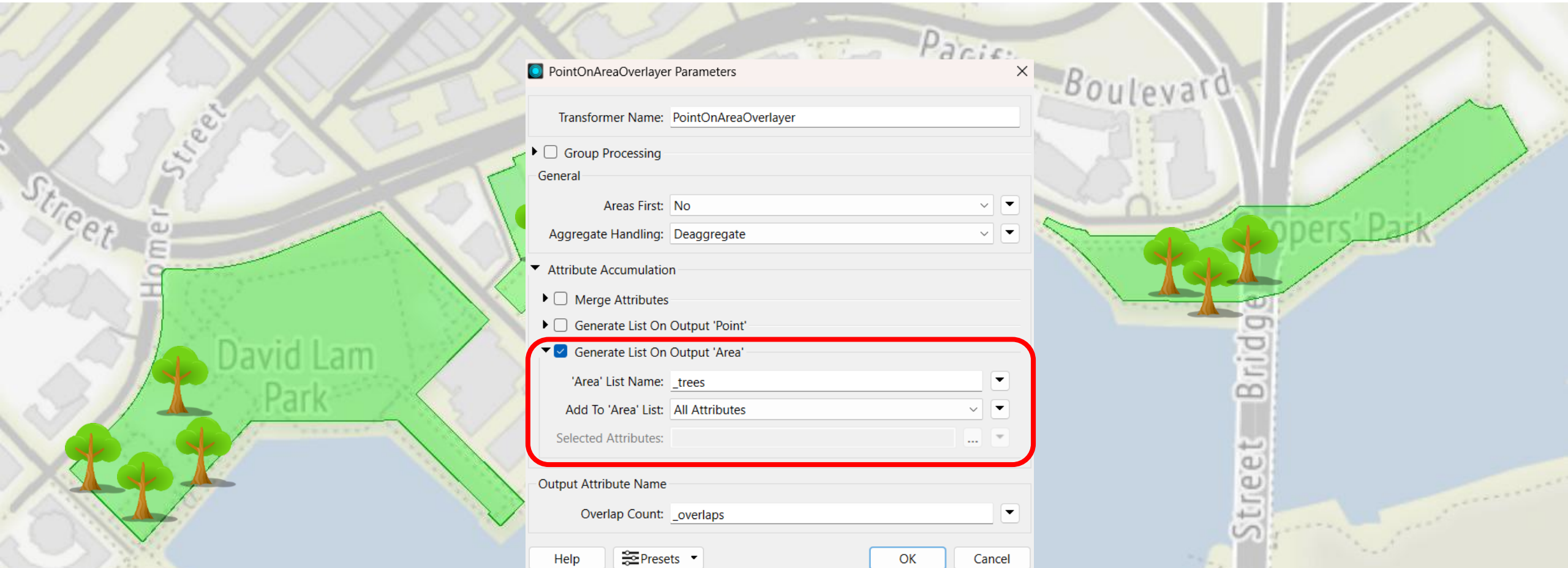
- Where can you find them?
  - Some **Transformers** create a list as a result of their processing
  - Some **FME readers** represent recurring values in the original data source in a list eg:
    - XML
    - JSON
    - DGN format returns IGDS linkages in list form



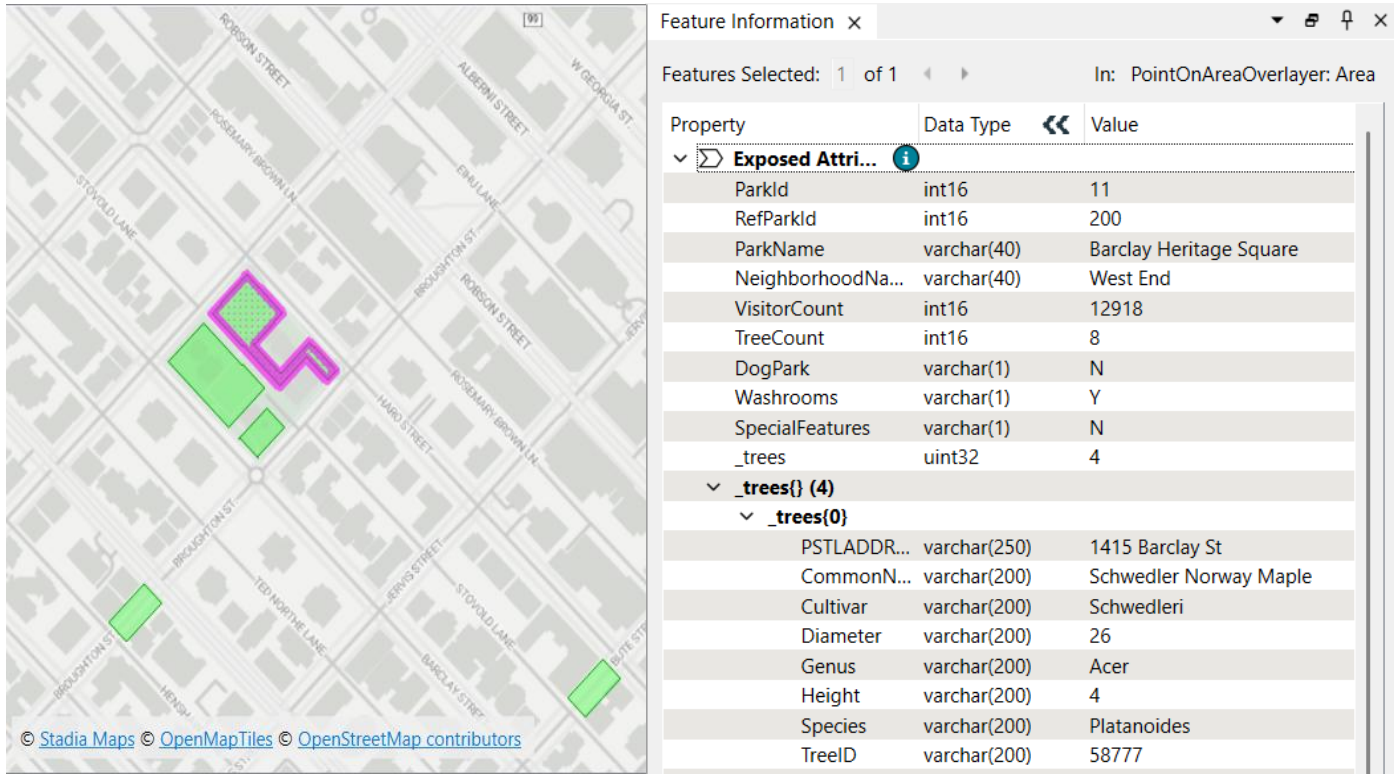
List Attributes - example

There are multiple Trees (points) in each Park (polygon)

Using a PointOnAreaOverlayer transformer we can choose to Generate List output on our parks, returning multiple values (an entry for each tree feature) per attribute



List Attributes - example



Feature Information

Features Selected: 1 of 1 In: PointOnAreaOverlayer: Area

Property	Data Type	Value
Exposed Attri...		
ParkId	int16	11
RefParkId	int16	200
ParkName	varchar(40)	Barclay Heritage Square
NeighborhoodNa...	varchar(40)	West End
VisitorCount	int16	12918
TreeCount	int16	8
DogPark	varchar(1)	N
Washrooms	varchar(1)	Y
SpecialFeatures	varchar(1)	N
_trees	uint32	4
_trees{} (4)		
_trees{0}		
PSTLADDR...	varchar(250)	1415 Barclay St
CommonN...	varchar(200)	Schwedler Norway Maple
Cultivar	varchar(200)	Schwedleri
Diameter	varchar(200)	26
Genus	varchar(200)	Acer
Height	varchar(200)	4
Species	varchar(200)	Platanoides
TreeID	varchar(200)	58777

Lists are used to return attributes of each Tree within a Park;

- CommonName
- Cultivator
- Diameter
- Genus
- Height
- PlantingDate
- PSTADRDRESS
- Species
- TreeID

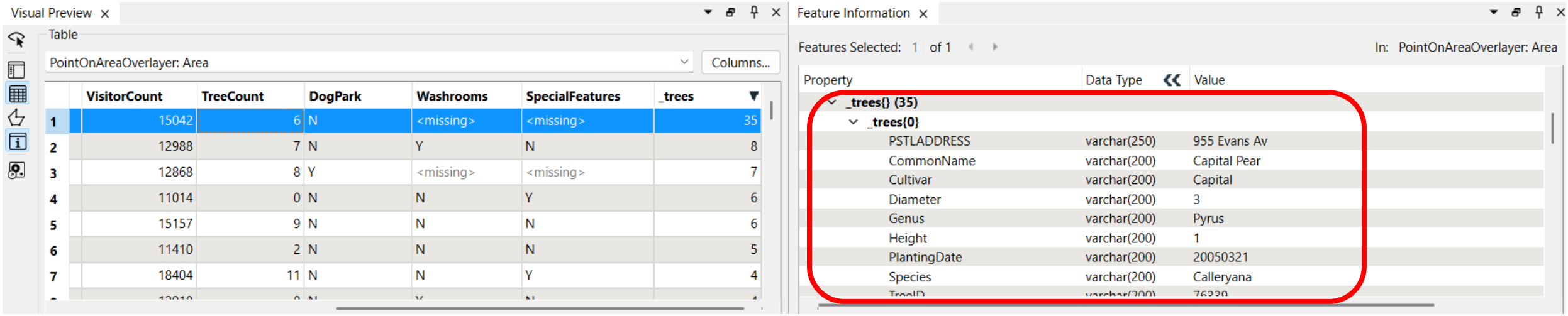
Where there are multiple trees within a park, multiple values are returned. The number inside the curly brackets represents the element's index inside the list:
{0}, {1}, {2}, etc

How Do I Inspect List Attributes

- List attributes are NOT included as attributes in Table View

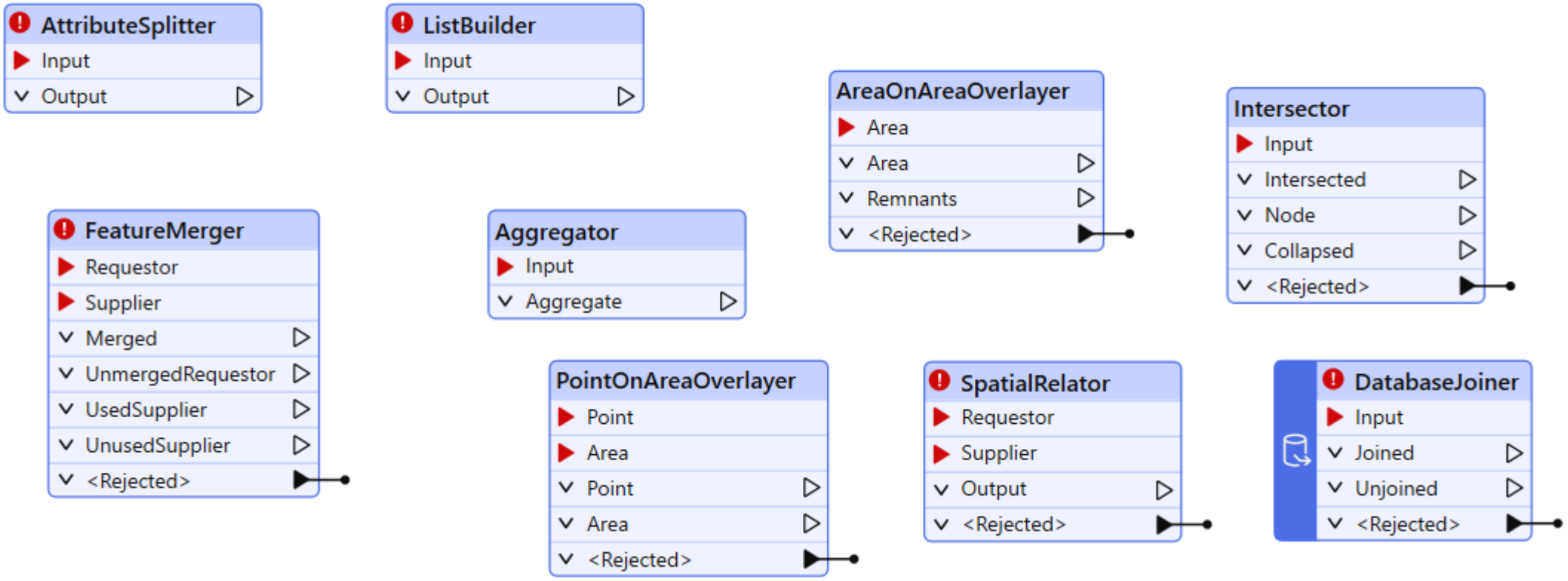
- Instead, you inspect List attributes using the **Feature Information Window**

  (select the feature you want to inspect in either the Table or Map view)



Which transformers create lists?

Several (both spatial and non spatial), here are a few examples:



Exercise 2.3

Create, View and Use Lists Attributes

- We have some address data for the city. We need to generate a new ID for each record. This new ID will be based on a component of an existing attribute called GlobalID.
- We will first split the GlobalID into its component parts, using a transformer. These component parts will be output as a list attribute. Which we will examine, then extract the required data to create our new ID attribute.

Data - Addresses Full (GeoPackage)

Goal:

- use a transformer to generate list attributes
- inspect list attributes using the Feature Information window
- extract data from list attribute to create a new attribute

Benefits of Lists

1. Generating lists for one-to-many relationships in database joins and/or spatial joins can preserve all the joined data.

2. List elements can easily be converted into tabular attributes, so you always have the option to store one or many list elements in a table.

3. Storing data in a structured indexed list prevents you from creating a large number of unnecessary table attributes, which can quickly become overwhelming.

Be careful! Just like when using attributes, you could end up with a ton of unnecessary data. It's easy to get lost in the data, so clean up your lists as you go!

On our ***Advanced Attribute Handling and Lists*** module we explore working with Lists in more detail, including transformers to help you extract data from lists to use in your workspace

Testing and Filtering data

Connect. Transform. **Automate**

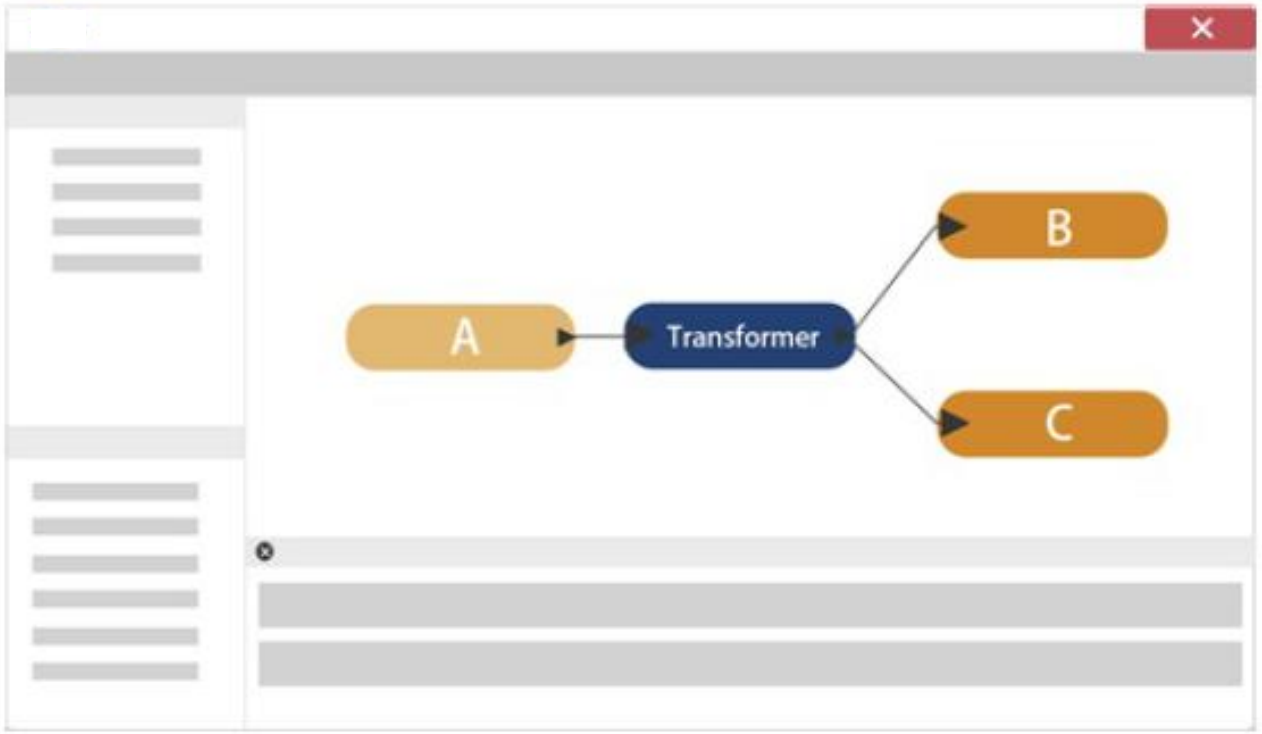
Testing and filtering data

Transformers that test/filter don’t transform data content, yet they are amongst the most commonly used Transformers

Some of the most popular Filter and Test Transformers are:

- **Tester**
- **TestFilter**
- **GeometryFilter**
- **AttributeFilter**
- **SpatialFilter**
- **Sampler**

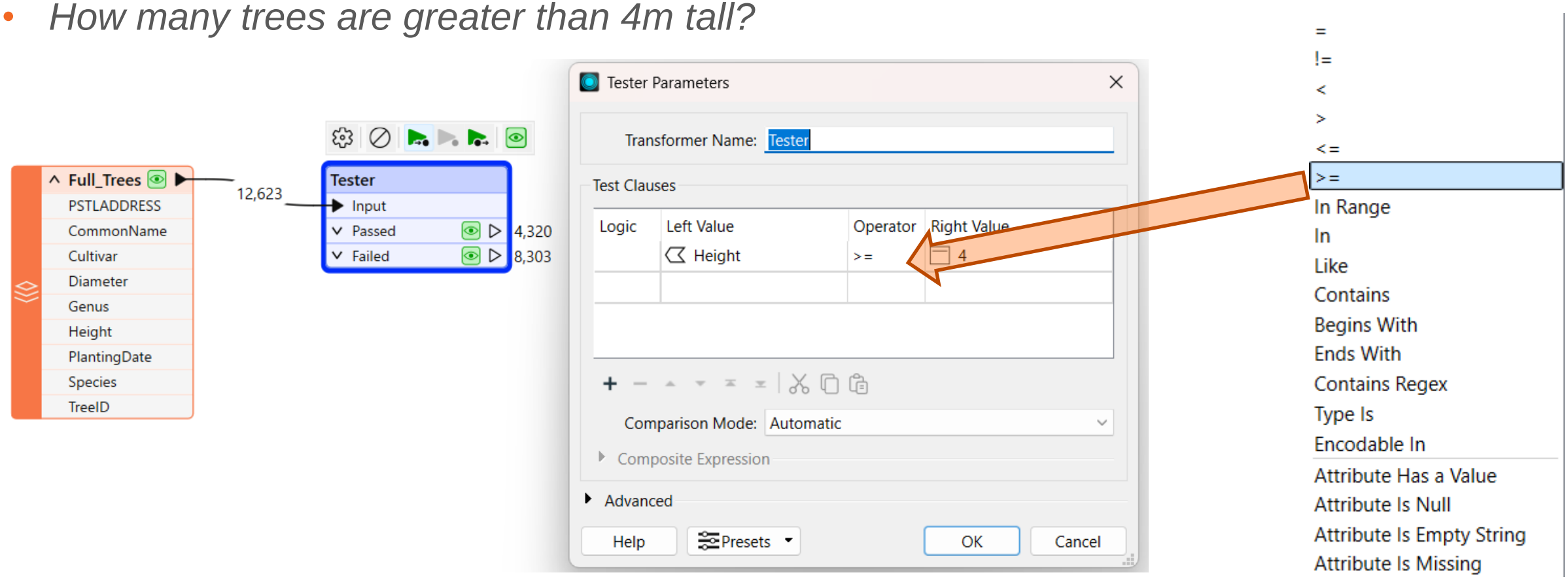
A filtering transformer may be any transformer with multiple output ports:



The Tester transformer

Single Clause

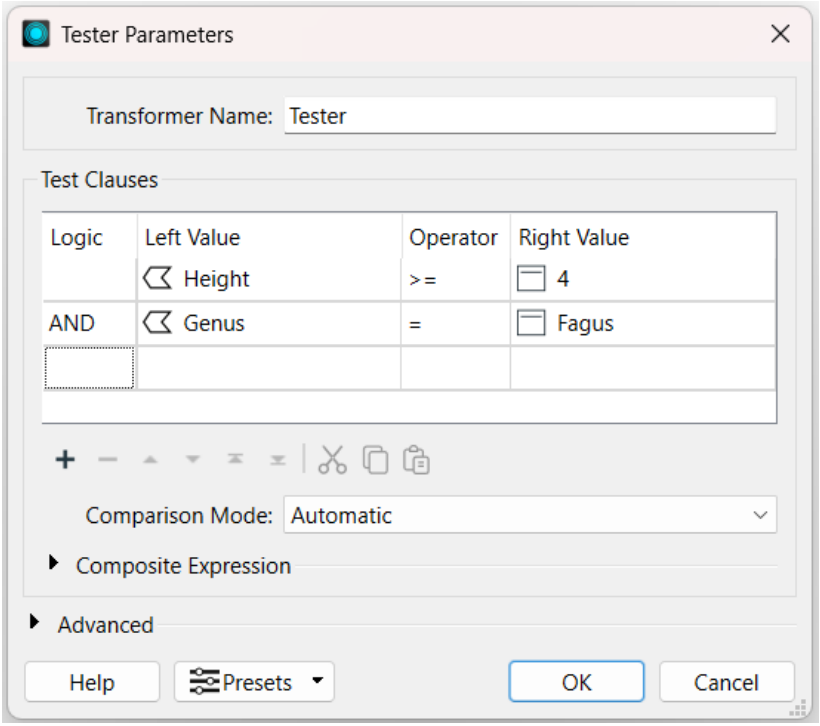
- Produces a Pass / Fail result
- *How many trees are greater than 4m tall?*



The Tester transformer

Multiple Clause

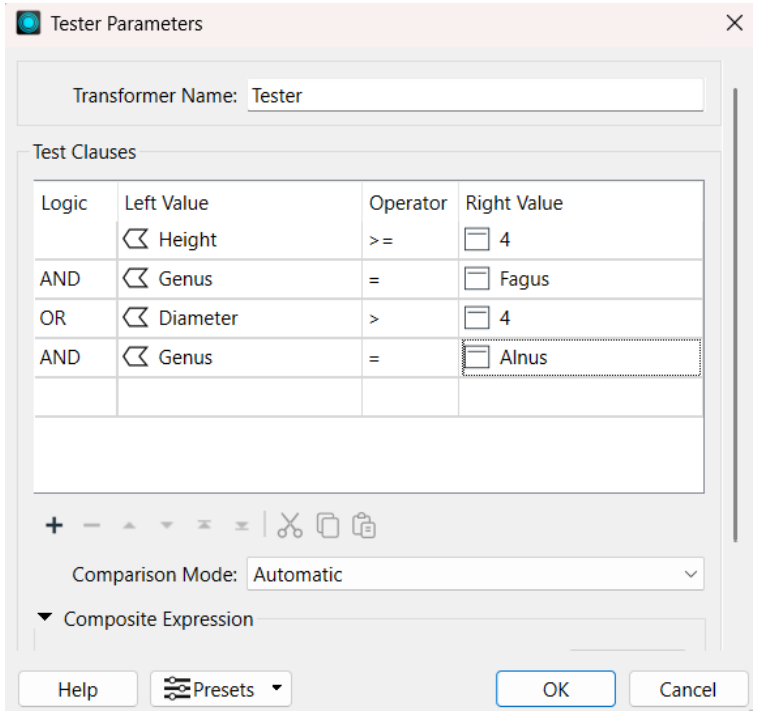
- Produces a Pass / Fail result
- Allows a combination of Multiple Tests – using AND / OR
- *How many trees are over 4m tall AND are of the Fagus genus?*



The Tester transformer

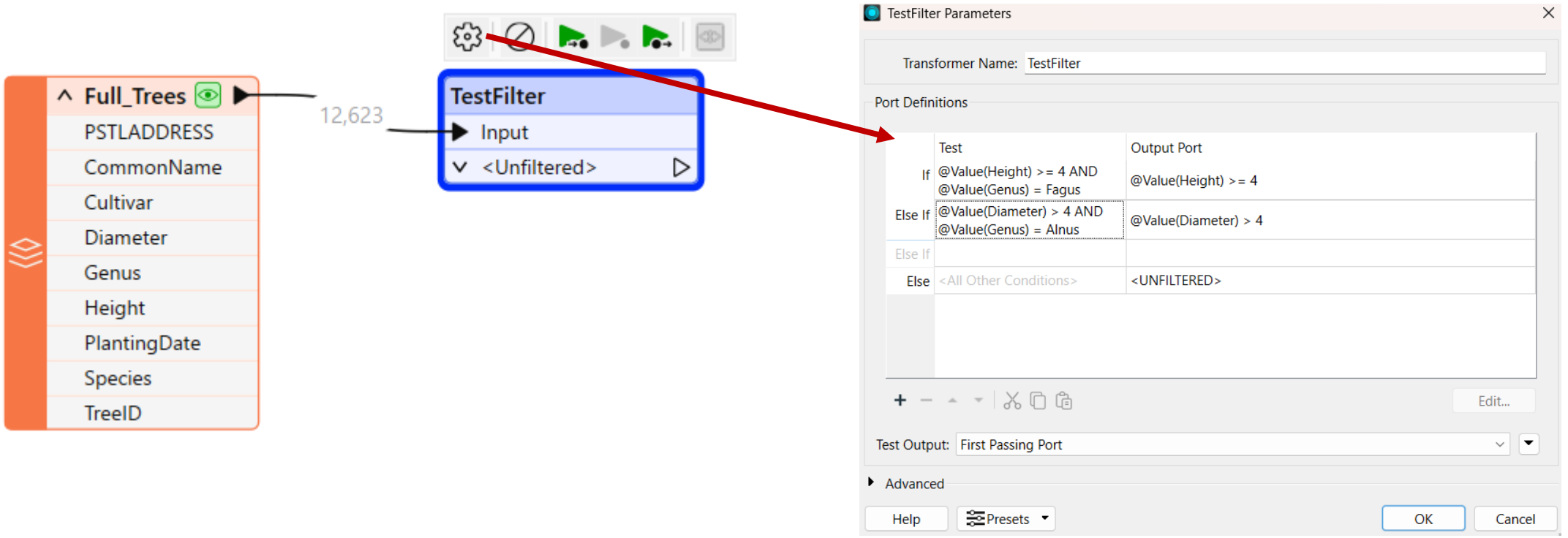
Composite Test

- Produces a Pass / Fail result
- Allows a blend of Multiple AND / OR tests
- *How many trees are equal to or greater than 4m tall and of the genus Fagus OR how many trees have a diameter over 4cm in diameter and of the genus Alnus?*



The TestFilter transformer

- Allows a number of conditions to be tested
- Each is given its own output port



Exercise 2.4

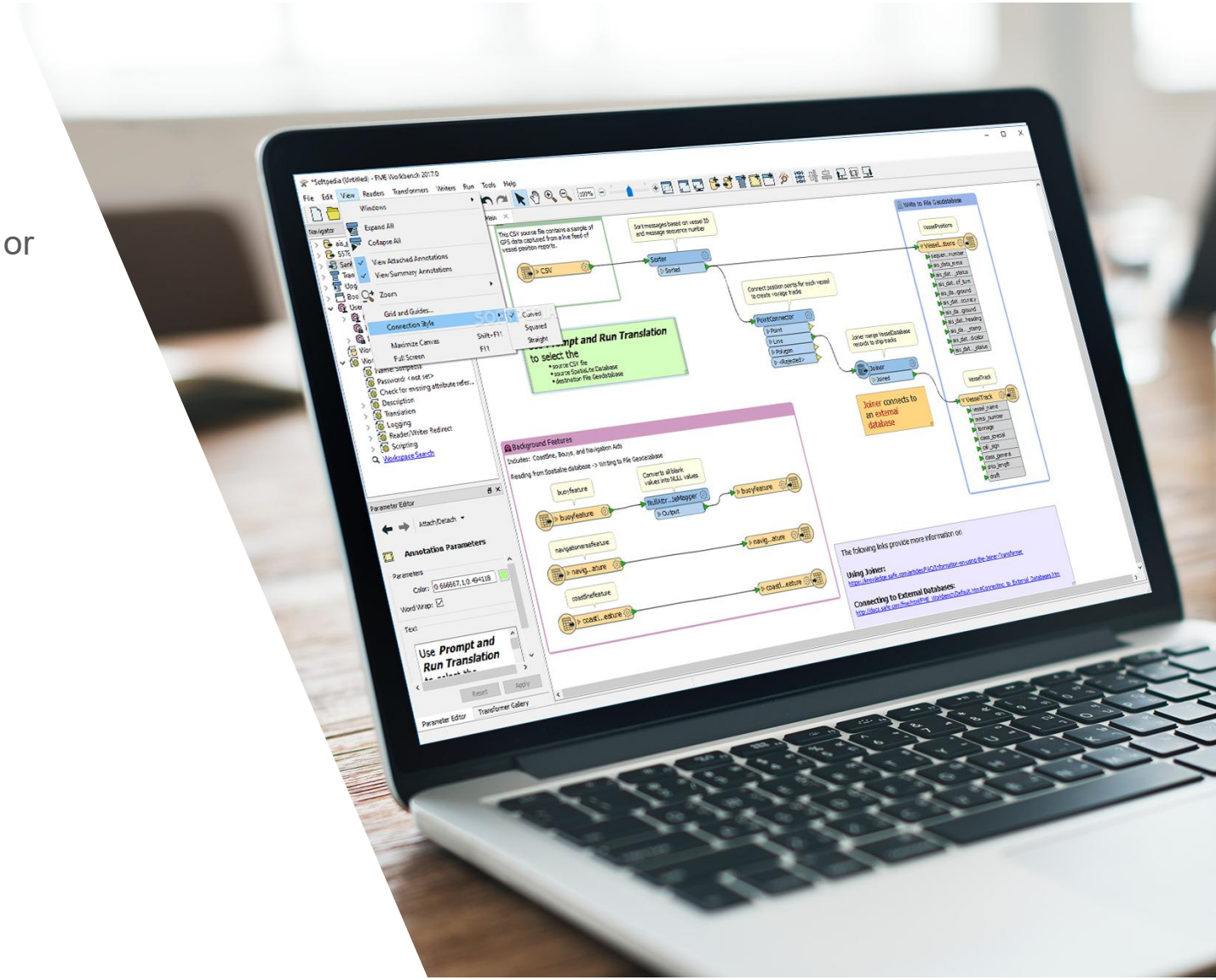
Testing to Filter Data

- The Council's Environmental Directorate want to categorize the city Parks into 'premier', 'destination' or 'local' - based on their features.

Data - Parks (MapInfo TAB)

Start Workspace - none

Goal - use testing to filter the parks into groups, then assign the park category as a new attribute.



Exercise 2.5

Testing to QA Data

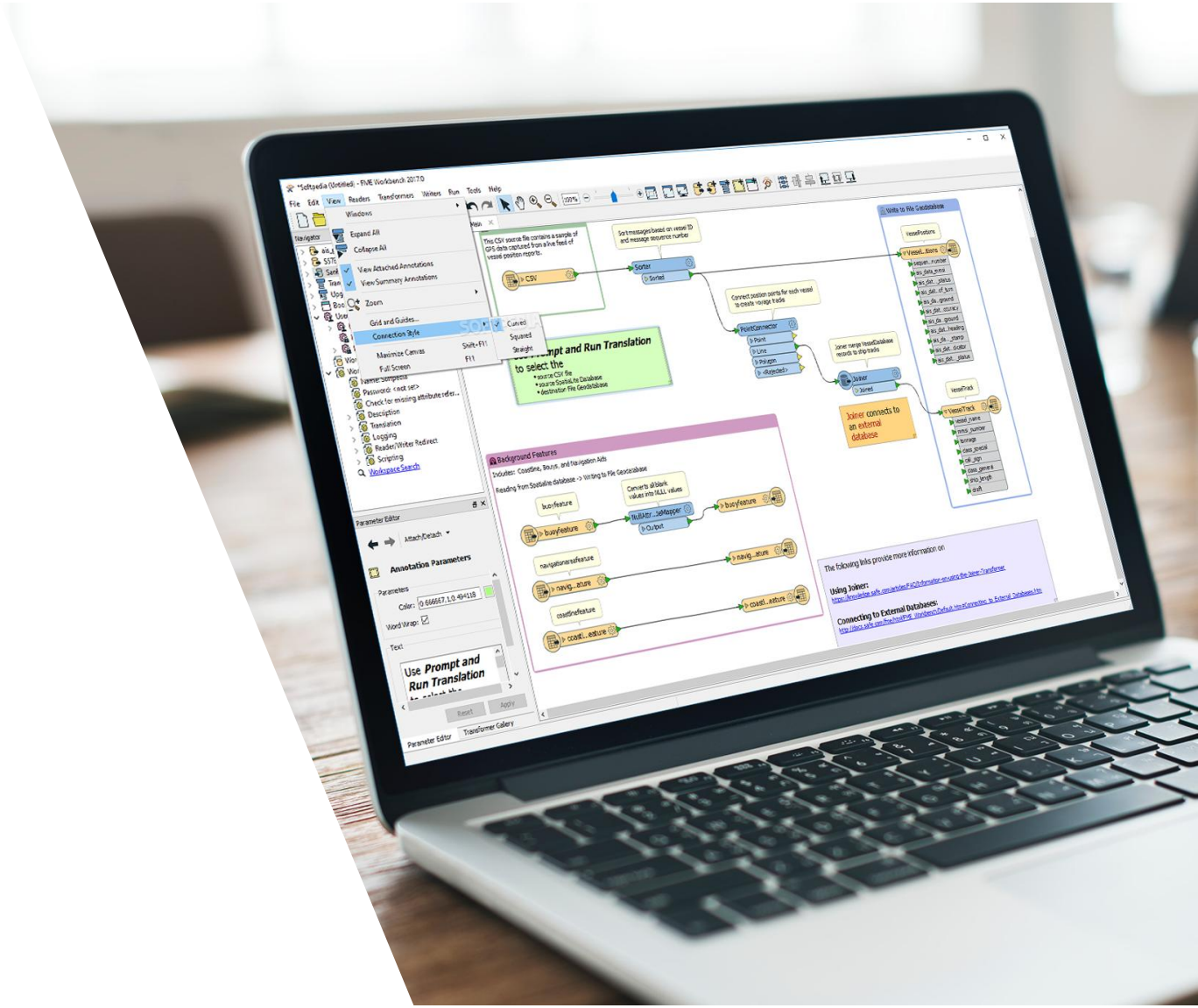
- We have a shapefile containing data about Sites of Special Scientific Interest, this needs validating and before it can be sent to a client.
- The SSSI dataset already contains an attribute called Hectares. However this is a static value on the source data, and we don't know when this was last populated, or if it's still correct.

Data - SSSI (MapInfo TAB)

Starter workspace – C:\FMEModularData\Workspaces\2.05-Attributes-TestingQA-Begin.fmw

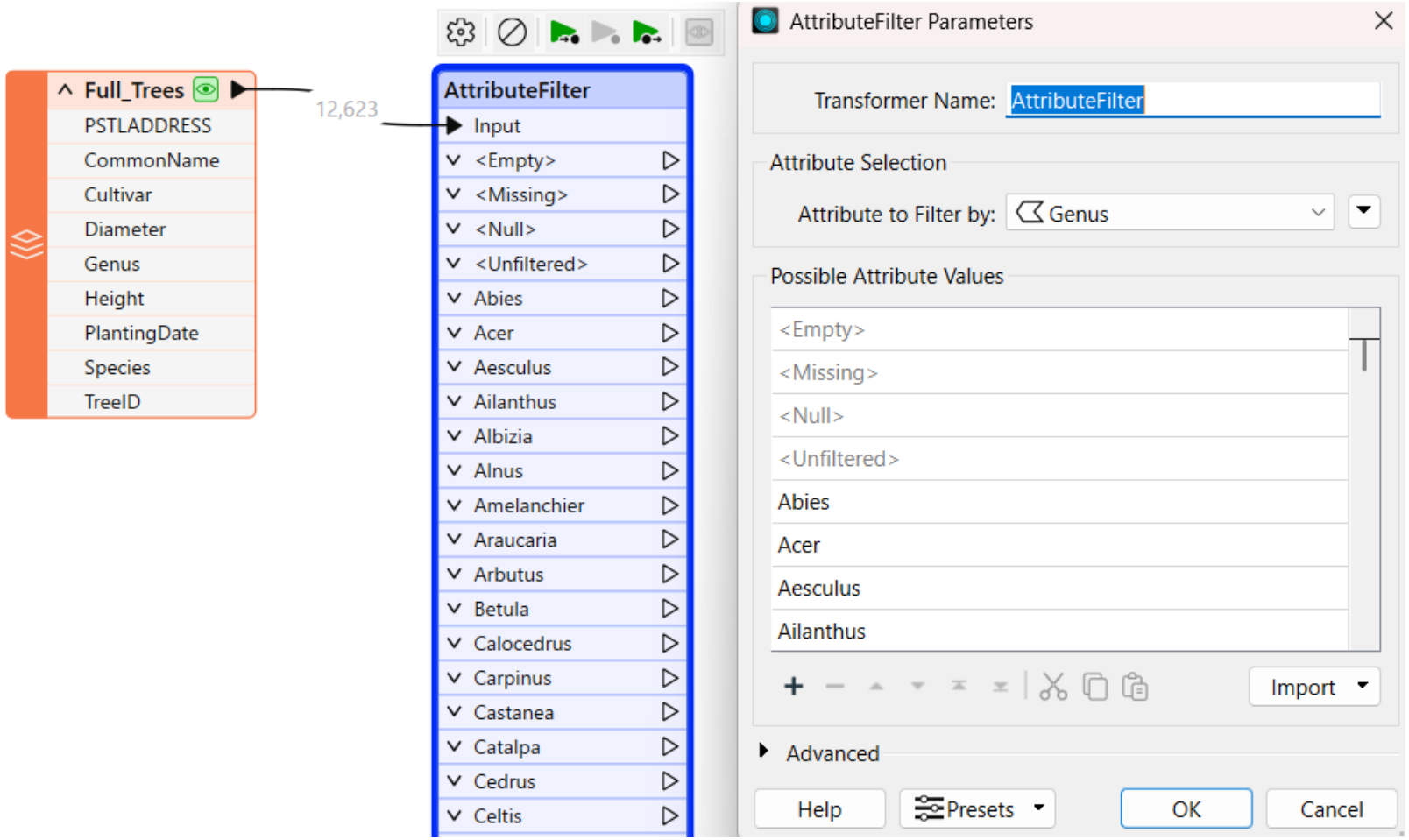
Goals -

- use Testing to validate Hectares attribute
- Manage, update and create new attributes



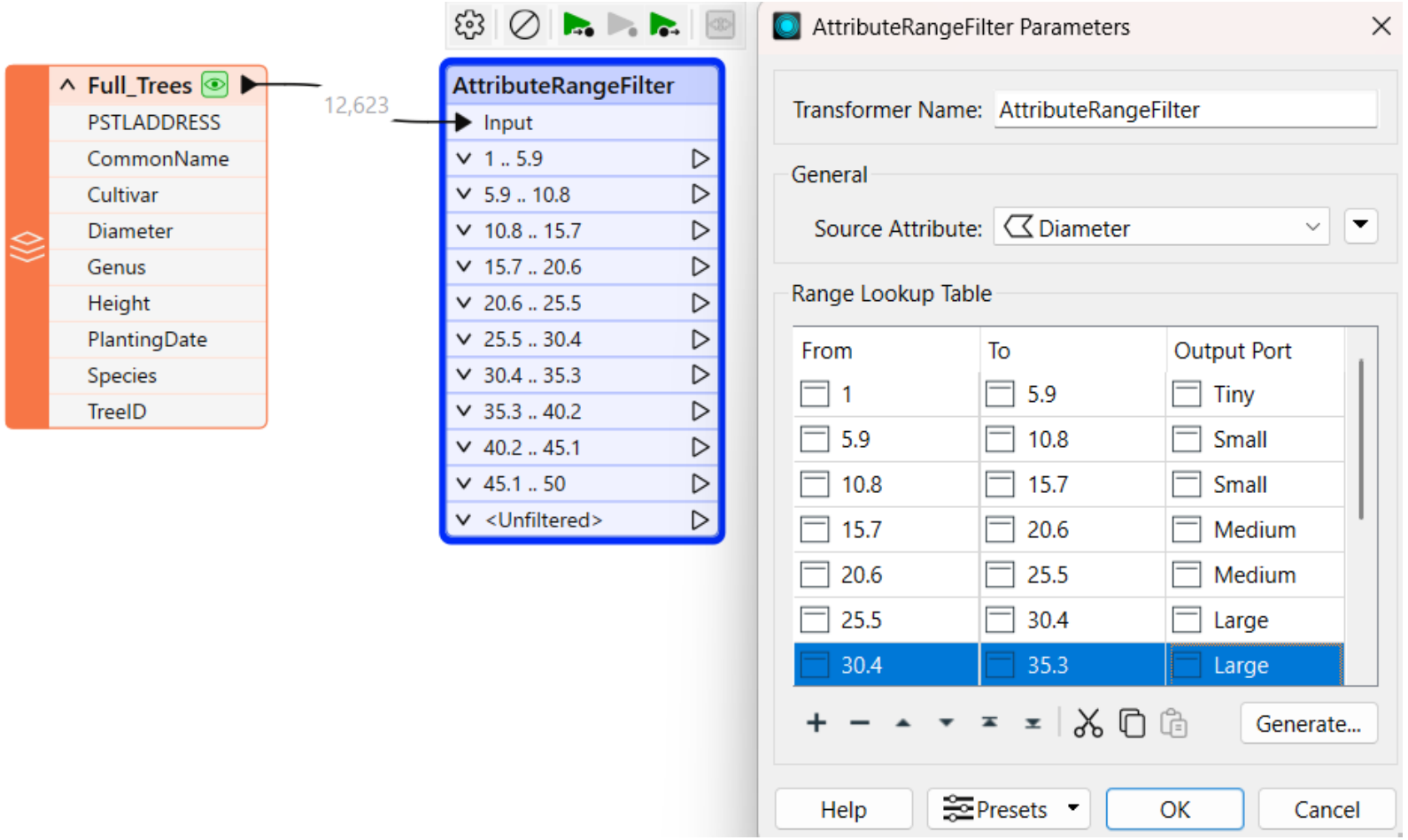
The AttributeFilter transformer

- Directs features by the values in a chose attribute
- Each is given its own output port



The AttributeRangeFilter transformer

- The same as AttributeFilter – but numeric
- Each is given its own output port

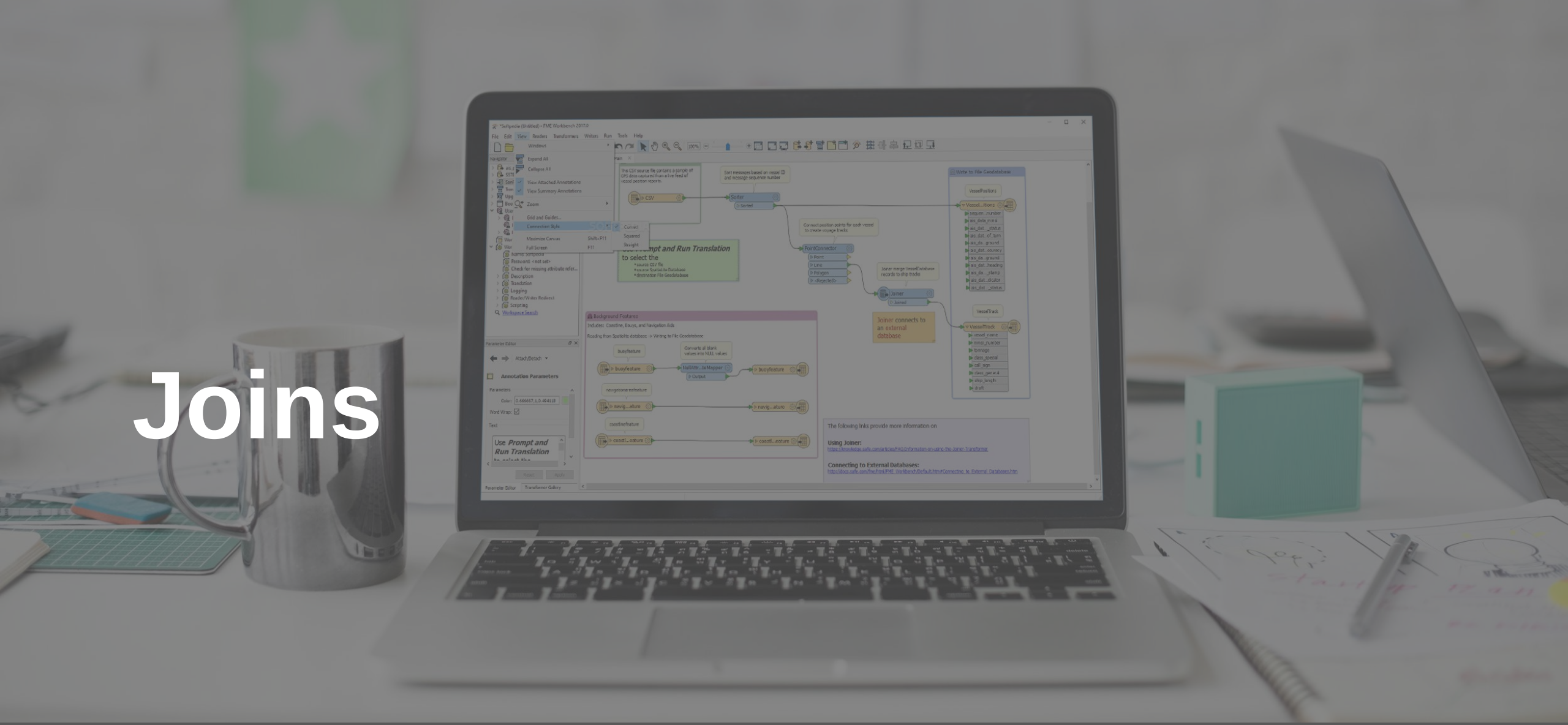


Testing and filtering data

If the Tester, TestFilter, and AttributeFilter all filter features on the basis of an attribute condition, then what's the difference? When would I use each?

	Single Test		Multiple Tests		Test Type		Operators	Attributes
	Single Clause	Multi Clause	Single Clause	Multi Clause	String	Numeric	(Number of)	(Number of)
Tester	Y	Y	–	–	Y	Y	16	Multiple
TestFilter	Y	Y	Y	Y	Y	Y	16	Multiple
AttributeFilter	Y	Y	–	–	Y	–	1	1
AttributeRangeFilter	Y	Y	–	–	–	Y	6	1

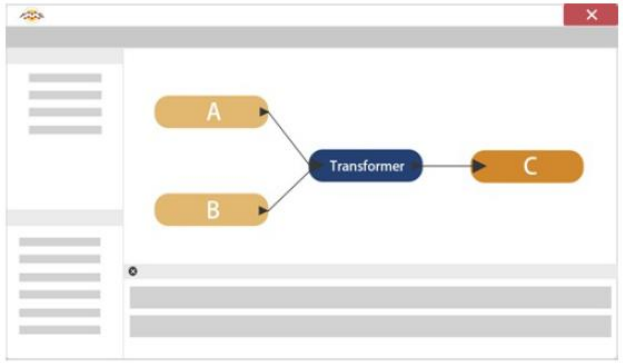
Joins



Connect. Transform. **Automate**

Data Joins

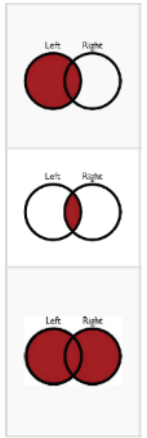
Data Join transformers bring data streams together, merging the data according to a set of user-defined conditions



Key-Based Join Transformers

For joins based on matching attribute values:

- DatabaseJoiner
- FeatureMerger
- FeatureJoiner
- InlineQuerier



Spatially Based Join Transformers

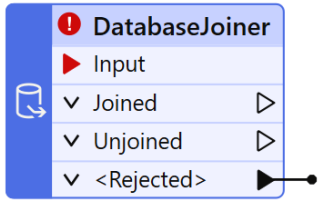
For joins based on a spatial relationship such as an overlap or proximity:

- NeighborFinder
- Overlayers
- SpatialRelator

Key based joins

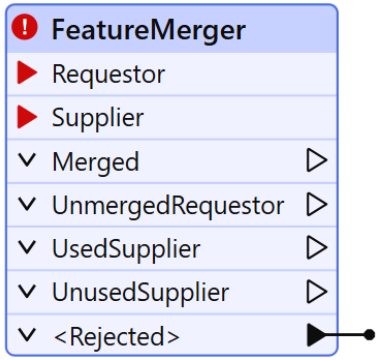
No SQL

Joins features by combining the attributes/geometry of feaures based on common attribute values, like a SQL join operation



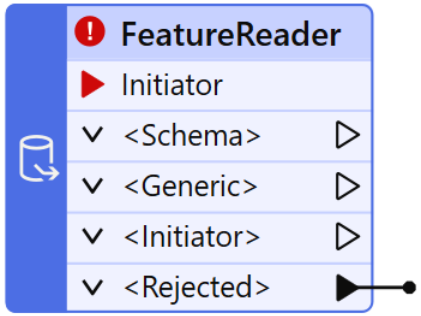
Joins attributes from an external table to incoming features as they are being processed through a translation

Many small queries, 1:Many, uses look up tables



Copies and merges the attributes/geometry from one feature (or multiple features) onto another feature (or multiple features). When working with lists, try the ListBasedFeatureMerger

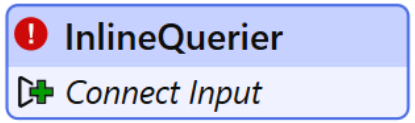
Predecessor to the FeatureJoiner



Reads features from any FME-supported format. The features read can be constrained by specifying WHERE clause or a spatial filter for formats that support them.

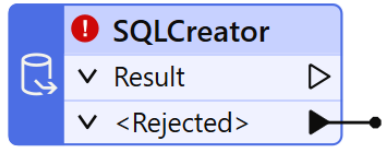
Joins any format, bulk queries, spatial joins

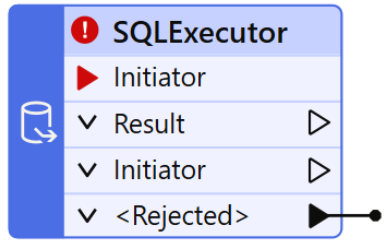
SQL



Executes SQL queries against a temporary database consisting of tables created from incoming features, returning results as new features.

Robust functionality



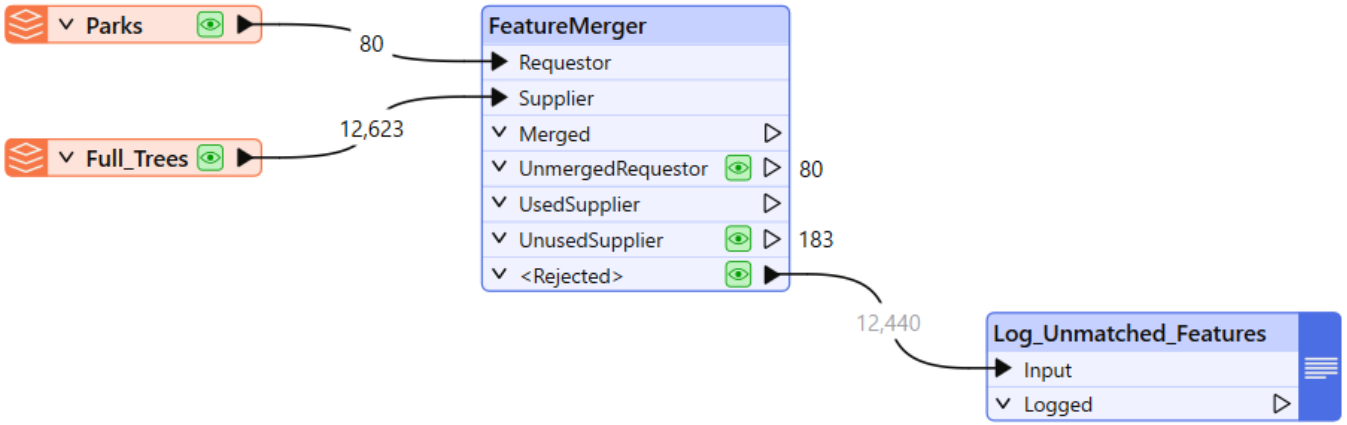


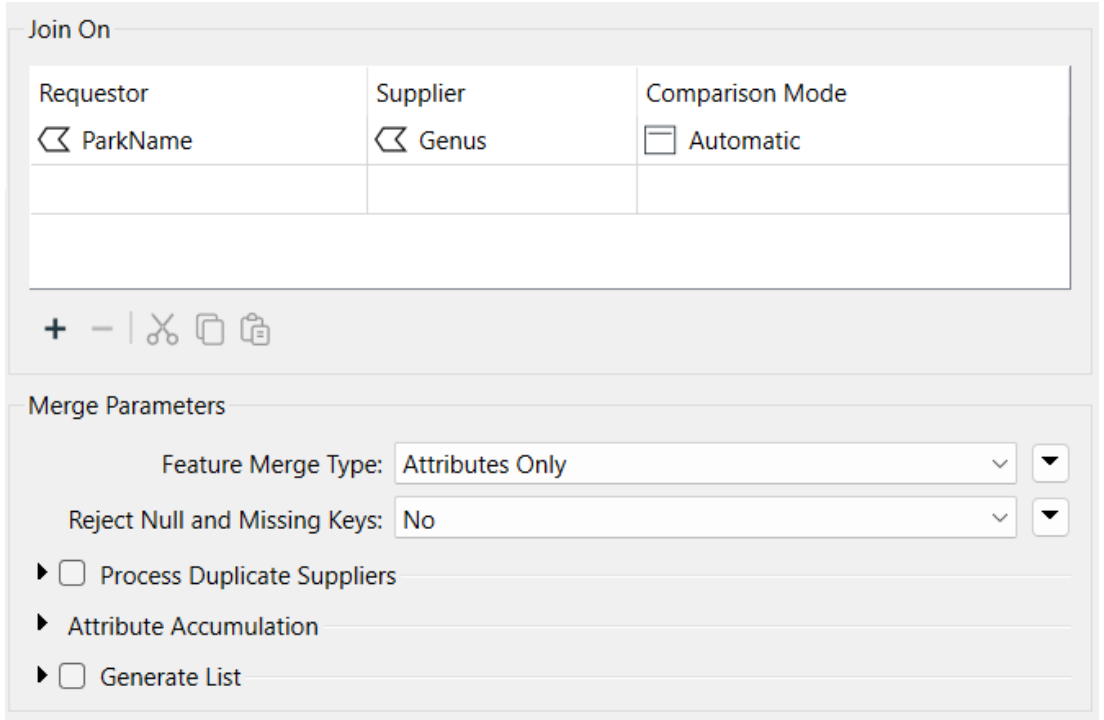
Performs SQL queries against a database. Either can be used interchangeably the only difference is the SQLCreator works at the beginning of the workflow.

Reads in data, query can be made against other sources

The FeatureMerger Transformer

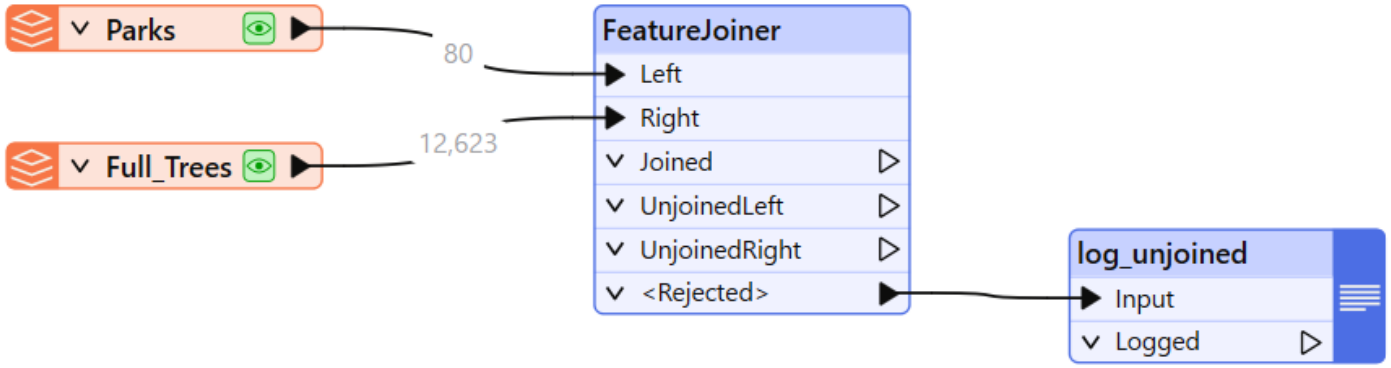
- Joins 2 or more streams of data – based on a key field match

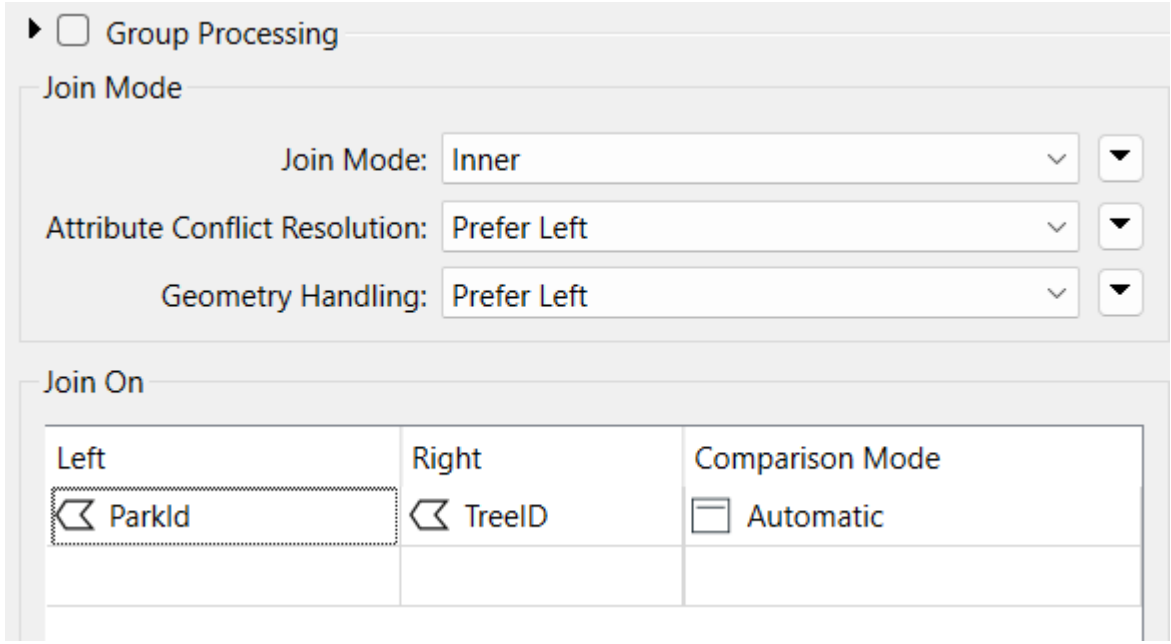




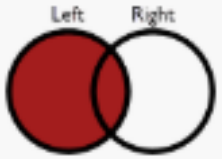
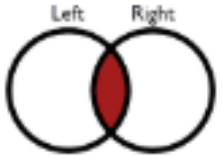
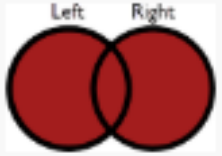
The FeatureJoiner Transformer

- Joins 2 or more streams of data – based on a key field match





Data Joins – Key based

Mode	Description	Depiction	Joined Output	Unjoined Left	Unjoined Right
Left	Left features look for a match and are output whether they find a match or not		All matches plus unmatched Left features	None	Unused Right features
Inner	Left features look for a match and are output if they find one		All matches only	Unmatched Left features	Unused Right features
Full	Both Left and Right features output through the Joined output port, whether they find a join or not		All matches plus unmatched Left and Right features	None	None

Exercise 2.6

Joining Datasets - Voting Analysis

- The Electoral Services Officer has asked for help identifying voting divisions that had a low turnout at the last election, or divisions where voters had difficulties understanding the process.
- They ask for your help, and you suggest the results should be provided MapInfo TAB format to enable them to generate visualizations for reporting.

Data –
- Election Results (Microsoft Excel)
- ElectionVoting (OGC GML)

Starter Workspace –

C:\FMEModularData\Workspaces\2.06-Attributes-Joins-Begin.fmw

Goal – Generate statistics of voting patterns by performing key-based join and mathematical calculations.

Thanks for joining!

Any questions?

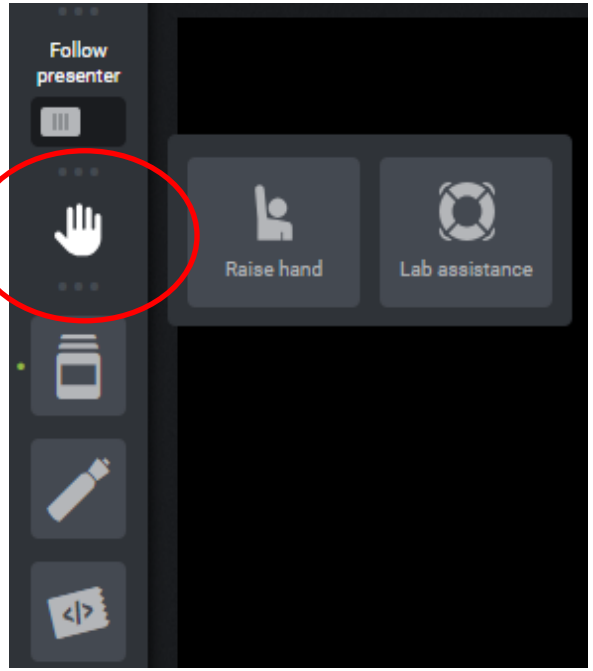
FME Form Training - Module 3

Working with Spatial Data

Training Environment

< keep '**Follow presenter**' on

< **Lab**



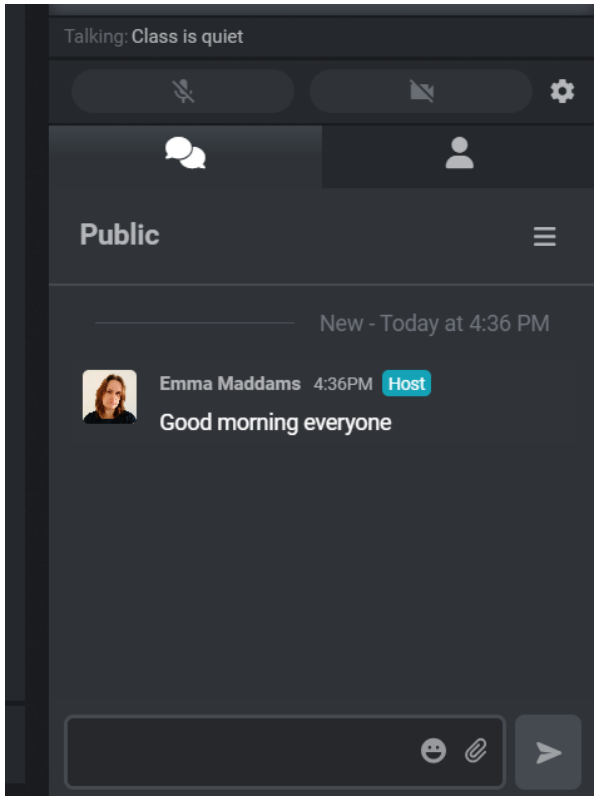
need help when using your Lab

Use either:

- 'Raise hand' or
- 'Lab Assistance'

Chat

- to everyone
- to trainer



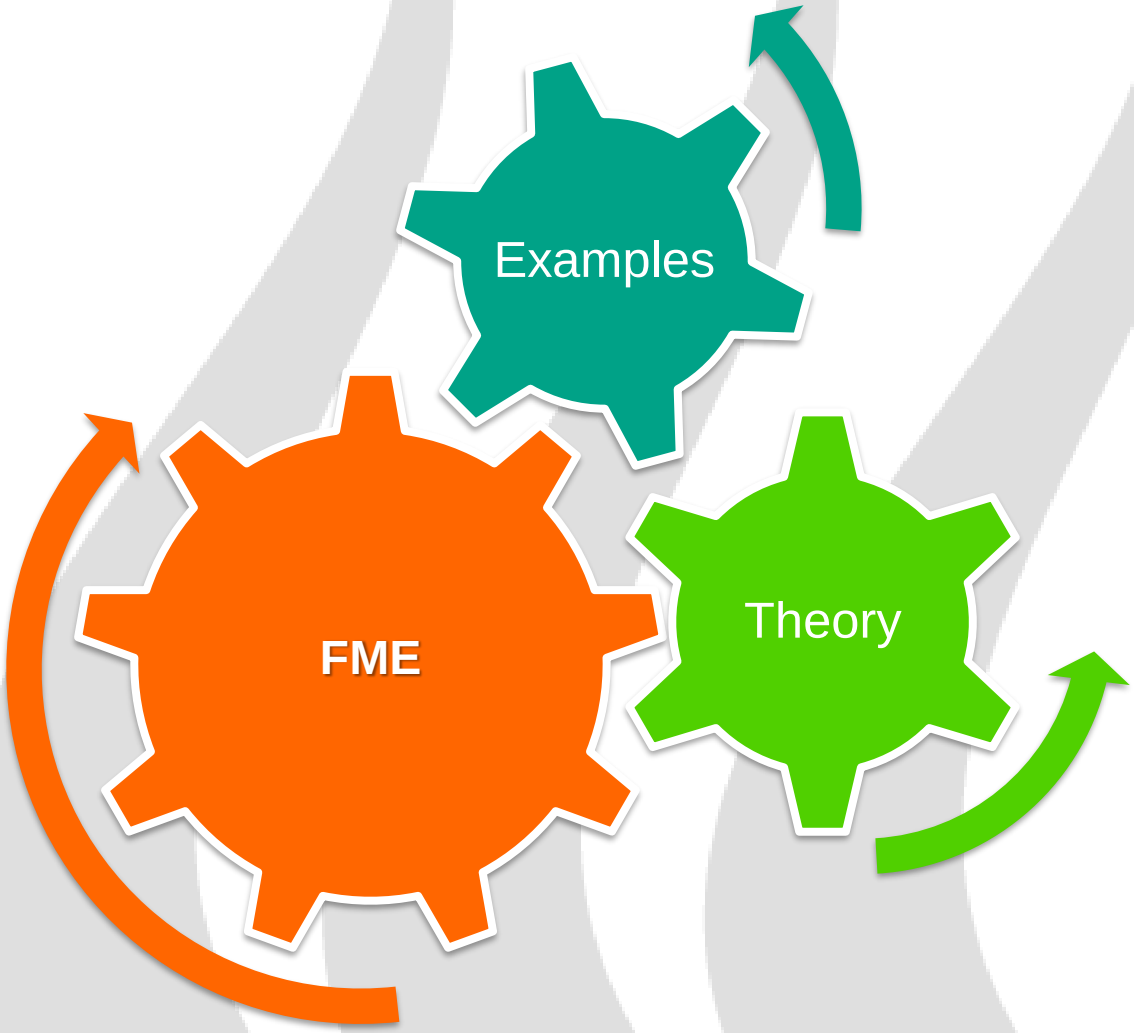
Training Environment

- Training Data folders **C:\FMEModularData**
  - Data
  - Output
  - Resources
  - Workspaces
- Slides
- Workbook – you need to download using link sent by the trainer

What we'll be covering today…

Agenda

- Overview of geospatial data
- Coordinate systems
- Geometry types
- Symbology
- Spatial transformers
  - geometry
  - analysis
  - validation
- Spatial Joins



Spatial data in FME

Connect. Transform. **Automate**

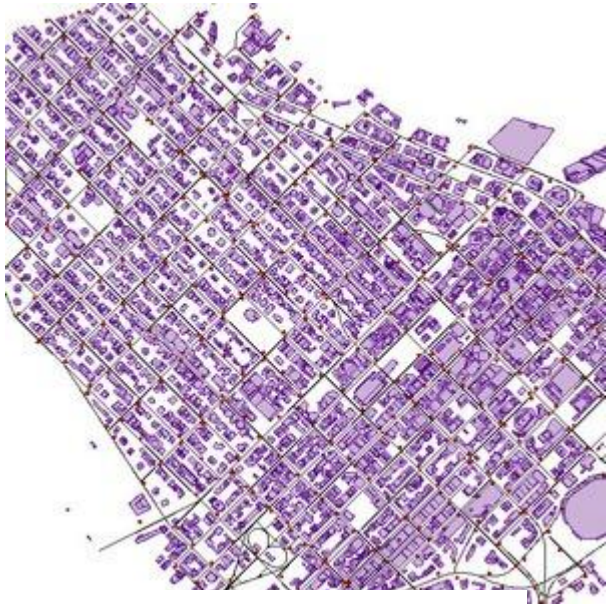
Geospatial data basics

Vector

Vector data is best described as graphical representations of the real world. There are three main types of vector data:

- Points
- Lines
- Polygons

Connecting points create lines, and connecting lines that create an enclosed area create polygons.



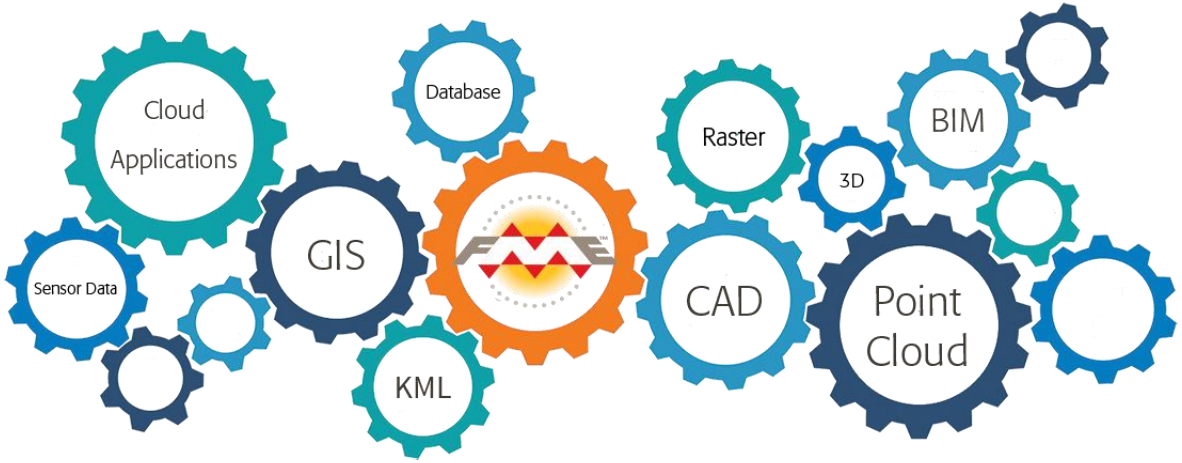
Raster

Raster data is data that is presented in a grid of pixels. Each pixel within a raster has a value, whether it be a colour or unit of measurement, to communicate information about the element in question. Rasters typically refer to imagery. In the spatial world, this may specifically refer to orthoimagery which are photos taken from satellites or other aerial devices.

Geospatial data

FME supports a wide range of commonly used spatial formats and applications including:

- GIS: ArcGIS, MapInfo, GeoMedia, Smallworld
- CAD: AutoCAD, MicroStation
- Spatial databases: PostGIS, Oracle Spatial, Geodatabase
- Rasters
- Point clouds
- XML-based spatial formats: KML, GML, CityGML
- BIM: Revit, IFC, SketchUp
- Cloud-based mapping platforms: ArcGIS Online, CARTO, Socrata
- and many more



Coordinate Systems & Reprojecting

Connect. Transform. **Automate**

Geospatial data basics - Coordinate Systems

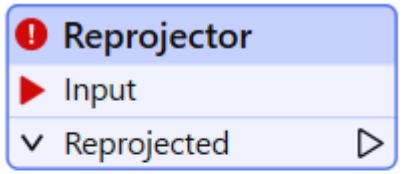
- Coordinate systems
  - Coordinate systems enable geographic datasets to use common locations for integration.
  - Used to represent the locations of geographic features, imagery, and GPS locations, within a common geographic framework.
  - British National Grid
  - World Geodetic System 1984 (WGS84)

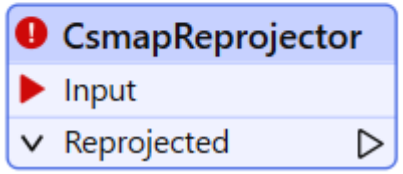
- FME interprets the coordinate system being read in

- **Data must be in the same coordinate system to calculate any spatial relationships**

Coordinate Systems

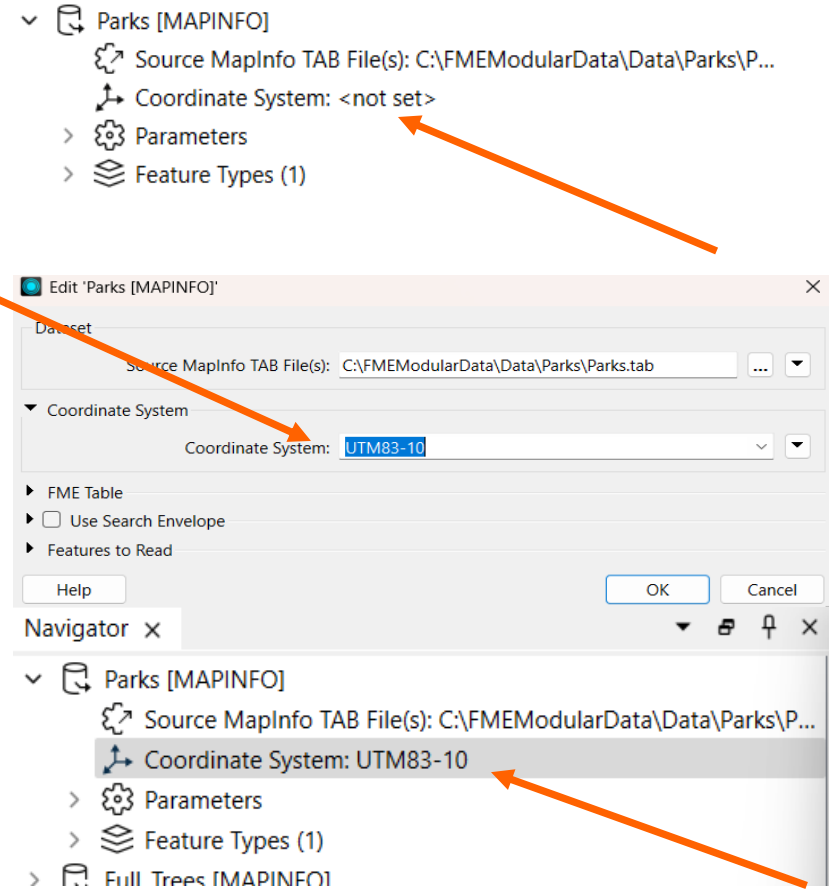
- **FME interprets the coordinate system being read in** and will carry that through the workspace and output it if you are writing to a spatial file
- You can set coordinate system on readers/writers or use the **CoordinateSystemSetter**
- You may also need to **reproject** your data, this may be to do a spatial join or to ready your file for another application
  - **Reprojector**: performs simple reprojections, without z value handling
  - **CsmapReprojector**: reprojections with finer control than the Reprojector, including z values (uses the CS-MAP library)





Coordinate Systems Parameter on Reader/Writer

- when a reader's Coordinate System parameter is defined as ***<not set>*** FME will automatically try to determine the correct coordinate system from the dataset itself. If it does not do that, double click on the '***Coordinate System***' tab and enter the desired coordinate system. In this case, it is ***UTM83-10***.



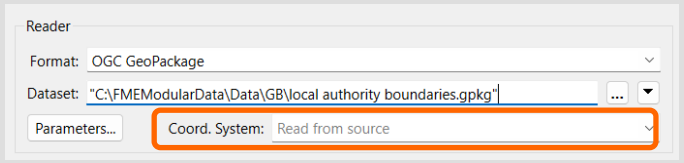
- When the source dataset is in a format that stores coordinate system information you can safely leave the parameter unset. *- However, it can be useful to users to see the coordinate information, especially in workspaces with multiple inputs with different coordinate systems.*

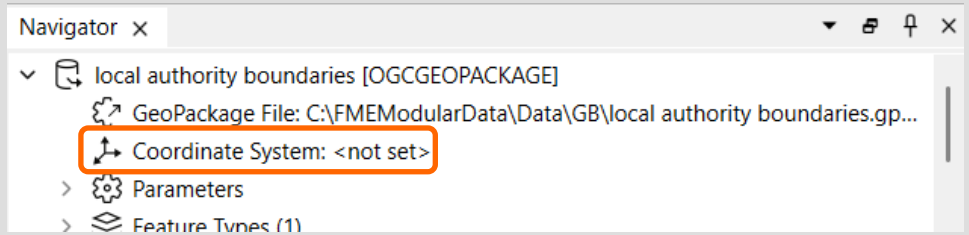
- You **must** set this parameter when you wish to reproject **source data that does not store coordinate system information**; otherwise, an error will occur in the translation.

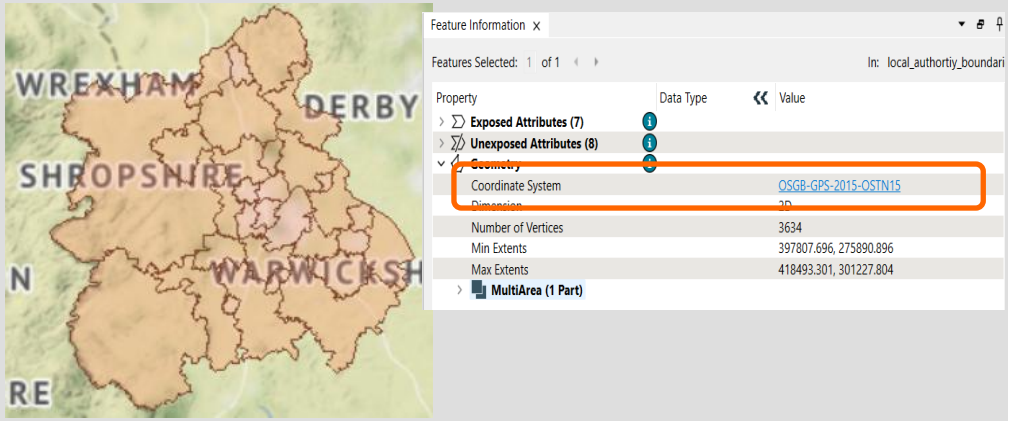
Demo – Coordinate Systems

Coordinate system Defined in data

*C:\FMEModularData\Data\GB**local authority boundaries.gpkg***

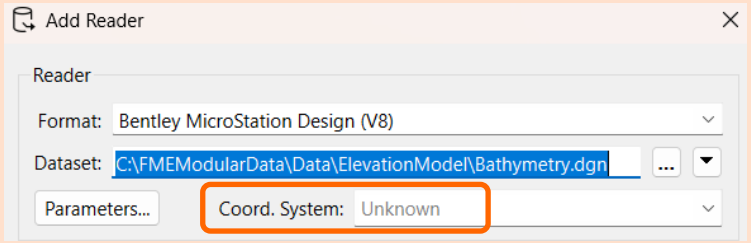


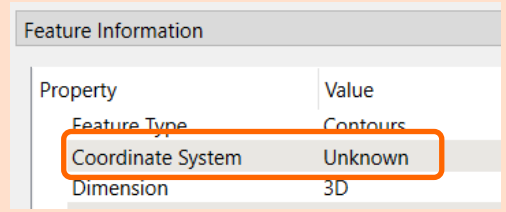




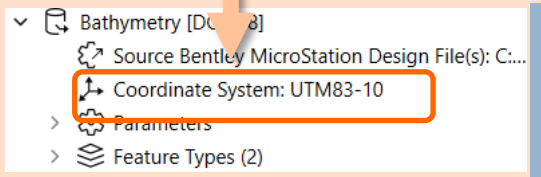
Coordinate system Not defined in data

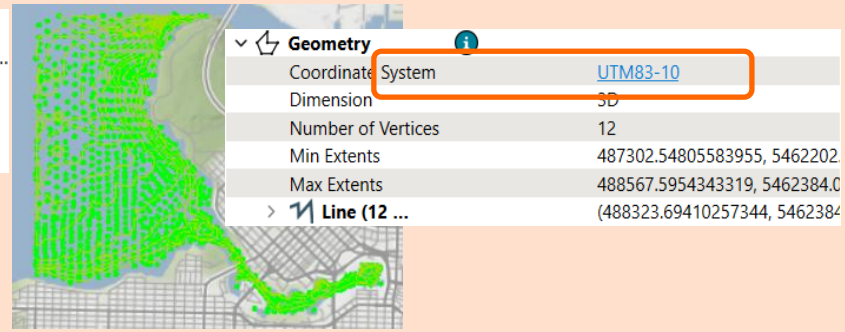
*C:\FMEModularData\Data\ElevationModel**Bathymetry.dgn***





set parameter





Geometries in FME

Connect. Transform. **Automate**

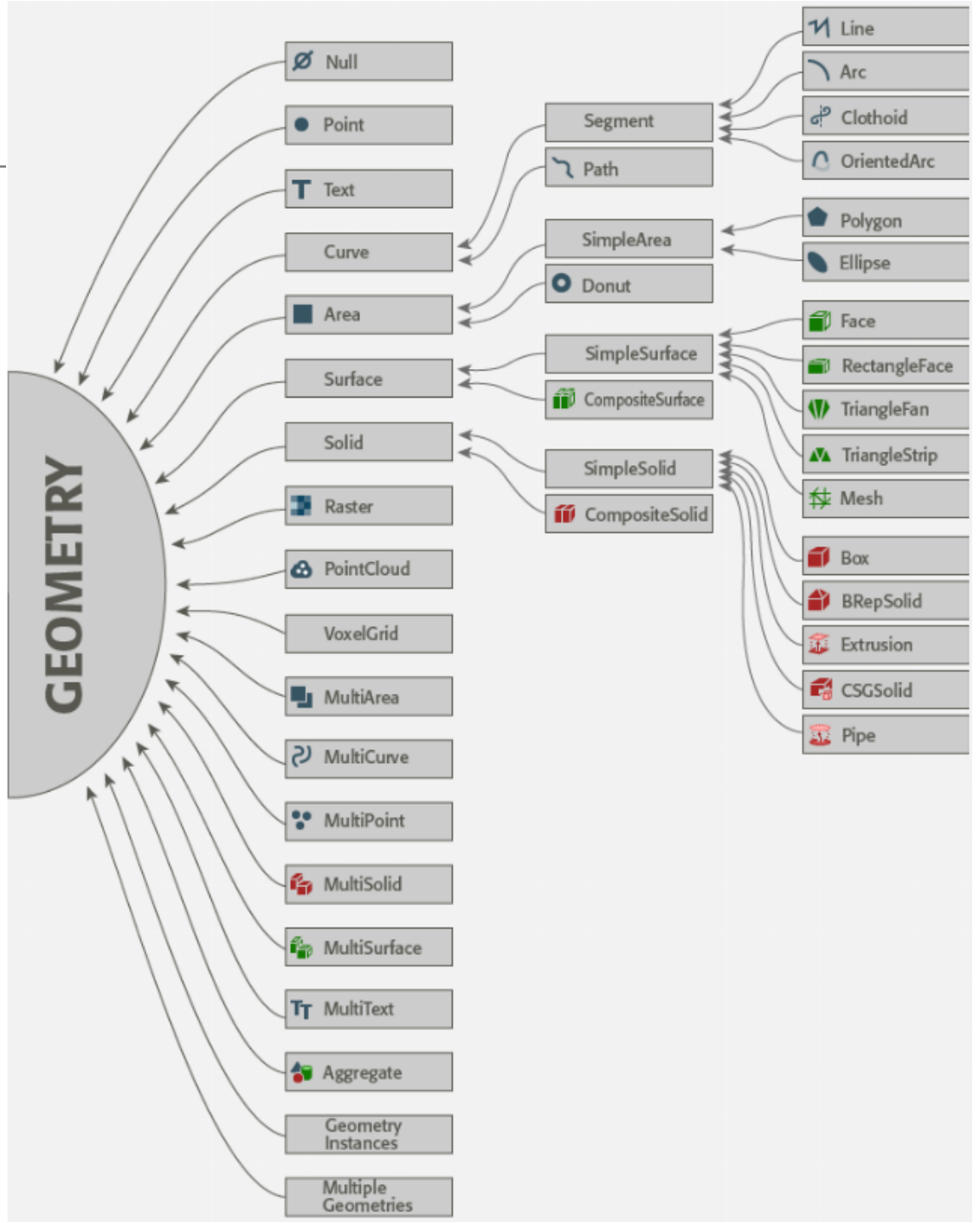
Geometry and Type

FME provides a comprehensive geometry model that includes everything from the simplest geometry to the most complex

There are two attributes to be aware of when working with spatial data:

fme_type and *fme_geometry*

Both of these relate to the geometry of a feature.



https://docs.safe.com/fme/html/FME_Desktop_Documentation/FME_ReadersWriters/!FME_Geometry/FME_Geometry_Model.htm

Geometry and Type

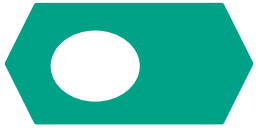
Examples:

Simple Polygon

fme_geometry = *fme_polygon*

fme_type = *fme_area*

Donut Polygon



fme_geometry = *fme_donut*

fme_type = *fme_area*

Point

fme_geometry = *fme_point*

fme_type = *fme_point*

Line

fme_geometry = *fme_line*

fme_type = *fme_line*

Text

fme_geometry = *fme_point*

fme_type = *fme_text*

Arc

fme_geometry = *fme_point*

fme_type = *fme_arc*

Ellipse

fme_geometry = *fme_point*

fme_type = *fme_ellipse*

Multis

- A Multi is a **collection** of geometries **of a single type** that is treated as a single unit.
- Multis **cannot** be nested or have a **hierarchy within** them.

Examples:

MultiPoint *(IFMEMultiPoint)*

a defined collection of Point geometries

fme_geometry = *fme_aggregate*

fme_type = *fme_point*

MultiCurve *(IFMEMultiCurve)*

a defined collection of Curve geometries

fme_geometry = *fme_aggregate*

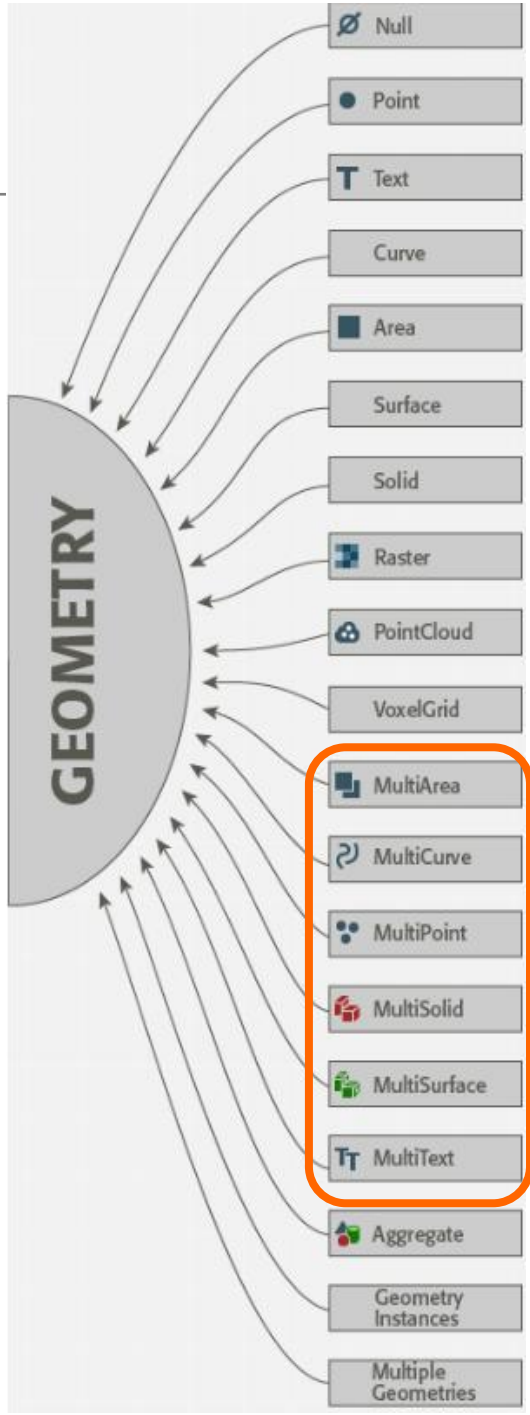
fme_type = *fme_line*

MultiArea *(IFMEMultiArea)*

a defined collection of Area geometries

fme_geometry = *fme_aggregate*

fme_type = *fme_area*



Aggregates

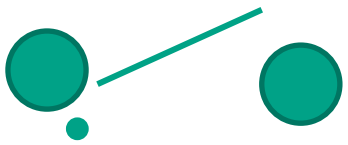
- An aggregate is a collection of geometries **of any type** that is treated as a single unit.
- Aggregates may or **may** not be homogenous and/or **hierarchical**:
  - **Hierarchical Geometries** - a collection of geometries that may, in turn, contain other collections (an aggregate that contains aggregates)
  - **Homogeneous Aggregates** - made up of features of the same fme_type

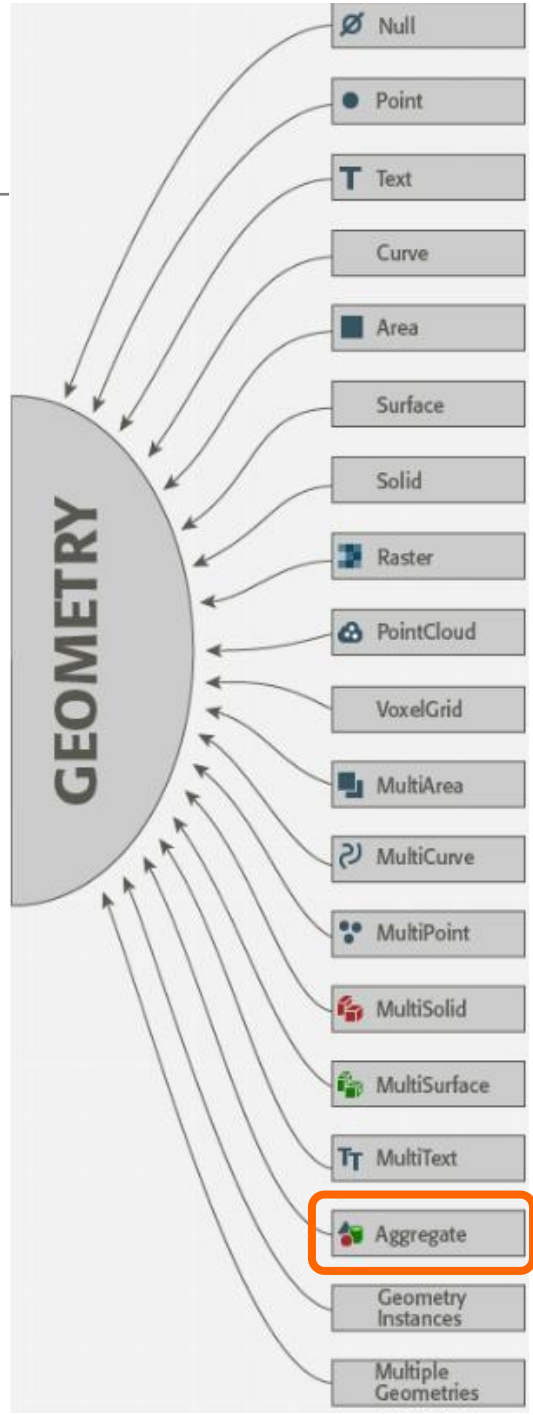
    Attributes:
    - fme_geometry = *fme_aggregate*
    - fme_type = *<type of contained geometries>* *e.g. fme_point*

    Note: some types of homogeneous aggregates may also be represented as multi geometries. For example, a collection of only Points could equally be represented as a MultiPoint Geometry.

  - **Non-Homogeneous Aggregates** - made up of features of differing geometry types. e.g. a collection of point, line, and polygon geometries within an aggregate

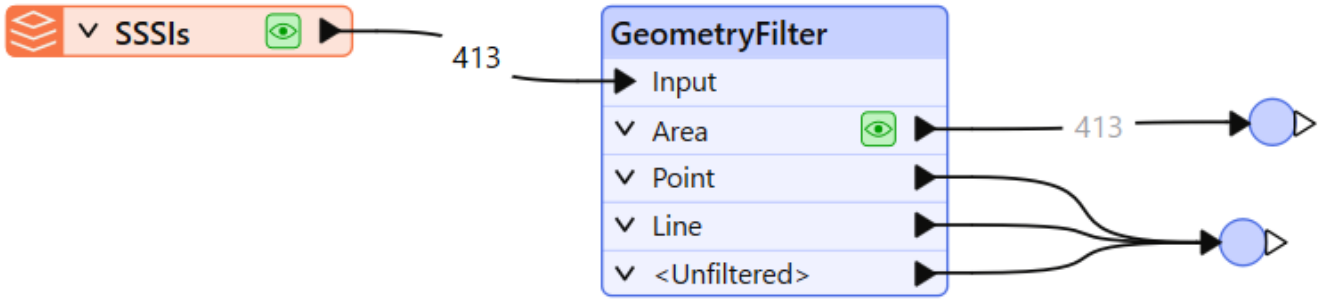
    Attributes:
    - fme_geometry = *fme_aggregate*
    - fme_type = *fme_collection*



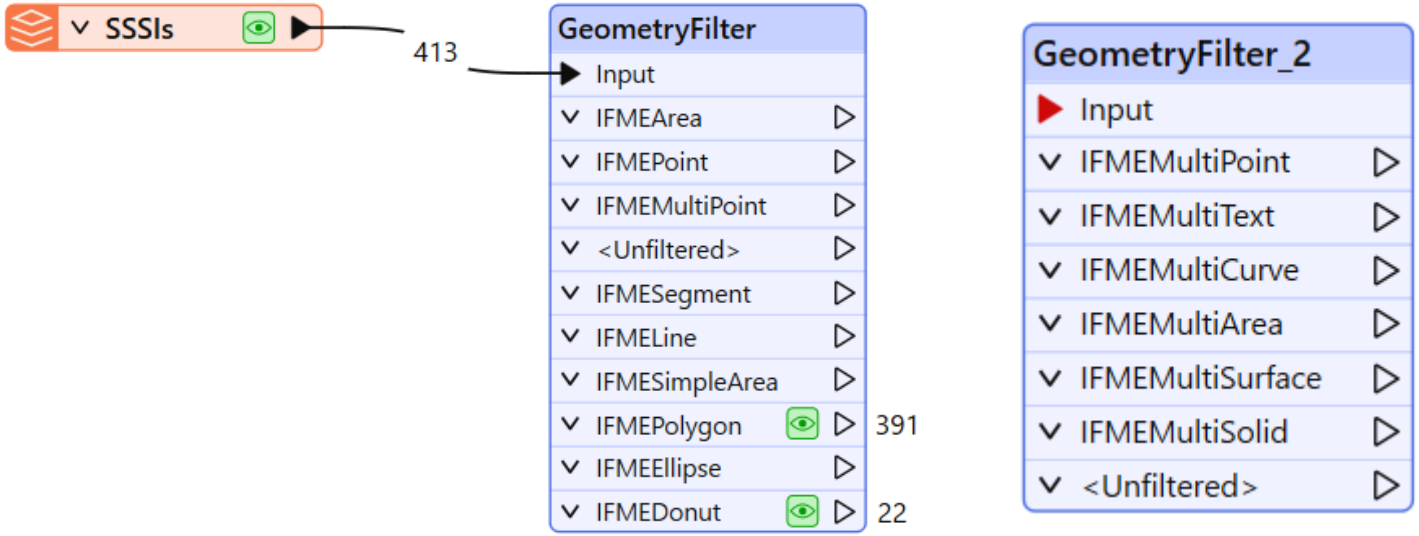


The GeometryFilter transformer

- Filters features based on Geometry Type
- User can select which geometry types to filter by

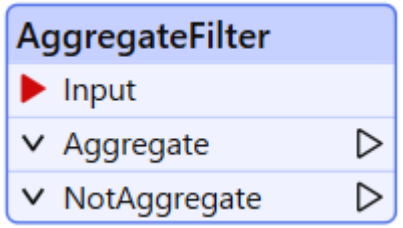


- switch to ***detailed*** *mode* to filter:
  - by *fme_geometry*
  - for Multis*/Aggregates

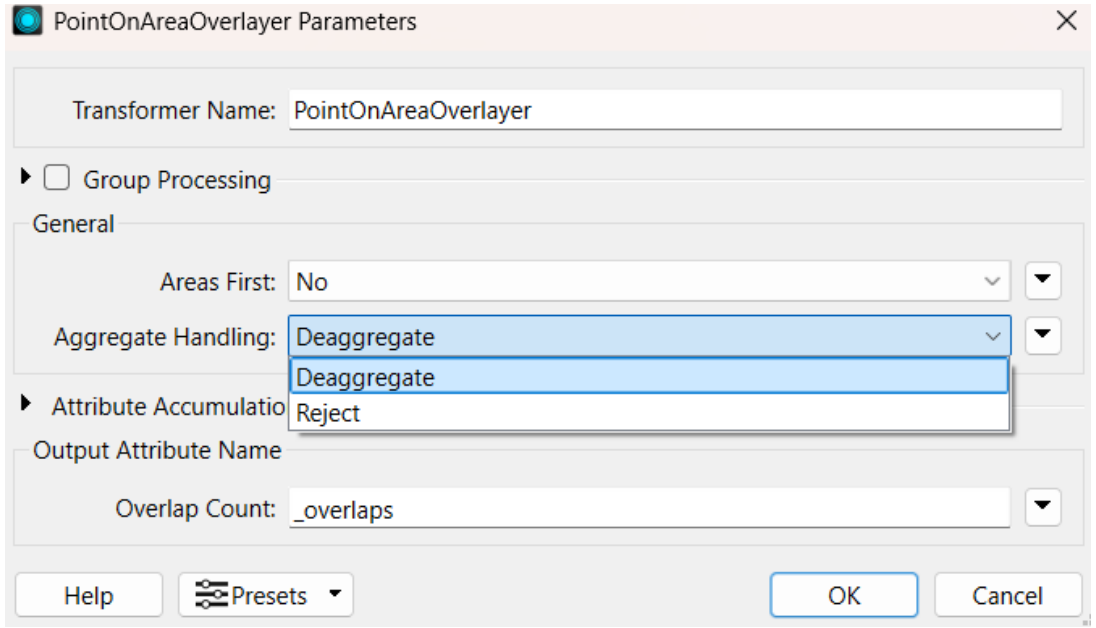


Working with Aggregates

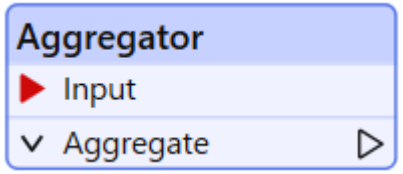
- Are you expecting aggregate features within the data?
  How would they behave/impact your workflow and results?
  Do you need to check for them or deaggreagte them?



- Some transformers will need to deaggregate or reject aggregates:

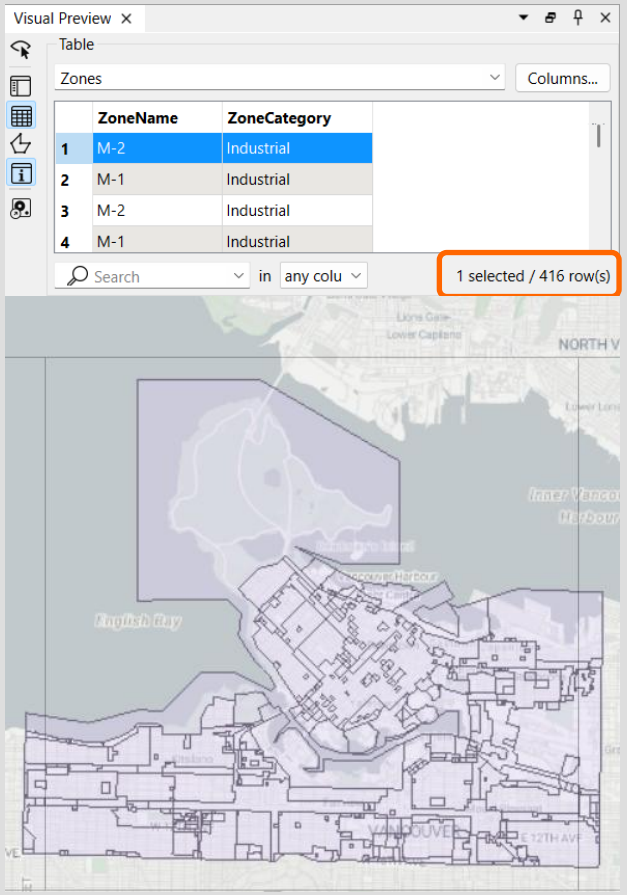


- Do you want to create aggregate features?

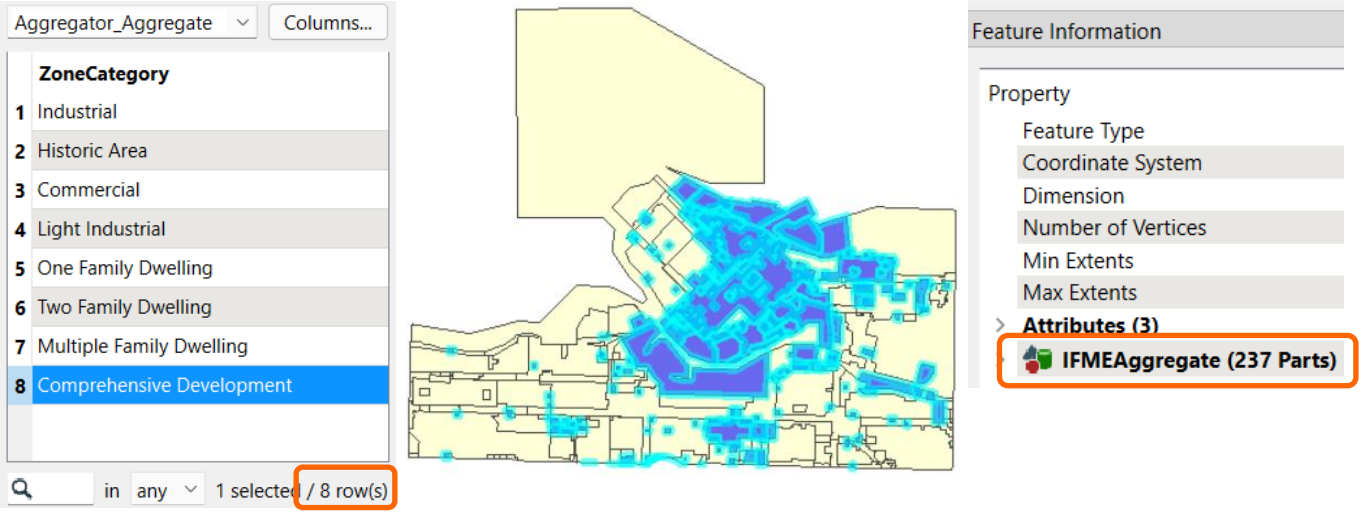


Example – Aggregates

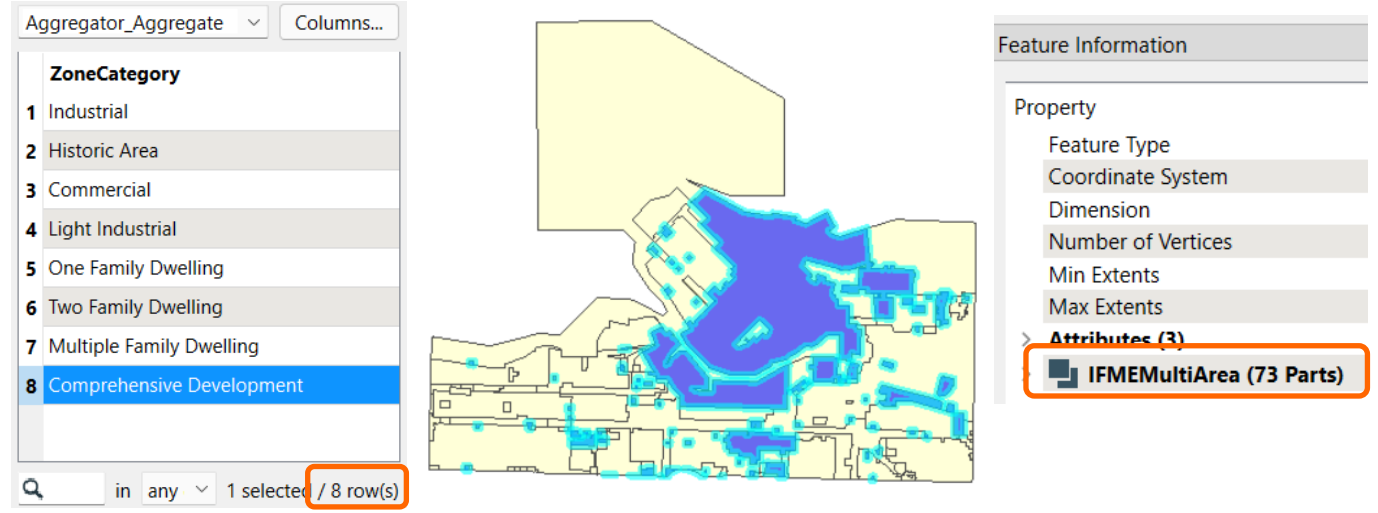
*C:\FMEModularData\Data\Zoning**Zones.tab***



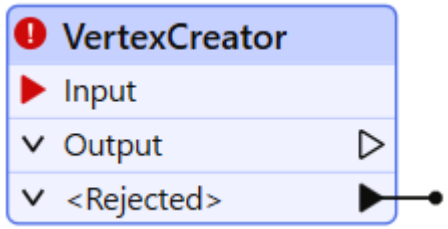
Aggreagated by Zone Category



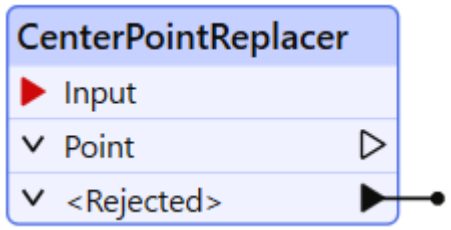
Dissolved & Aggreagated by Zone Category



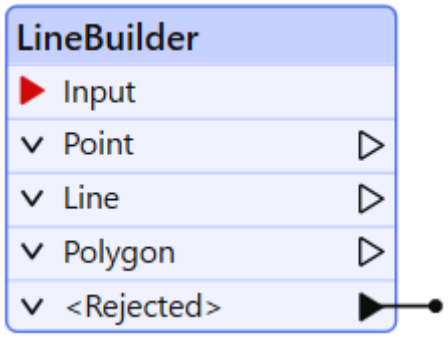
Creating Geometry – getting started



Creates a point from x,y coordinates

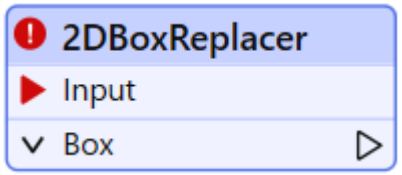


Replaces polygons with points

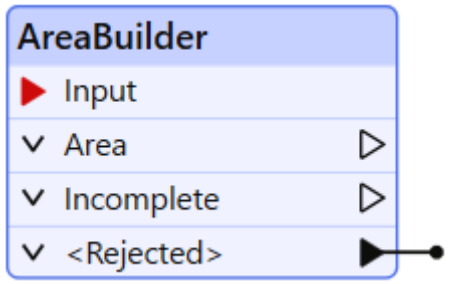


Creates lines from points

- connects point features in the order they enter, forming lines or polygons

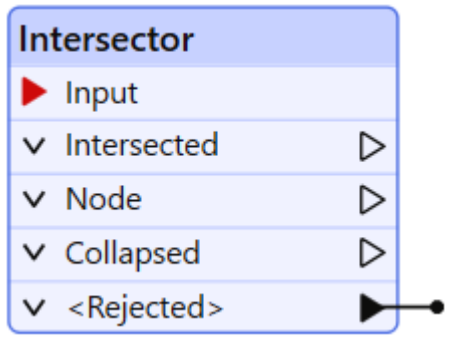


Creates a box from coordinates



Creates polygons from lines

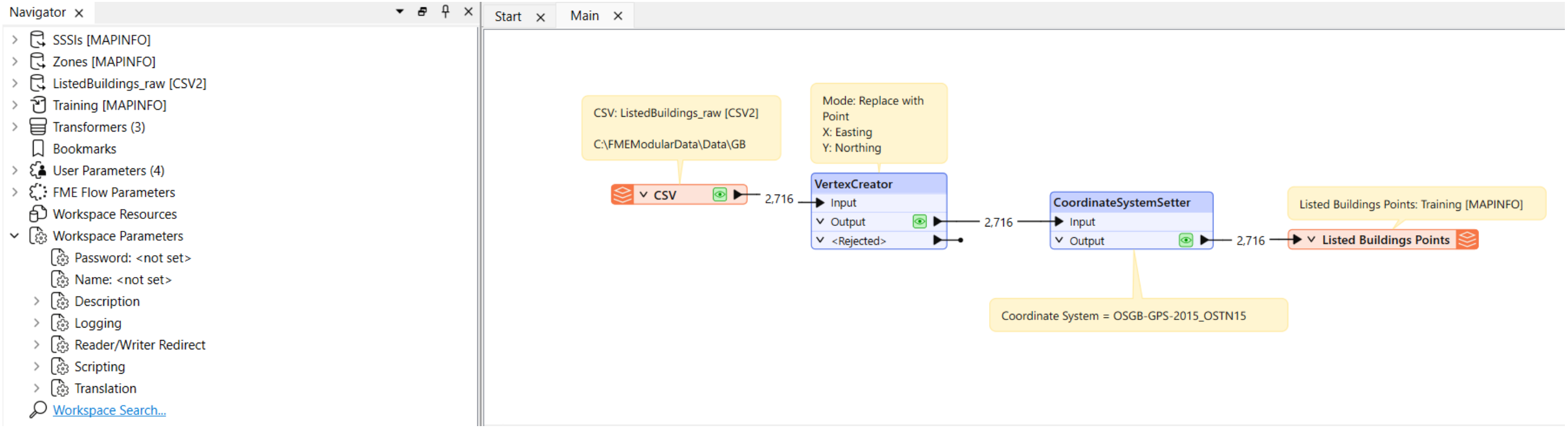
- uses topologically connected linework to create polygons



Break lines and polygons wherever an intersection occurs and creates nodes at those locations

Demo – create points from XY coordinates

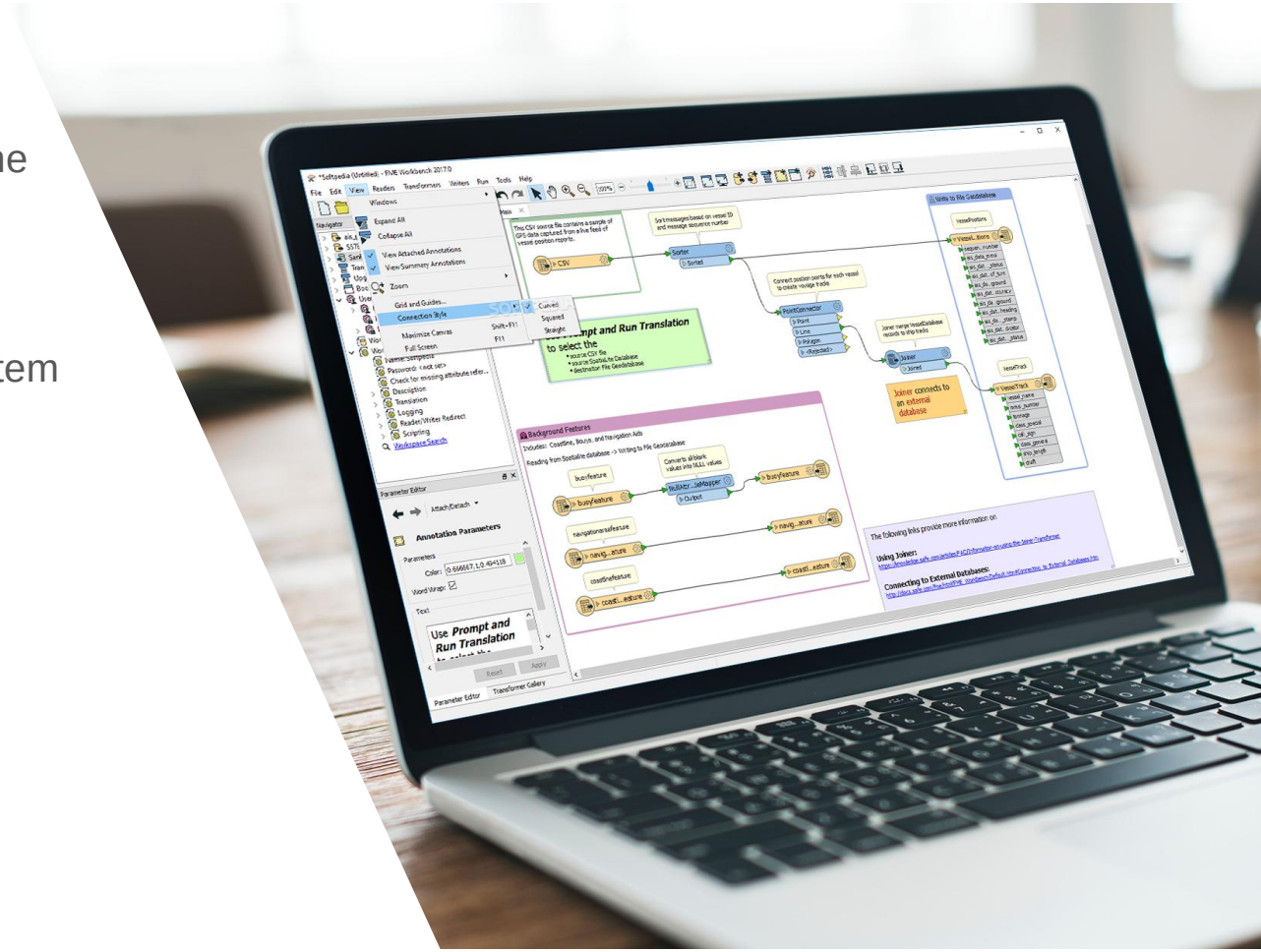
- Use Listed buildings csv



Exercise 3.1

Spatial Data Concepts

- The Community Engagement team has sourced a spatial dataset containing crime incidents and want to load it into one of their systems.
- However, the data needs to be structured in a certain way before it can be consumed by their system:
  - the data has to be in Lat/Long WGS84 coordinate system
  - contain only points
  - include the coordinates stored as attributes



Data – Crime Incidents (MapInfo TAB)

Starter workspace – none

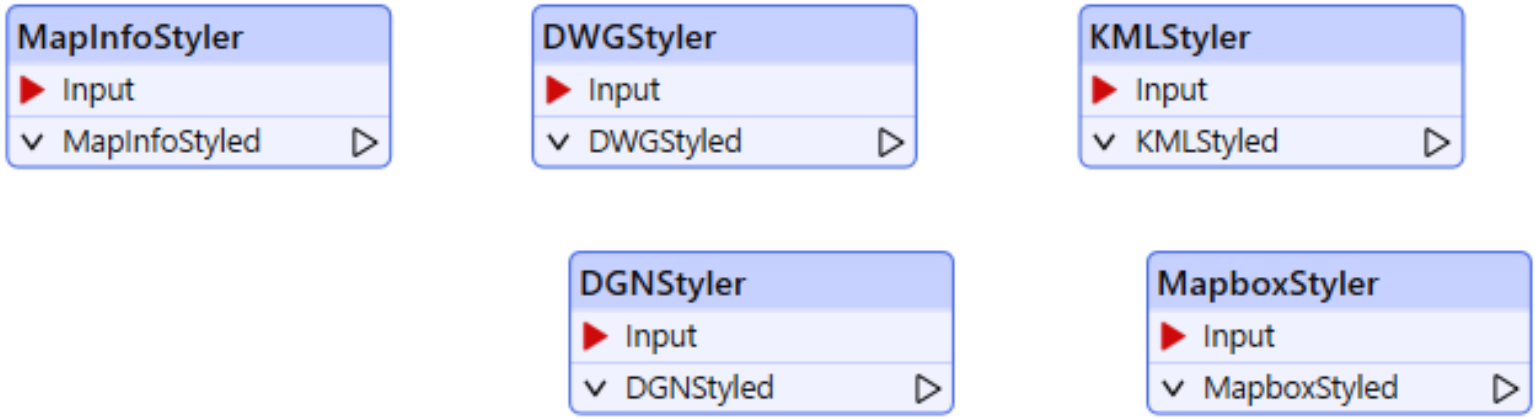
Goal - Translate the Crime Incidents MapInfo TAB data to GeoPackage format, whilst also checking geometry type and reprojecting to the required coordinate system.

Symbology and Styling

Connect. Transform. **Automate**

Symbology and styling in FME

- Format attributes are useful for reading and applying styling to files
- Styler transformers are available for a number of formats:



Spatial Joins and Filtering

Connect. Transform. **Automate**

Analyze Spatial Data

Conduct basic spatial analysis by comparing the location of features or filtering data based on location.

What Is Spatial Joining and Filtering?

- **Spatial Join** - *combines* information between two datasets based on their spatial location.

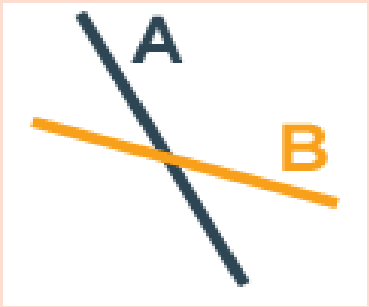
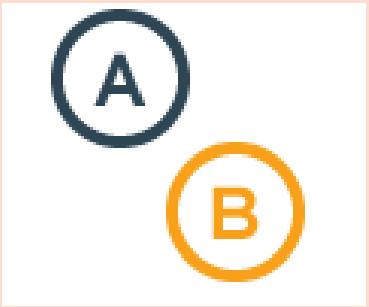
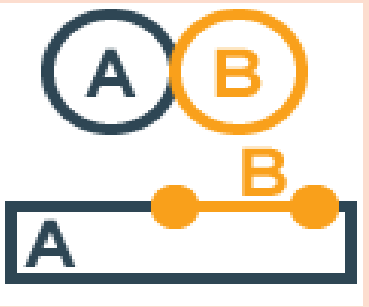
  For example, you might have a dataset of incident points and a polygon dataset of postcode boundaries. You could use how the incident points fall within the postcode polygons to obtain attributes from the postcode dataset and add them to the incident points dataset.

- **Spatial Filtering** - *separates* features based on their spatial location.

  For example, you might have a dataset of incident points and a polygon representing an authority area. You could filter your incident data to only include incident points within the authority boundary.

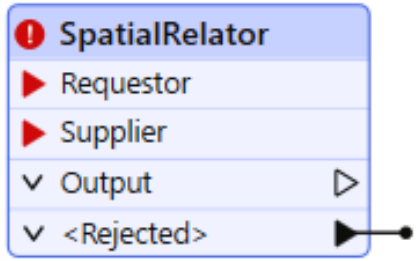
Spatial Tests

These tests can be performed in transformers using spatial filters and joins

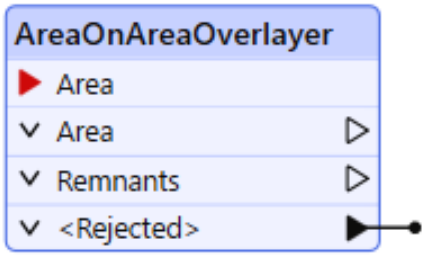
Intersects	Contains	Equals	Disjoint From	Within	Touches
 	 *Inverse of Within object A *contains* object B			 *Inverse of Contains object A is *within* object B	

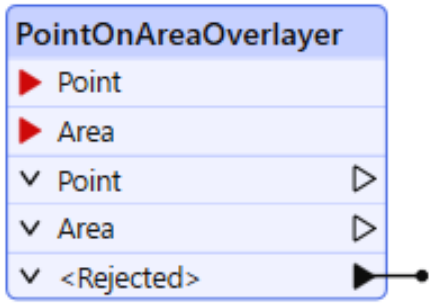
Overview of spatial joiners and filtering transformers

SpatialRelator determines the spatial relationship between geometry and can optionally join data

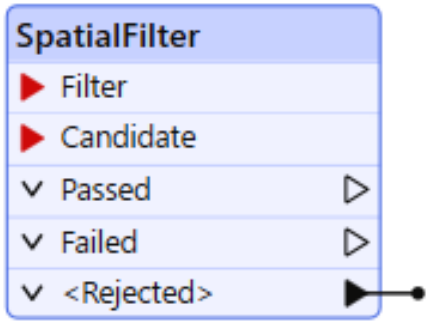


There are a number of overlayers which handle different forms of overlay



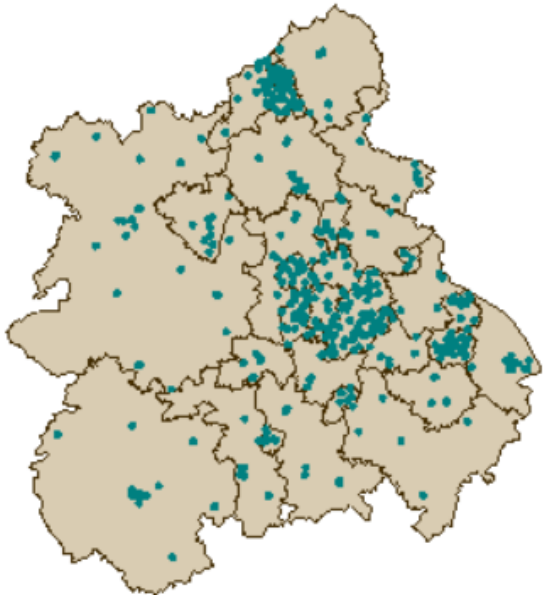


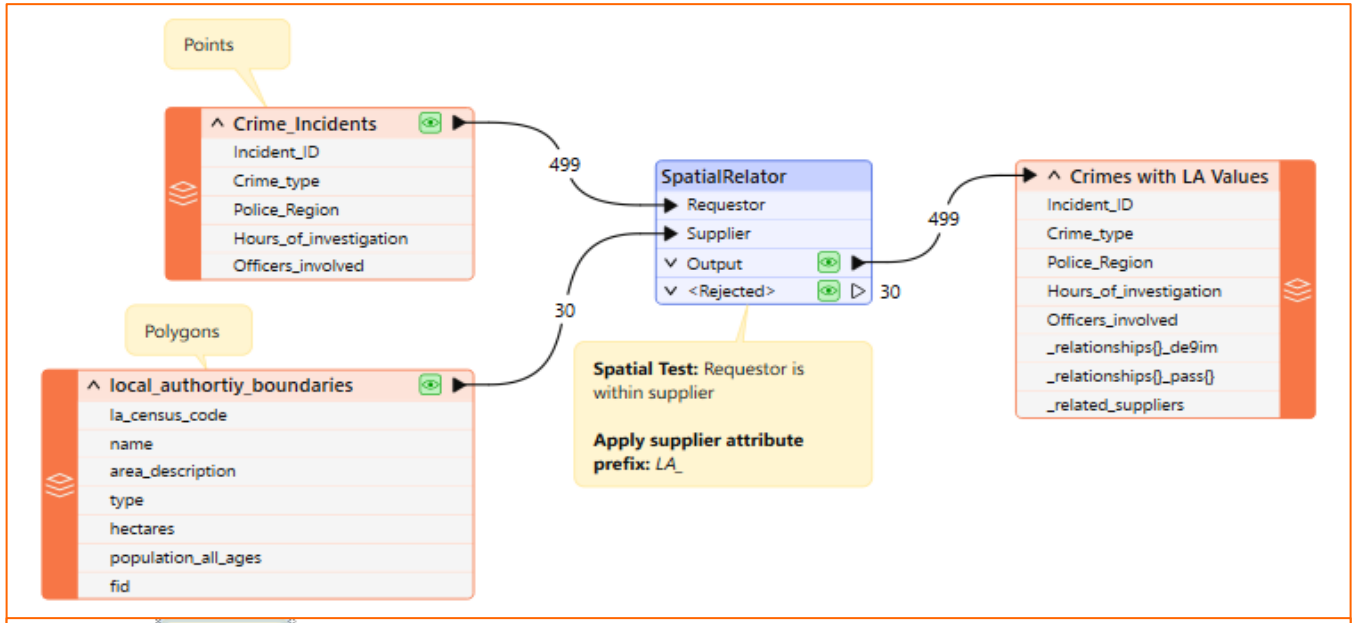
Filters according to spatial relationship but can also be used to merge attributes

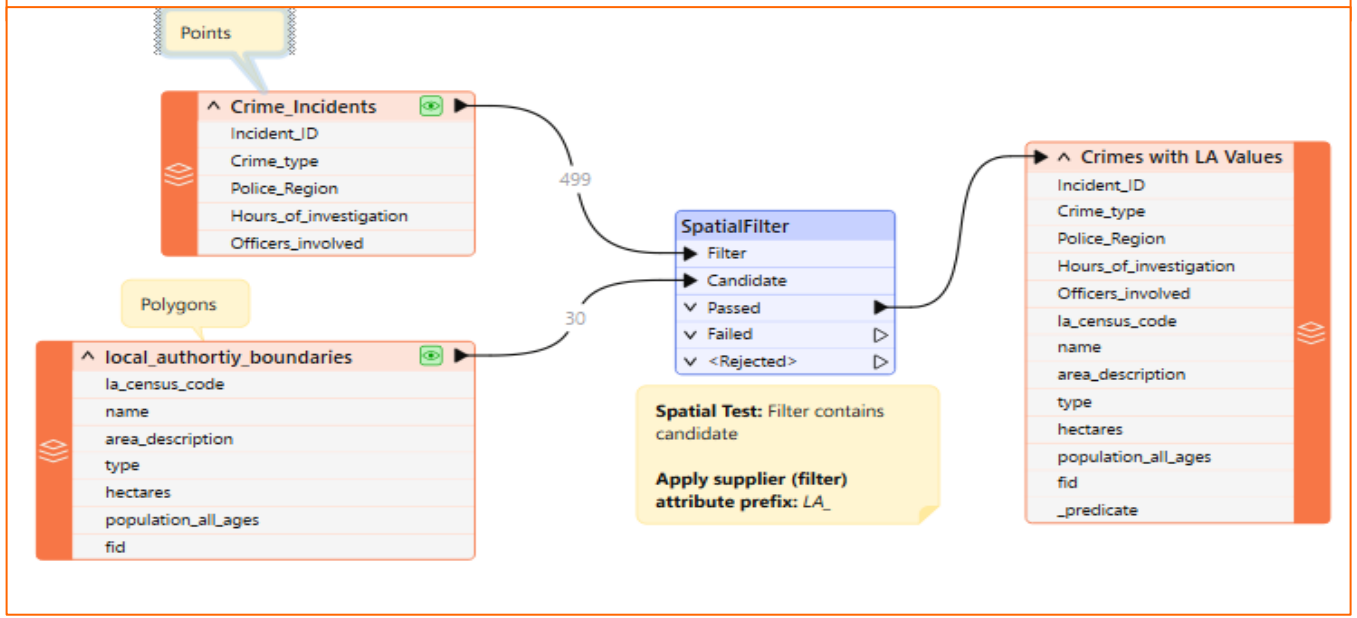


Example - Spatial Join

- To each Crime Incident add the attributes of the Local Authority it falls within.







Exercise 3.2

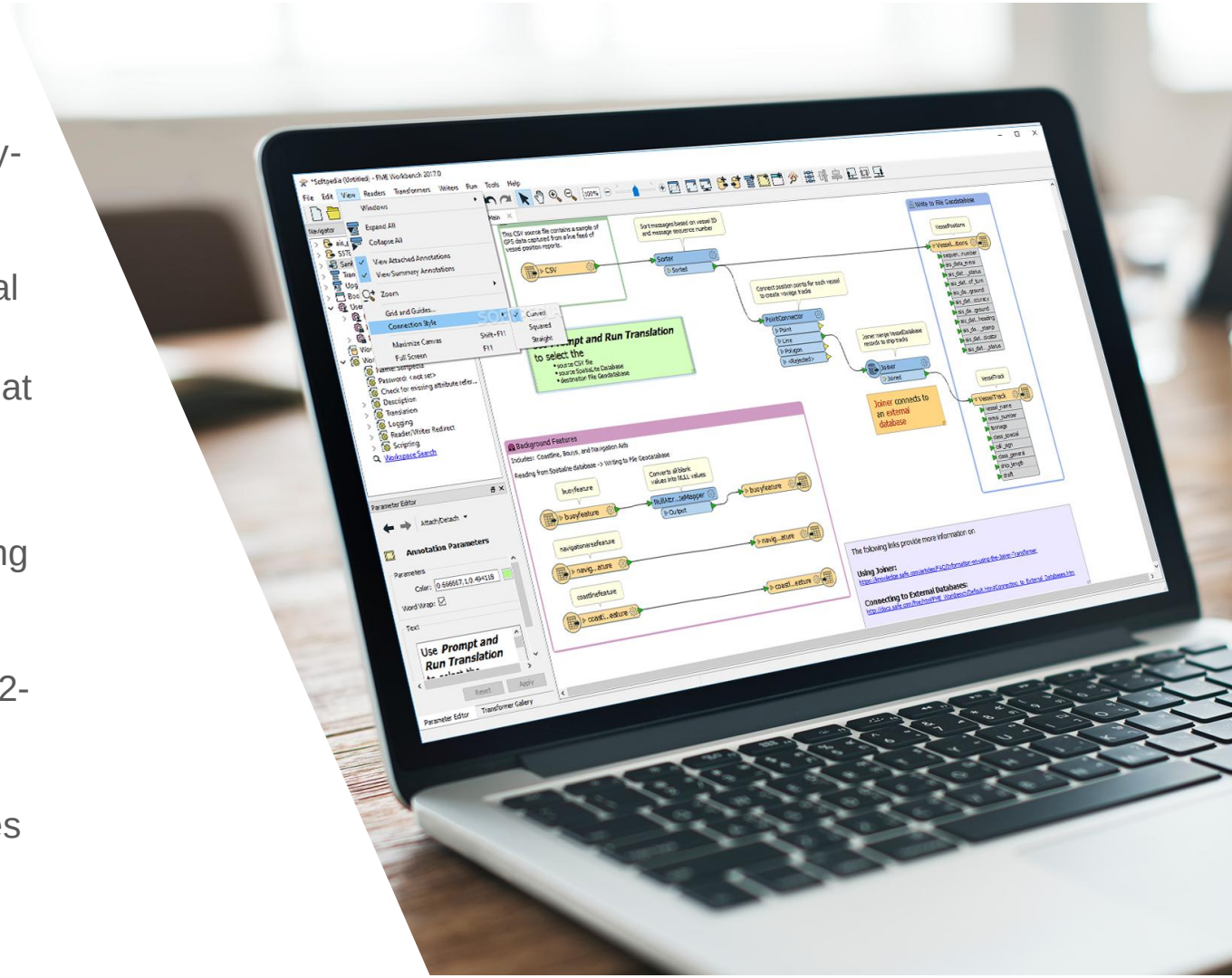
Spatial Join

- You have been given the task of preparing a dataset for the Corporate Strategy and Environmental Services teams. They have requested a breakdown of regional fly-tipping incidents to local authority level.
- The task is to join two spatial and generate a count of how many fly-tipping incidents occurred within each local authority area.
- Secondary to that we will output the results to KML format for use in GoogleEarth.

Data – Local Authority Boundaries (Geopackage), FlyTipping (MapInfo TAB)

Starter workspace – C:\FMEModularData\Workspaces\3.02-Spatial-SpatialJoins-Begin.fmw

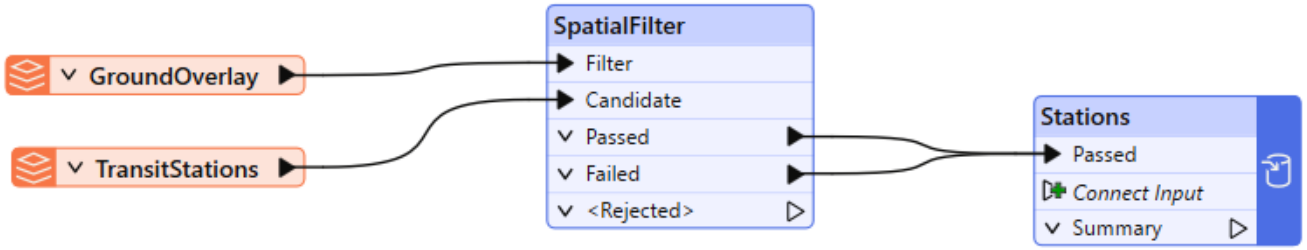
Goal - Create a new version of the local authority boundaries that includes the required fly-tipping incident counts.

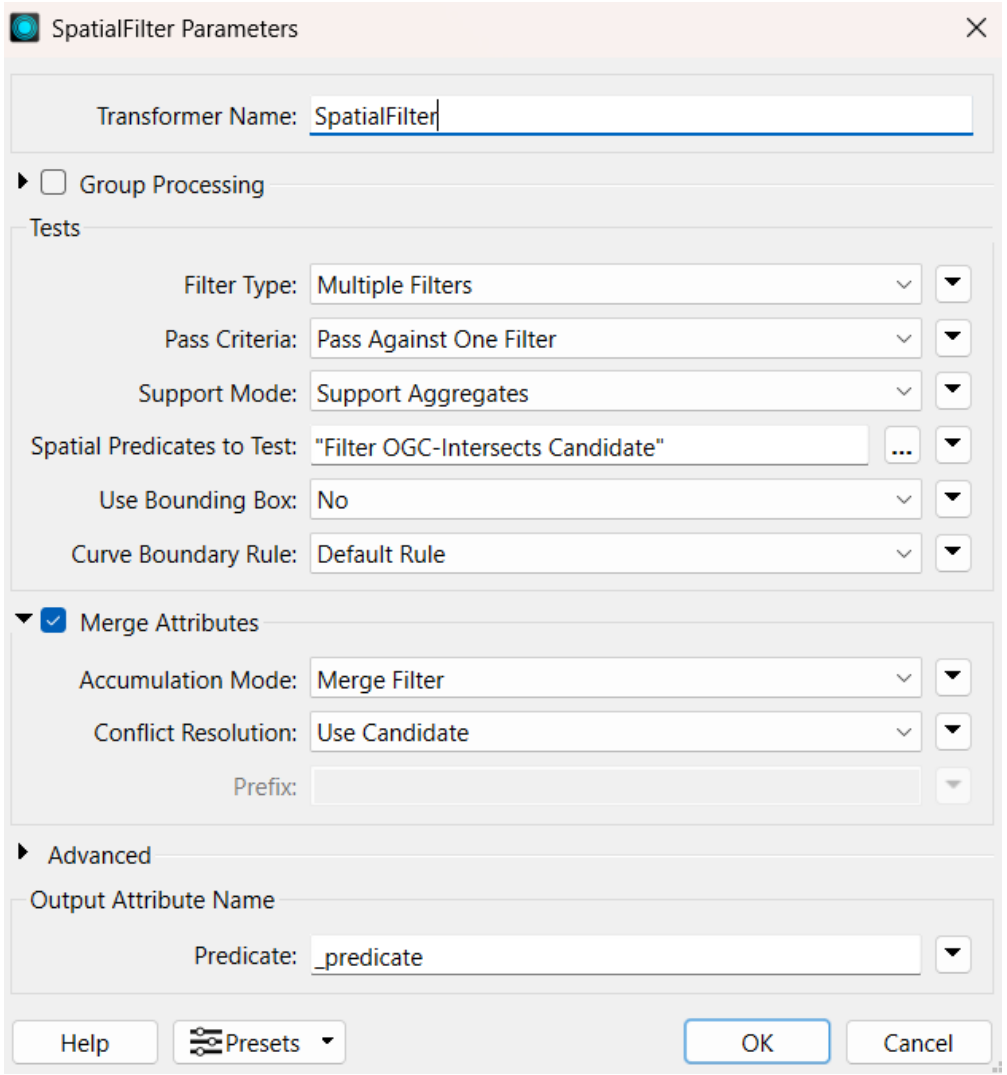


SpatialFilter Transformer

Typical Uses:

- **Routing features**, depending on whether a defined spatial relationship is true or false
- Performing **quality control** on a dataset by checking for expected spatial relationships with another dataset
- Performing a spatial join to **transfer attributes** from one feature to another based on their spatial relationship

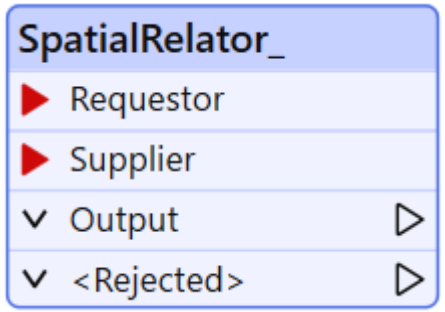




SpatialRelator Transformer

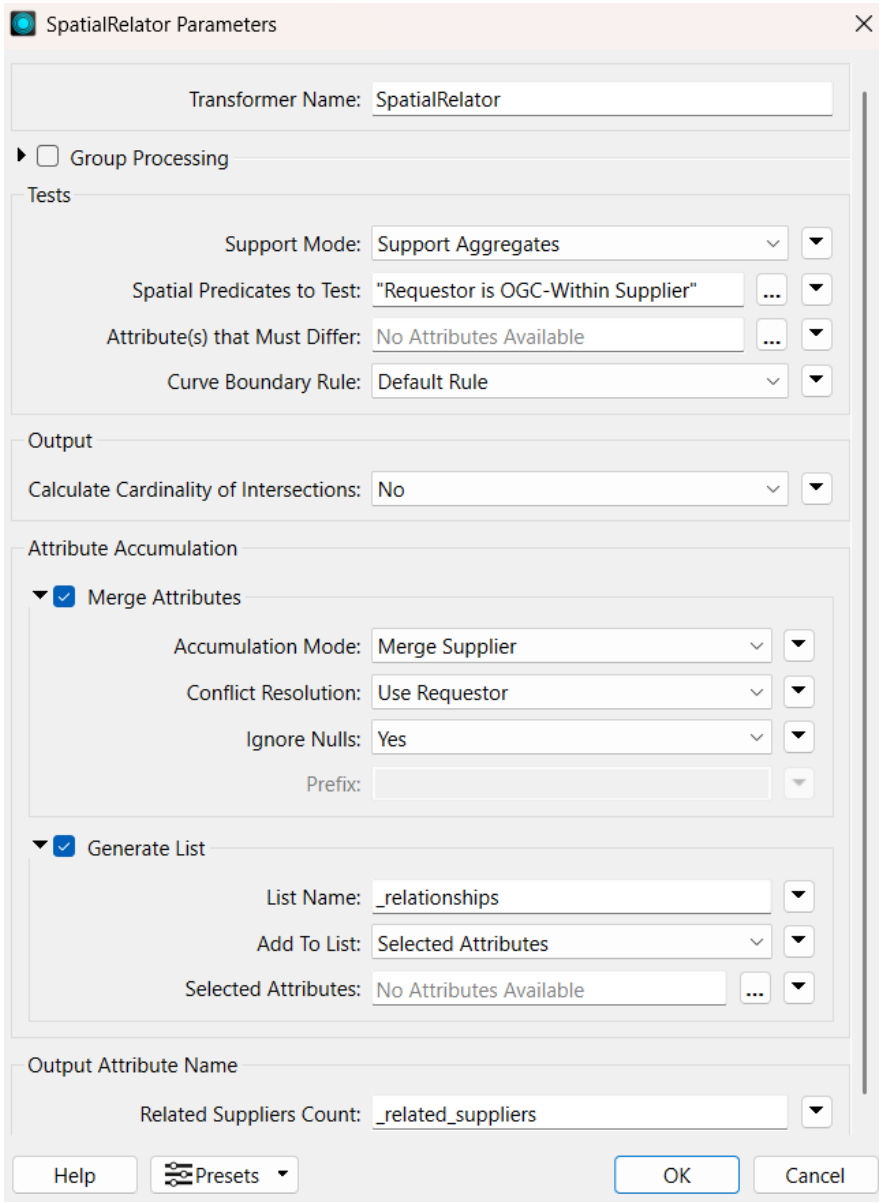
Typical Uses:

- Identifying what kind of **spatial relationship**(s) exist between features
- Performing a spatial join to **transfer attributes** from one feature to another based on their spatial relationship



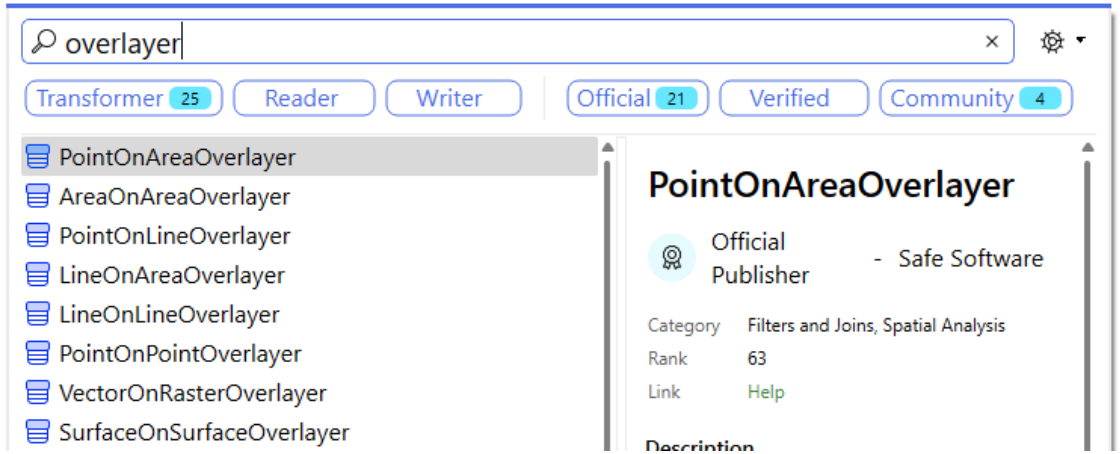
How does is compare to SpatialFilter?:

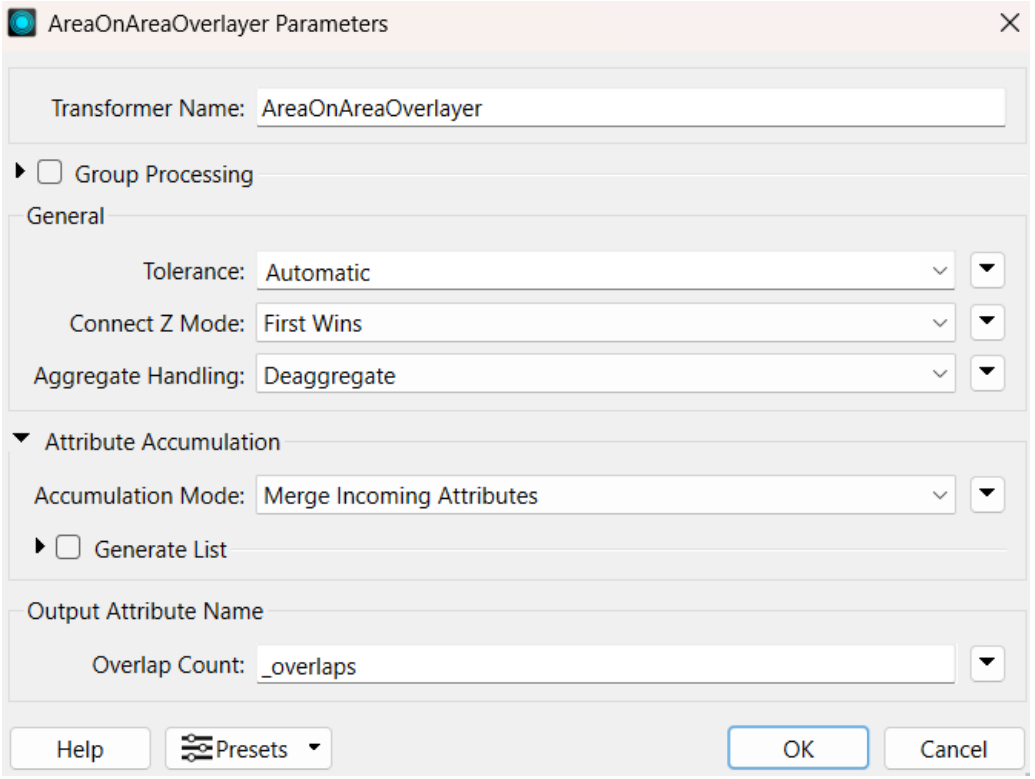
- *Pros:*
  - *Includes more functionally/configuration options including List attribute generation and creation of 'Count' attribute*
- *Cons:*
  - *More resource intensive*
  - *More complex to use*



Overlayer transformers

- There are several different "overlayer" transformers, each handling a different form of overlaying.
- Overlayers look for the intersection of two streams of spatial features (**performing spatial tests**). They **return both streams** in full but add intersection information as **attributes**.
  - Merges attributes
  - Includes an '_overlaps' count attribute
  - List generation

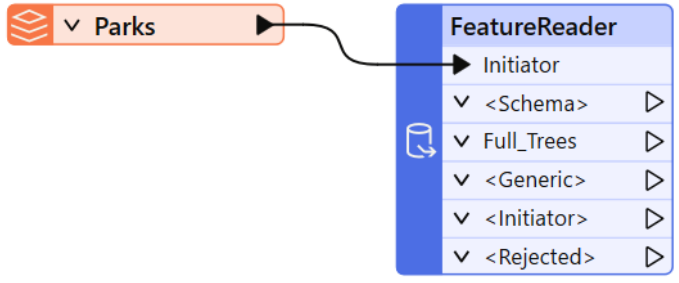


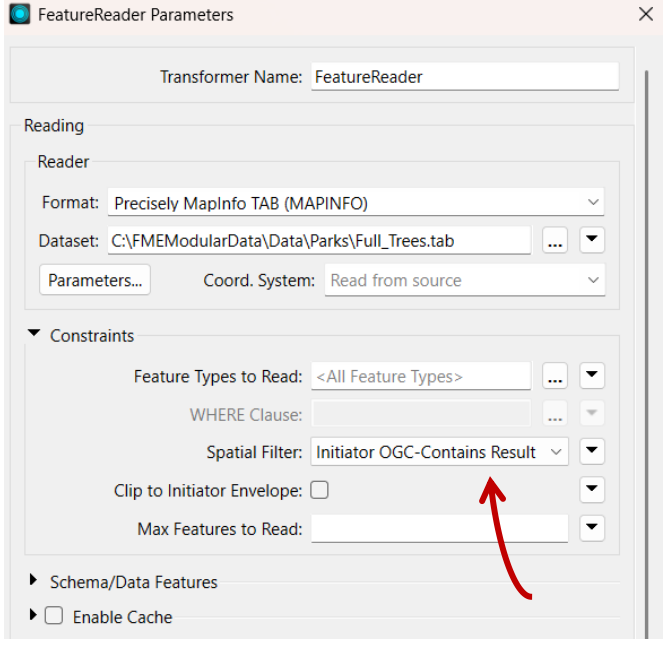


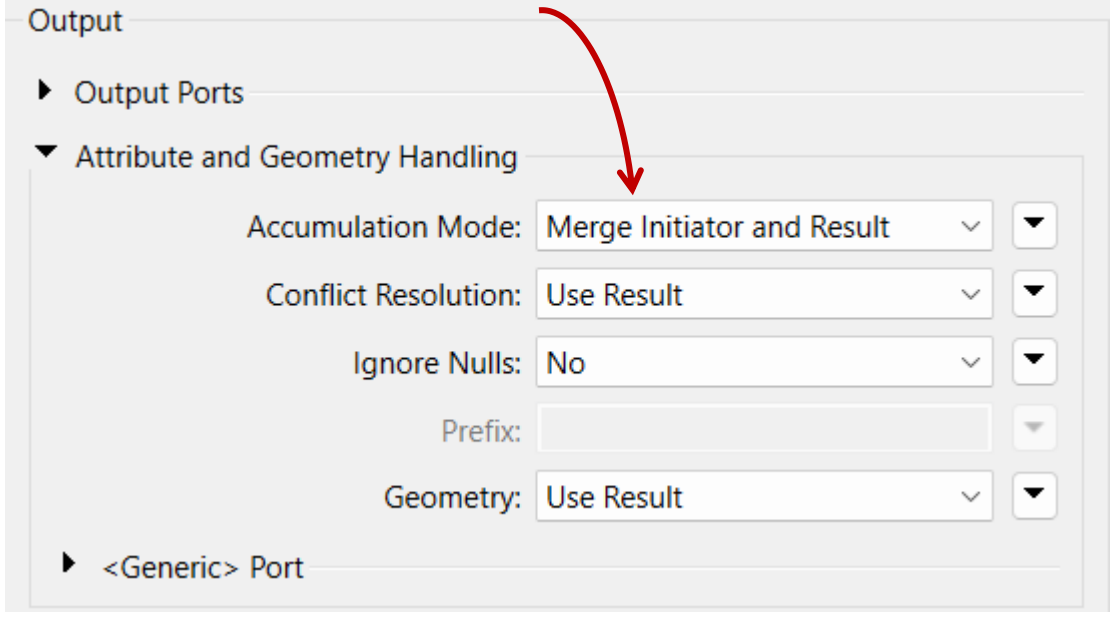
The Overlayers are easier to use than the SpatialRelator and SpatialFilter. But do provided slightly different output.

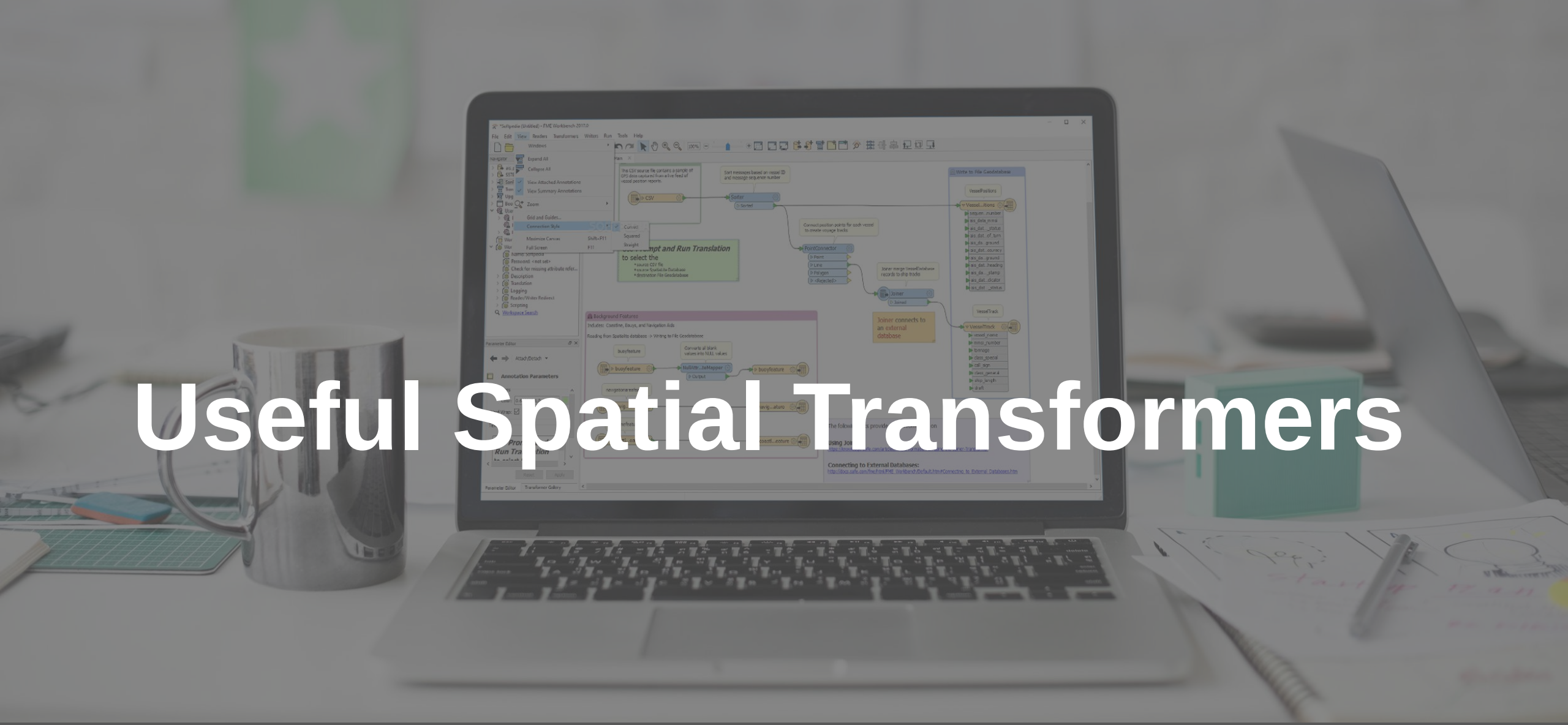
Spatial filtering within transformers - *Advanced*

- Here the feature reader is being used to only read in data within a particular area
- Reads from external dataset and constrained by the defined spatial test
- Output from schema port is the queried feature







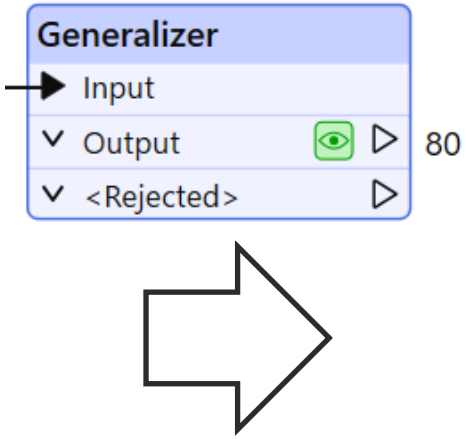


Useful Spatial Transformers

Connect. Transform. **Automate**

Generalising

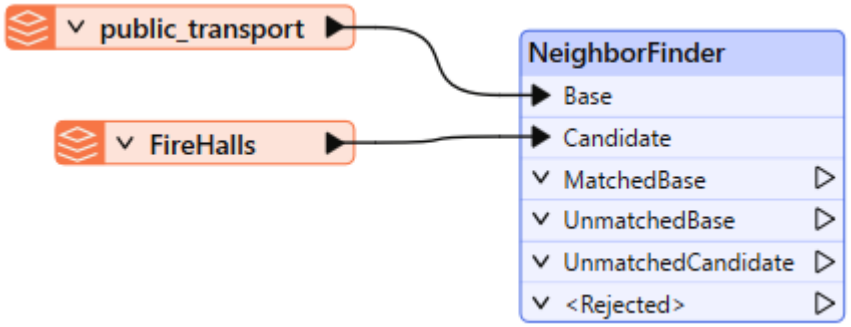
- Sometimes spatial files contain excess spatial information for the scale they are needed at
- Spatial files can be generalised to reduce the detail held in the data
- The Generalizer transformer has 4 types of algorithm:
  - **Generalising algorithms**: Reduce the density of coordinates by removing vertices
  - **Smoothing algorithms**: Determine a new location for each vertex
  - **Measuring algorithms**: Calculate the location of points, and return a list of these points
  - **Fitting algorithms**: Replace the original geometry completely, with a new feature fitted to a specified line

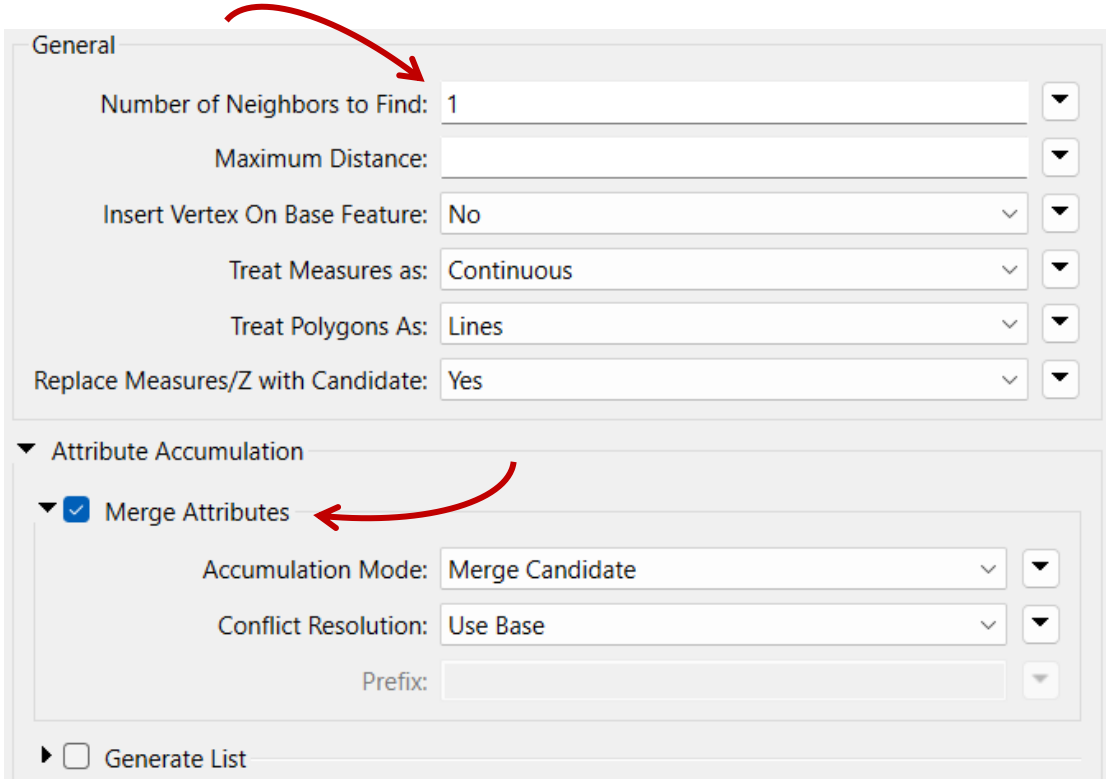


NeighborFinder transformer

- Carries out analysis based on proximity relationship

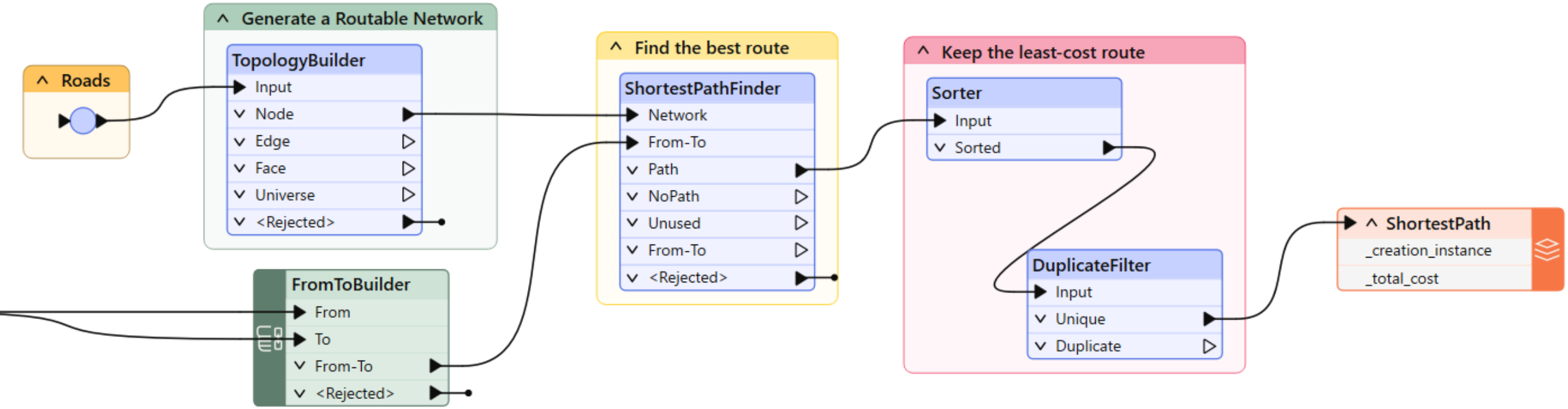
In this example the NeighborFinder is being used to identify the closest fire hall to each transit station:



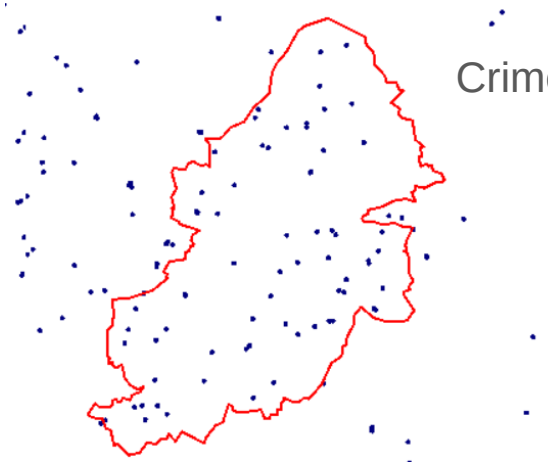


Route Analysis

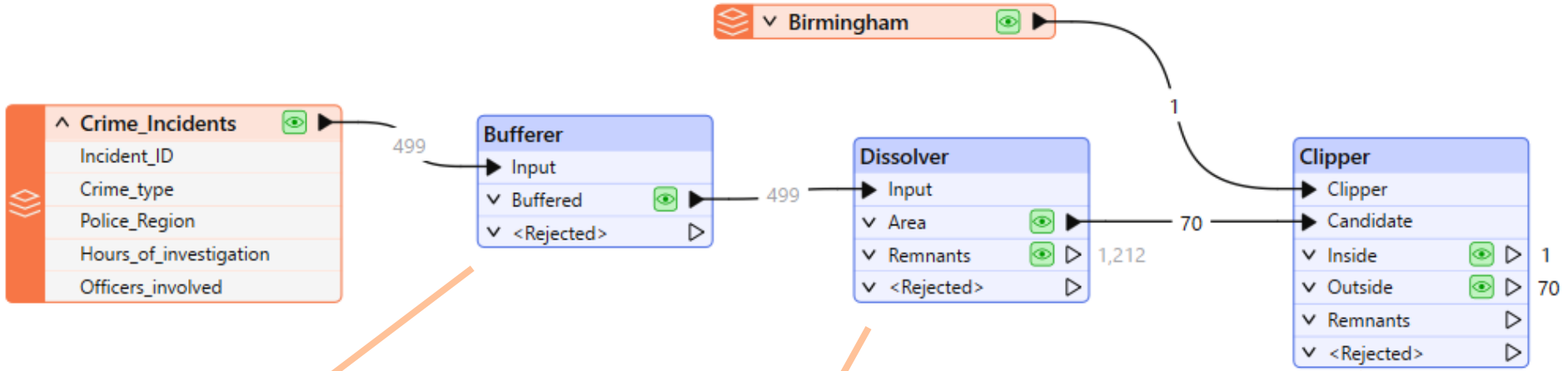
- Carry out routing analysis by creating topological networks, source & destination nodes, then identifying the shortest paths:



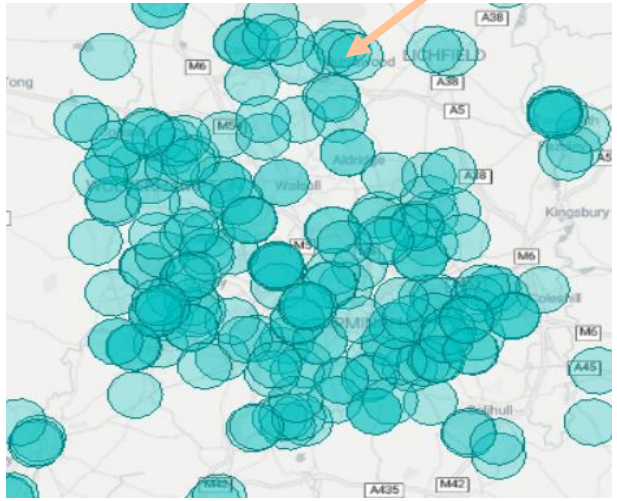
Buffer, Dissolve and Clipping



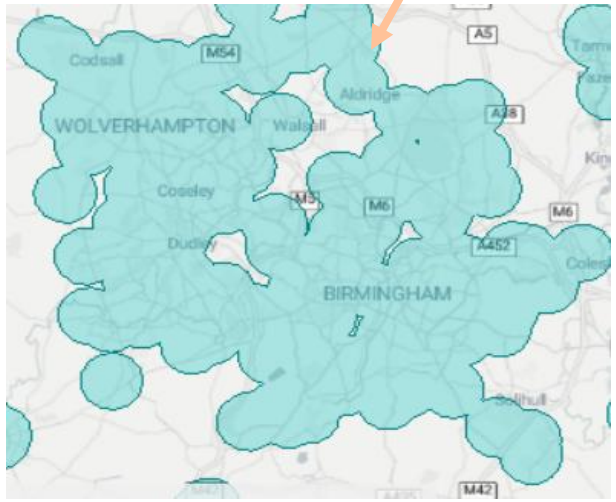
Crime Points and Birmingham Polygon



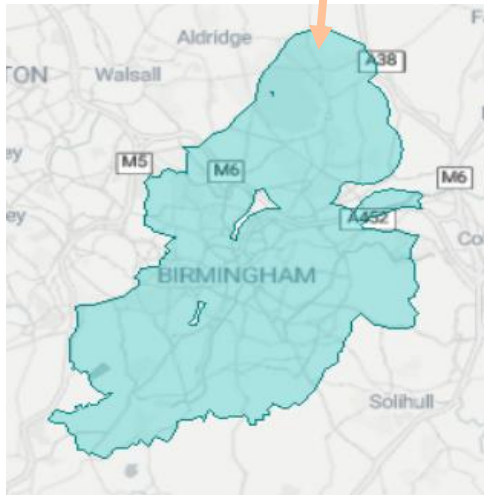
Buffer crime points creating buffer polygons



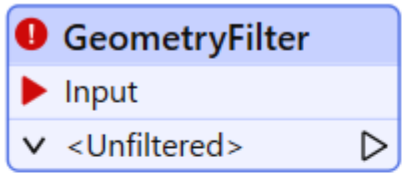
Dissolve buffer polygons into single crime zone polygon

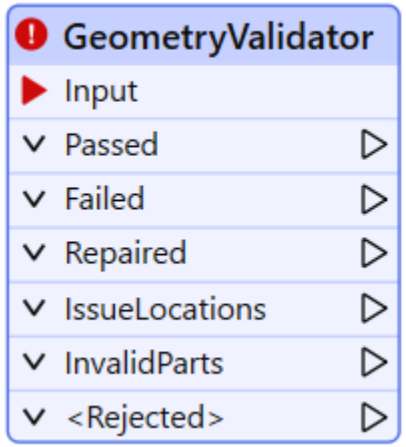


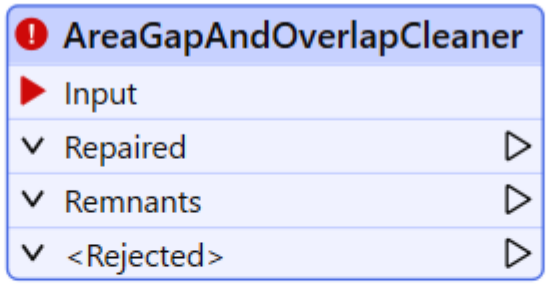
Clip crime zone polygon to Birmingham boundary

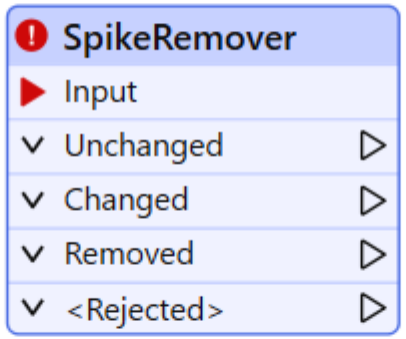


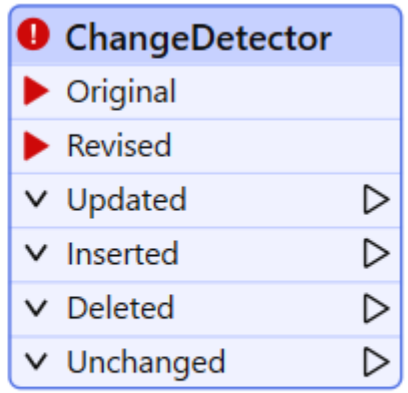
Useful Transformers for Validating Spatial Data

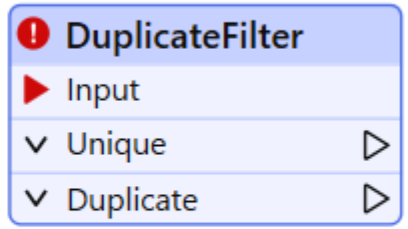












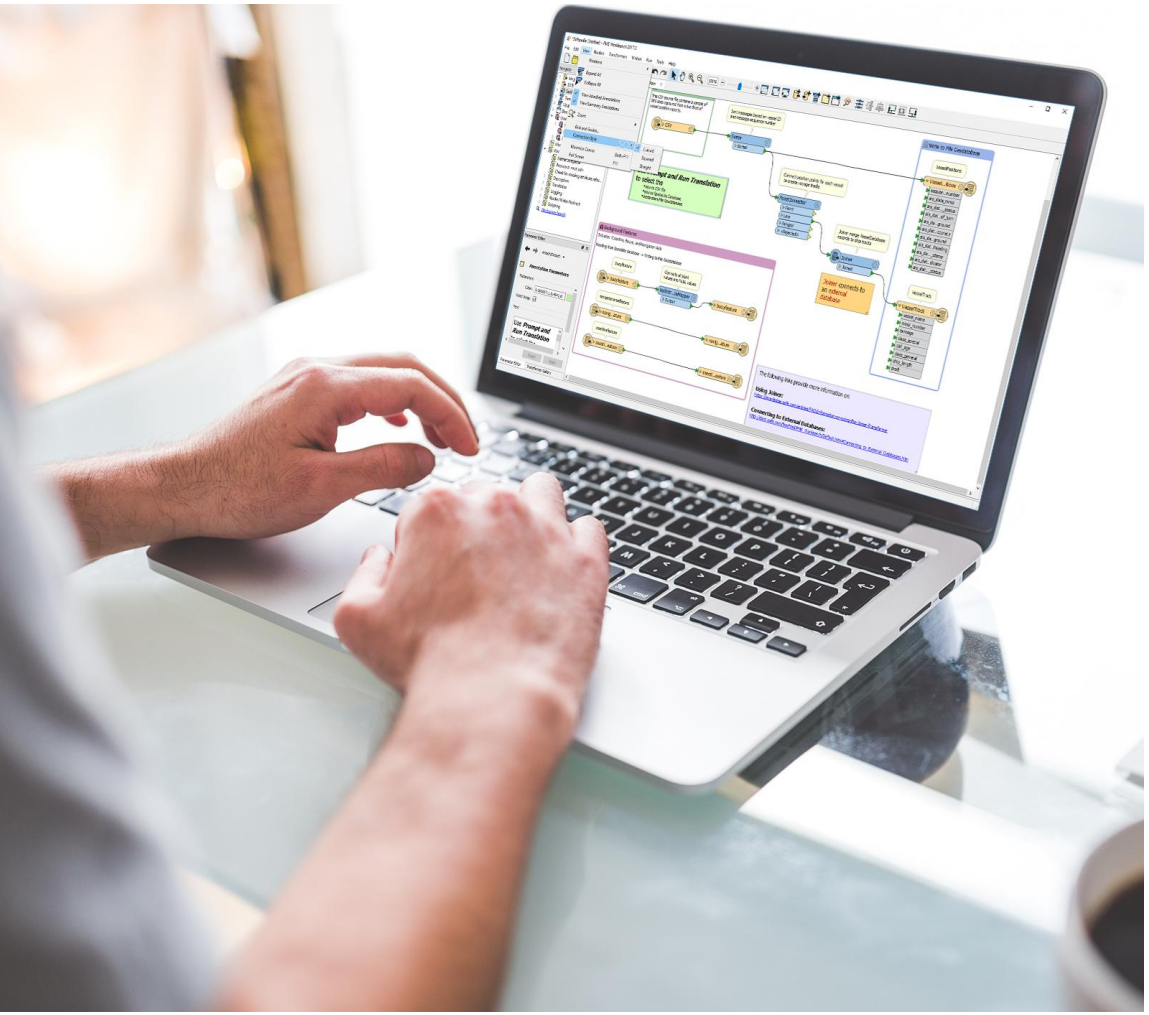
Geometry Transformers

- 2DArcReplacer
- 2DBoxReplacer
- 2DEllipseReplacer
- 2DForcer
- 2DGridAccumulator
- 2DGridCreator
- 3DArcReplacer
- 3DForcer
- 3DInterpolator
- 3DRotator
- AffineWarper
- AnchoredSnapper
- AngleConverter
- ArcEstimator
- ArcGISGridSnapper
- ArcPropertySetter
- ArcStroker
- AreaAmalgamator
- AreaBuilder
- AreaGapAndOverlapCleaner
- BoundingBoxReplacer
- CenterlineReplacer
- CenterPointReplacer
- Chopper
- CoordinateRounder
- CoordinateSwapper
- CSGBuilder
- Curvefitter
- Densifier
- Displacer
- Dissolver
- DonutBridgeBuilder
- DonutBuilder
- DonutHoleExtractor
- EllipsePropertySetter
- Extruder
- FaceReplacer
- Generalizer
- GeometryCoercer
- GeometryExtractor
- GeometryRefiner
- GeometryRemover
- GeometryReplacer
- H3HexagonalIndexer
- HullReplacer
- Intersector
- LabelPointReplacer
- LineBuilder
- LineCloser
- LineCombiner
- LineExtender
- MeasureRemover
- MeasureSetter
- MeshMerger
- MeshSimplifier
- MinimumAreaForcer
- MinimumSpanningCircleReplacer
- MultipleGeometrySetter
- OffsetCurveGenerator
- Orientor
- PathBuilder
- PathSplitter
- PipeEvaluator
- PipeReplacer
- PointCloudSurfaceBuilder
- PointPropertySetter
- Rotator
- RubberSheeter
- Scaler
- SherbendGeneralizer
- Snapper
- Snipper
- SolidBuilder
- SolidDissolver
- SpikeRemover
- SurfaceDissolver
- SurfaceFootprintReplacer
- SurfaceSplitter
- TextAdder
- Tiler
- TINGenerator
- Triangulator
- VertexCreator
- VertexNormalGenerator
- VertexNormalRemover
- VertexRemover

Spatial Analysis Transformers

- AffineWarper
- AnchoredSnapper
- ArcGISGridSnapper
- AreaAmalgamator
- AreaBuilder
- AreaOnAreaOverlayer
- BoundingBoxAccumulator
- Bufferer
- CenterlineReplacer
- CenterPointReplacer
- Clipper
- ContourGenerator
- DEMDistanceCalculator
- Displacer
- Dissolver
- DonutBridgeBuilder
- FeatureReader
- HullAccumulator
- Intersector
- LineOnAreaOverlayer
- LineOnLineOverlayer
- NeighborFinder
- NeighborhoodAggregator
- NeighborPairFinder
- NetworkCostCalculator
- NetworkFlowOrientor
- NetworkTopologyCalculator
- Offsetter
- PointOnAreaOverlayer
- PointOnLineOverlayer
- PointOnPointOverlayer
- PointOnRasterValueExtractor
- SectorGenerator
- ShortestPathFinder
- Snapper
- SolidDissolver
- SpatialFilter
- SpatialRelator
- SpatialSorter
- SurfaceBuilder
- SurfaceDissolver
- SurfaceDraper
- SurfaceOnSurfaceOverlayer
- TopferIndexCalculator
- TopologyBuilder
- VectorOnRasterOverlayer
- VoronoiCellGenerator
- VoronoiDiagrammer

Exercise 3.3



Analyze Spatial Data

- The council has asked you to identify addresses within the city that are at risk of flooding.
- You have elevation data (raster DEM), address points, land boundary polygon, and the coastline. You need to use spatial analysis techniques to model risk as a combination of closeness to the shoreline and elevation above sea level

Data - Addresses (ESRI Geodatabase), Land Boundary (ESRI Shapefile), Coastline Vancouver (ESRI Shapefile) Canadian Digital Elevation Data (CDED)

Starting Workspace - C:\FMEModularData\Workspaces\3.03-Spatial-AnalyzeSpatialData-Begin.fmw

Goal - Use spatial analysis techniques of buffering, clipping and spatial joins to identify addresses within the city that are at risk of flooding.

Thanks for joining!

Any questions?

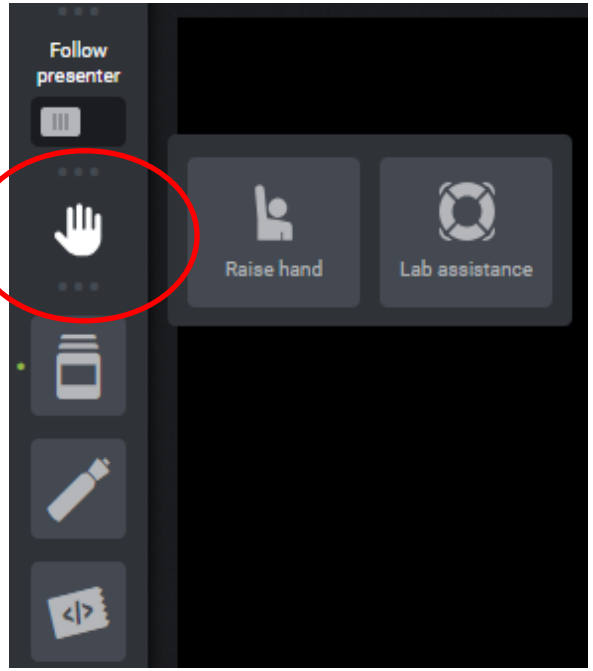
FME Form Training - Module 4

Workflow Design

Training Environment

< keep '**Follow presenter**' on

< **Lab**



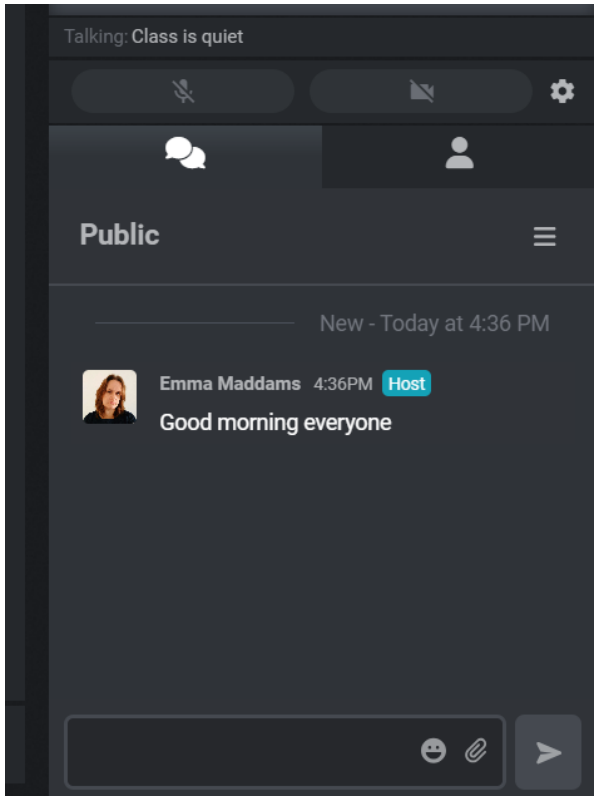
need help when using your Lab

Use either:

- 'Raise hand' or
- 'Lab Assistance'

Chat

- to everyone
- to trainer



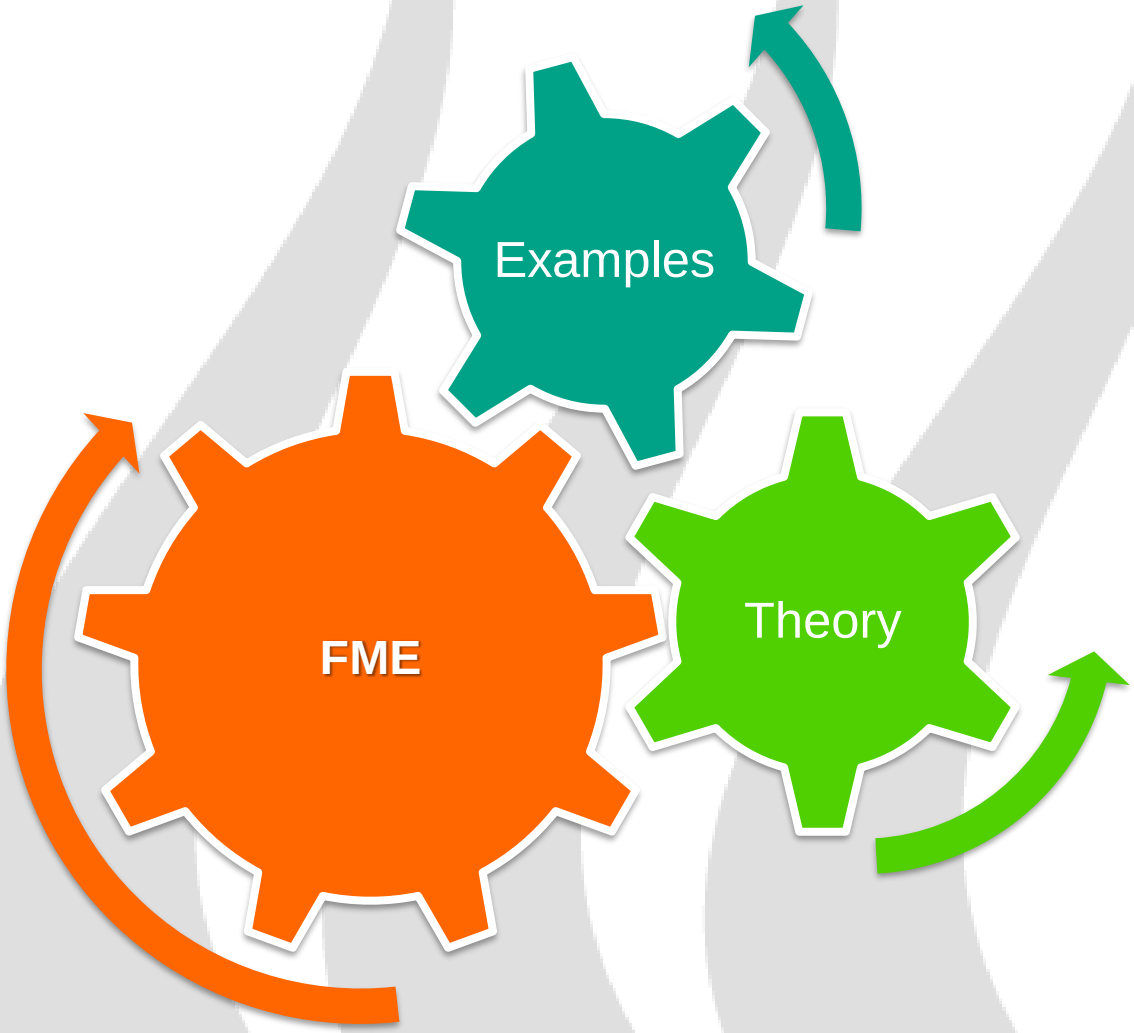
Training Environment

- Training Data folders **C:\FMEModularData**
  - Data
  - Output
  - Resources
  - Workspaces
- Slides
- Workbook – you need to download using link sent by the trainer

What we'll be covering today…

Agenda

- Reading multiple input files
- Single Merged Feature Type
- Fanout
- Working with Zip files
- Error Trapping
  - Rejected Features
  - Logging
- Workspace Runner
- Emailer
- Scheduling Workspace runs

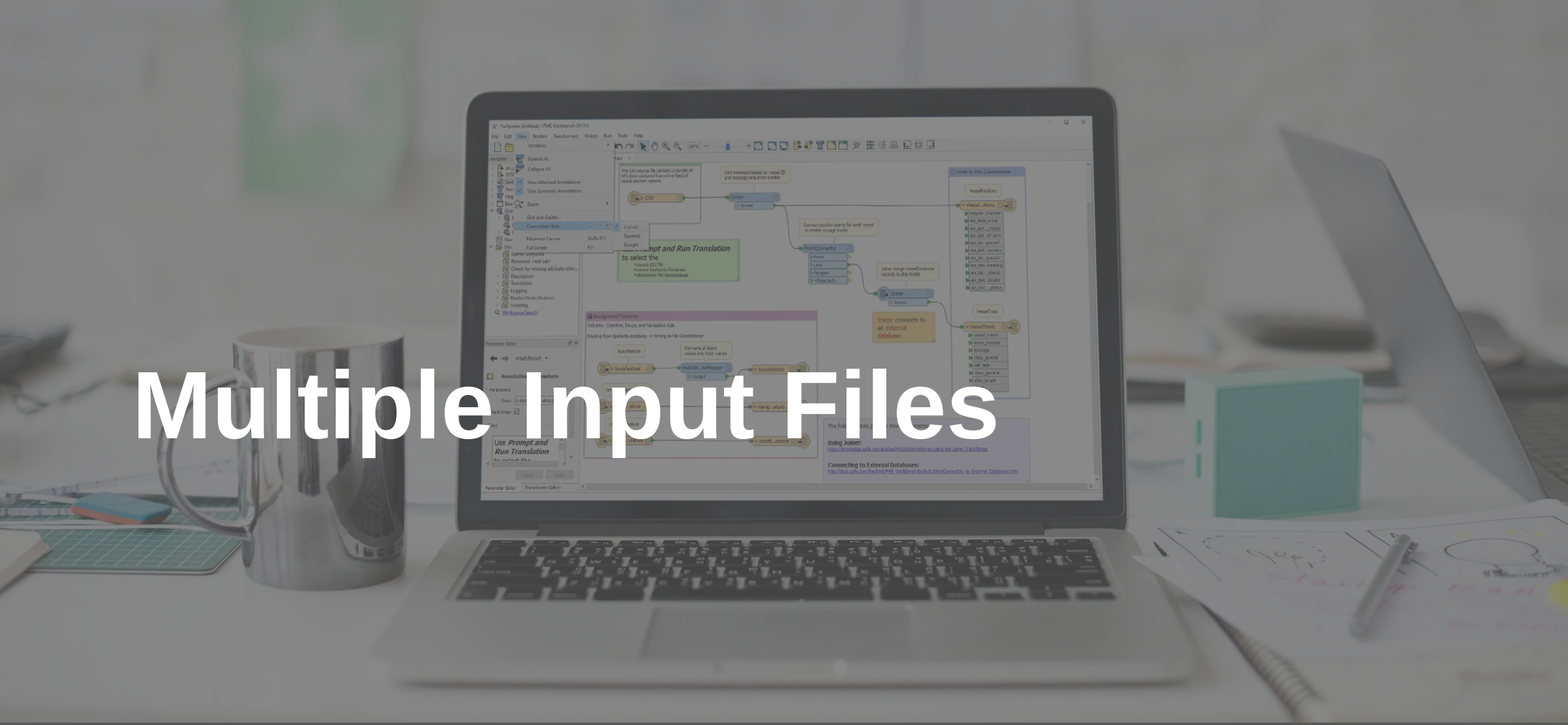


Workflow Design

Connect. Transform. **Automate**

Workflow Design

- Build flexible workflows using techniques that can save you time, make your workspaces more flexible and reusable.
- Learn useful functionality for deploying workspaces to run in production environment.



Multiple Input Files

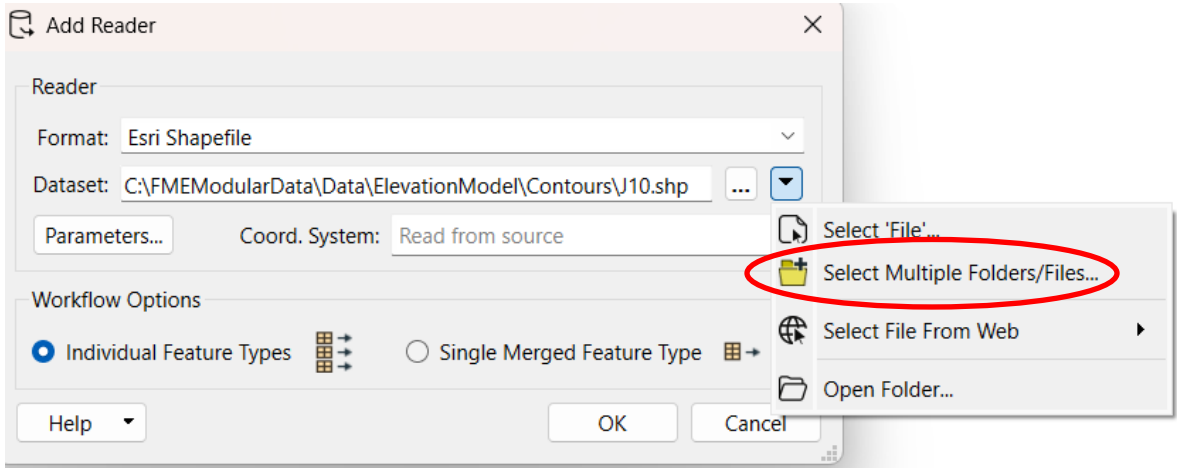
Connect. Transform. **Automate**

Reading from Multiple Files

It's possible to read multiple datasets or layers using a single reader. There are a few ways to accomplish this goal:

- **Manually select** all individual files – *not very efficient!*

- **Select Multiple Folders/Files** option:



- **Directory and File Pathnames Reader** - an advanced method used in conjunction with a FeatureReader. Great for batch processing data! *- we look at this method on our 'Advanced Workflow Design' training module*

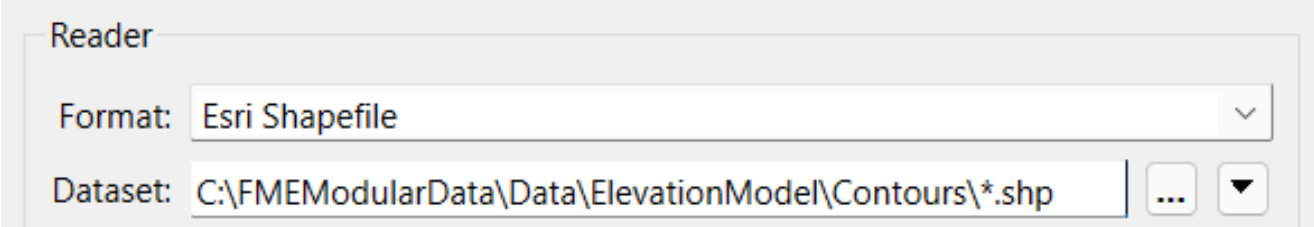
Reading from Multiple Files

- **Wildcards ✶**

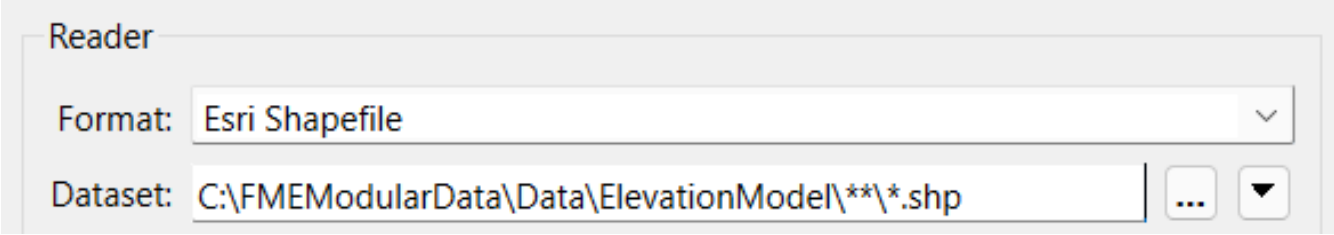
  If you need to read multiple files, but you don't know their file name or path in advance.
  Or you want an easy way to "greedily" accept input datasets.

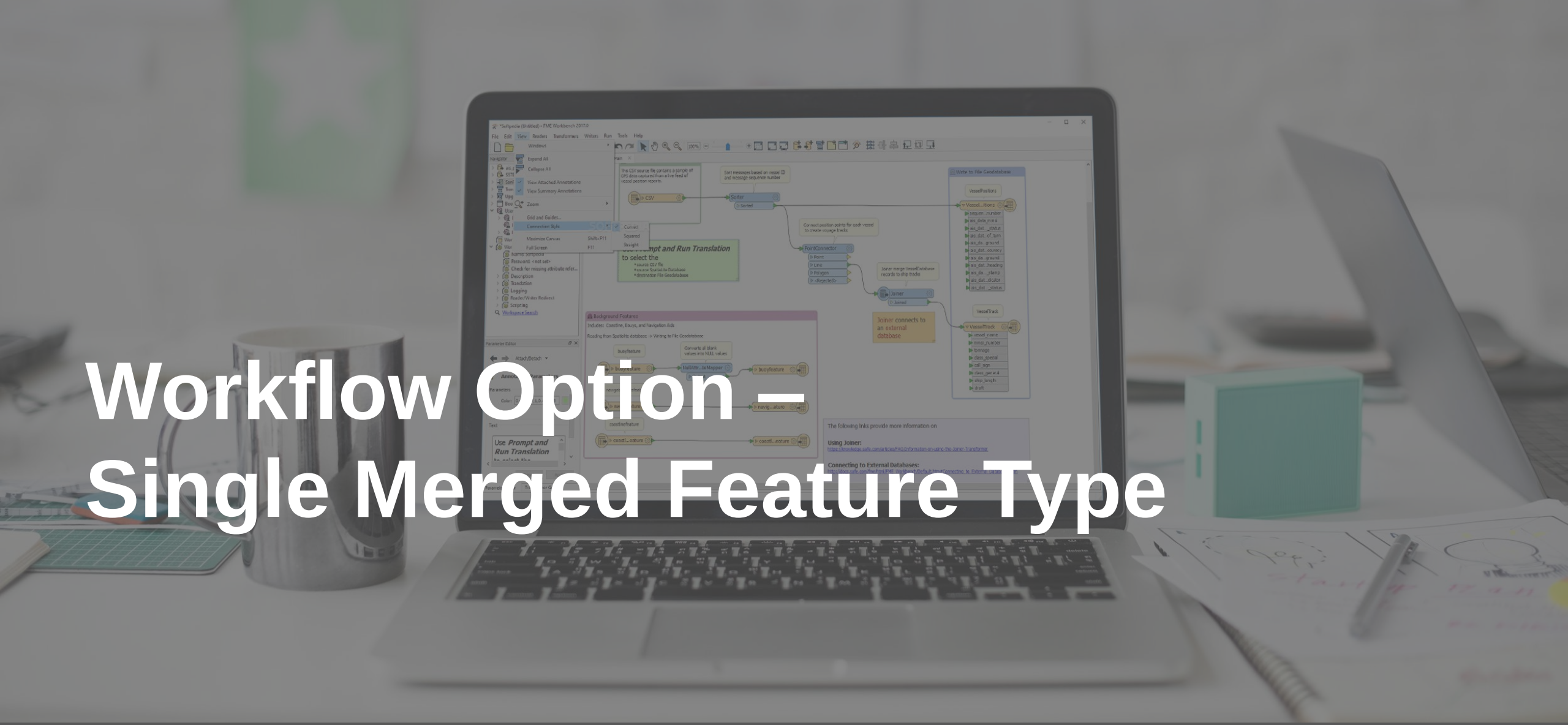
  You can accomplish this by using wildcards in the Source Dataset parameter

  - This example will read in **all the files with the extension *.shp*** within the *Contours* folder:



  - This example will read in **all the files with the extension *.shp*** within **all the subfolders** of the *ElevationModel* folder





Workflow Option – Single Merged Feature Type

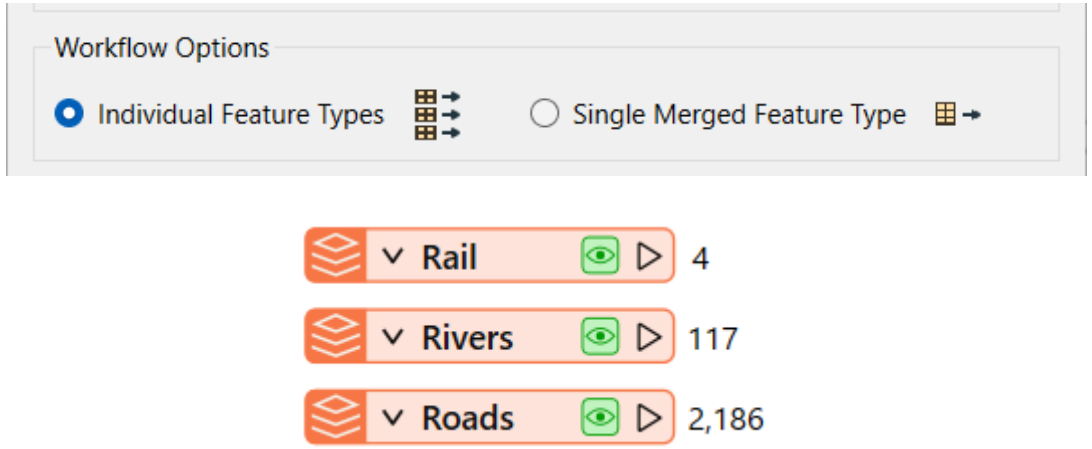
Connect. Transform. **Automate**

Single Merged Feature Type

- This is a Workflow option that is available on Readers
- Merges all the Reader's feature types into a single 'input' for entering the workflow

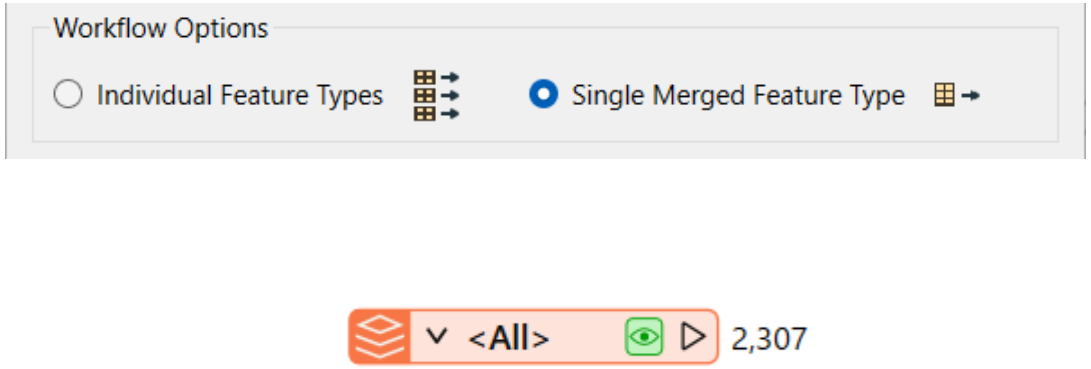
Add Reader

Standard Individual Feature Types



Add Reader

Single Merged Feature Type



Single Merged Feature Type

Advantages

- Makes it easier to manage & connect a **large number of incoming feature types**
- Accepts incoming feature types of **any name** – great if the feature type names are not yet known
- Makes workspace more **reusable, flexible** and better suited for production environments

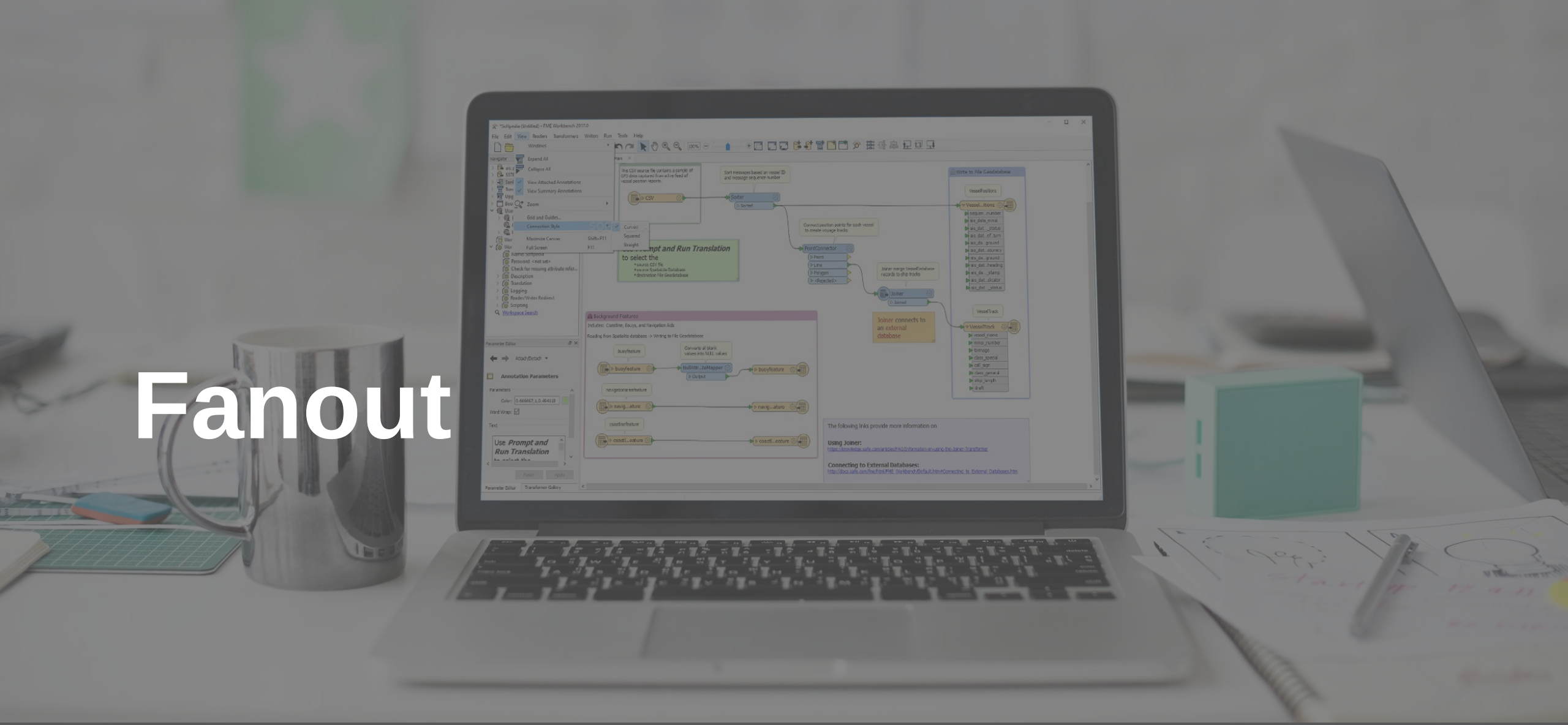
Limitations

- **Schema/Attributes** – be mindful of data schema. Your incoming features must still be of the expected schema; attributes and geometry types.

  For a truly dynamic workflow that is ‘schema-less’, the Dynamic Translation approach is required

  – we cover Dynamic Translations on our Advanced Workflow Design training module.

Fanout

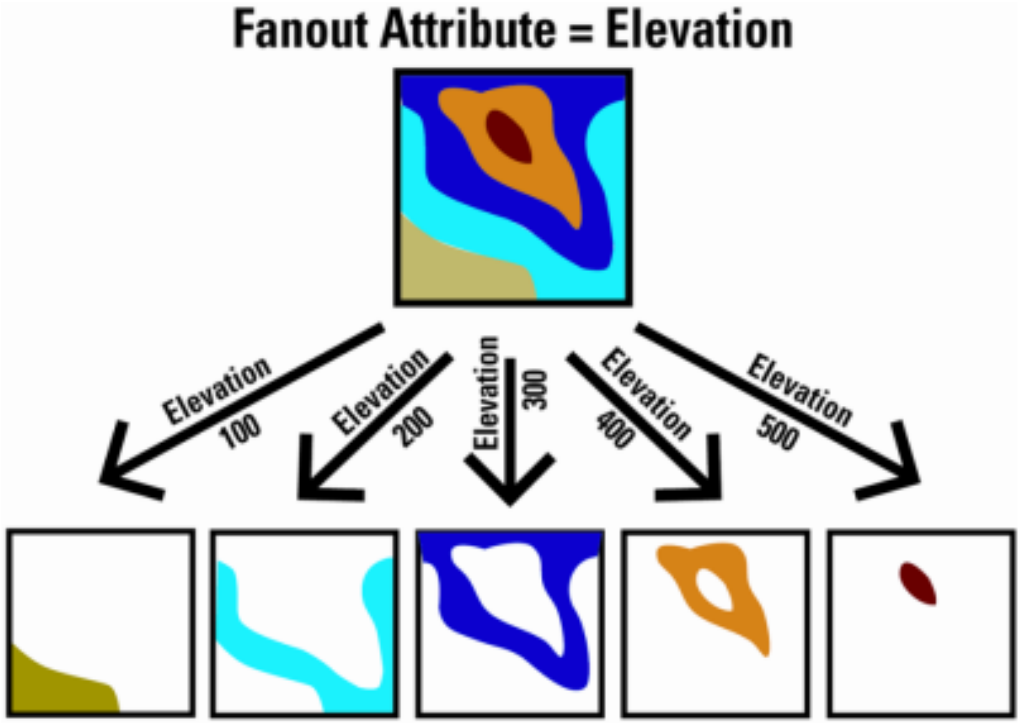


Connect. Transform. **Automate**

Writing Multiple Files - Fanout

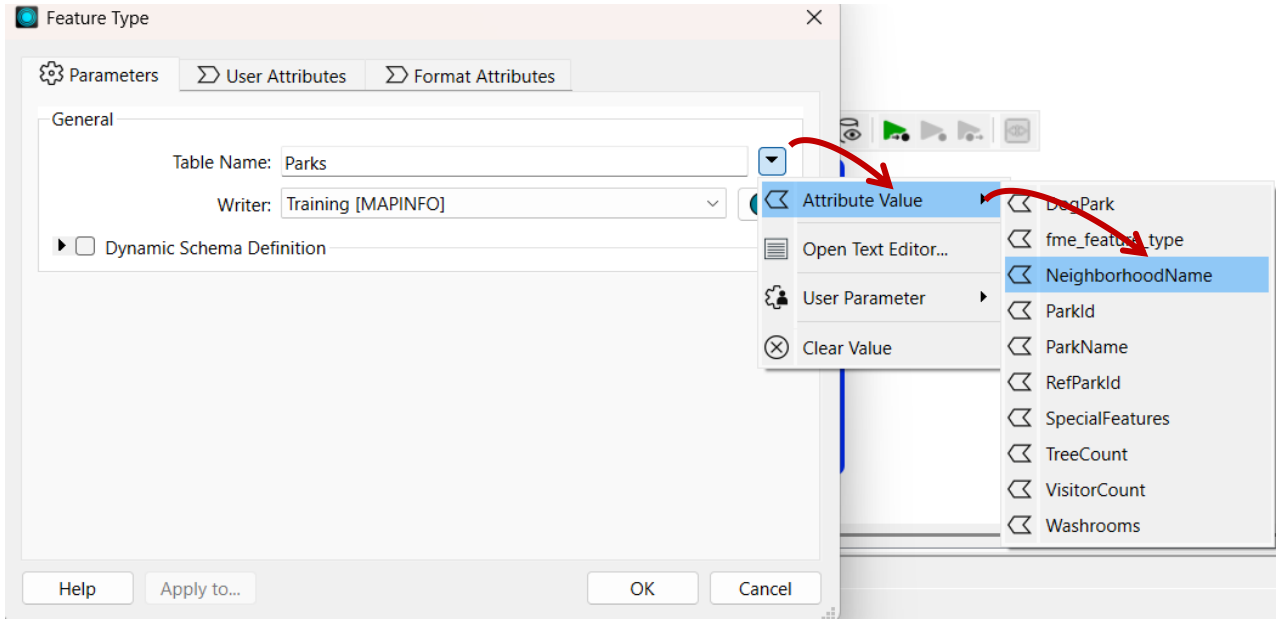
A **fanout** is a tool applied to a writer or writer feature type in FME. They are a way to write data divided into groups of features.

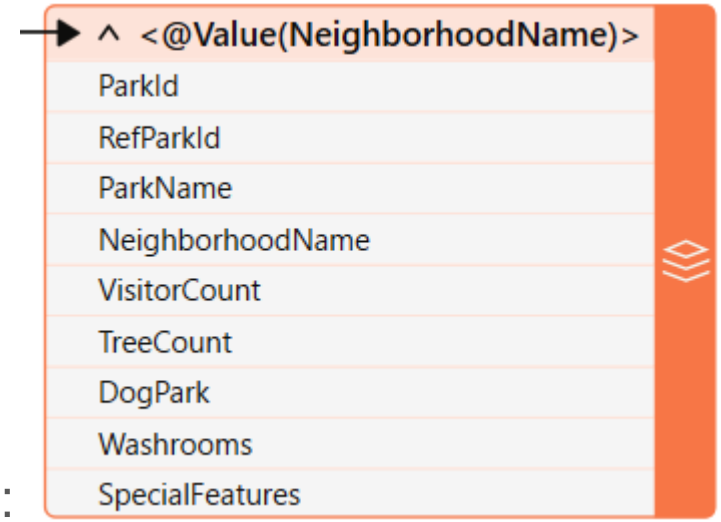
- Feature Type Fanout
- Dataset Fanout



Fanout on Feature Type

- A Feature Type Fanout **splits data to multiple feature types within a single dataset**
- This is set within the Writer Feature Type.

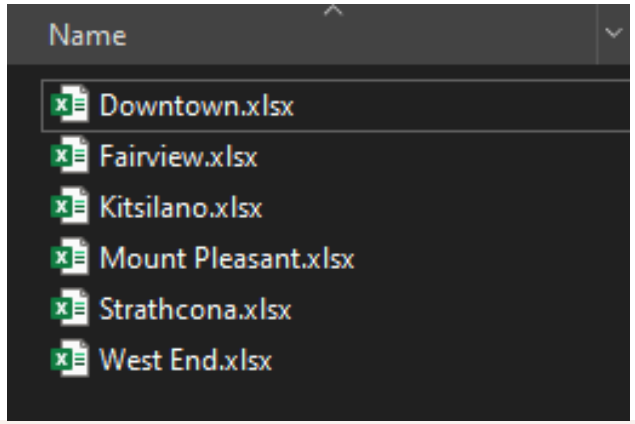


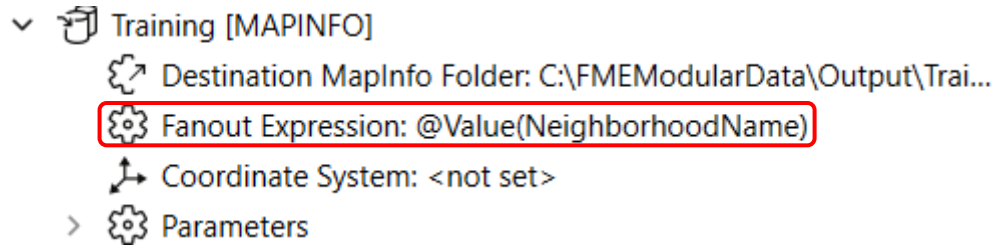


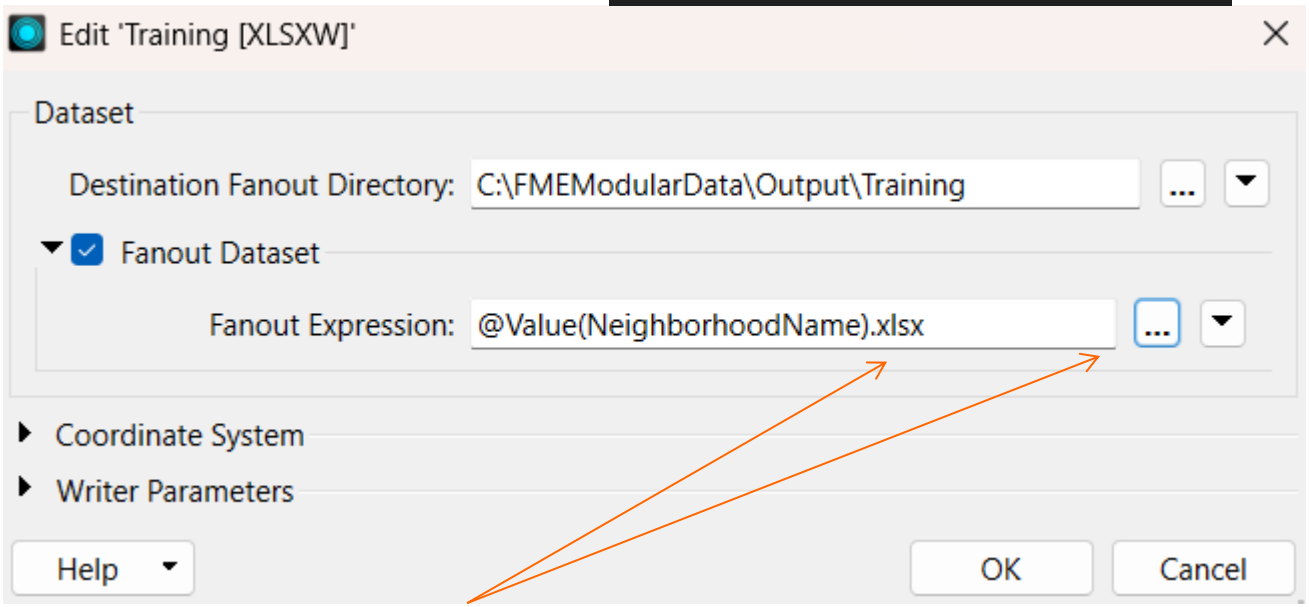
- The effect on the output will depend on the File Format being used:
  - AutoCAD – creates separate Layers/ Levels
  - Excel – creates separate Sheets
  - MapInfo TAB – creates separate .tab files

Fanout on Dataset

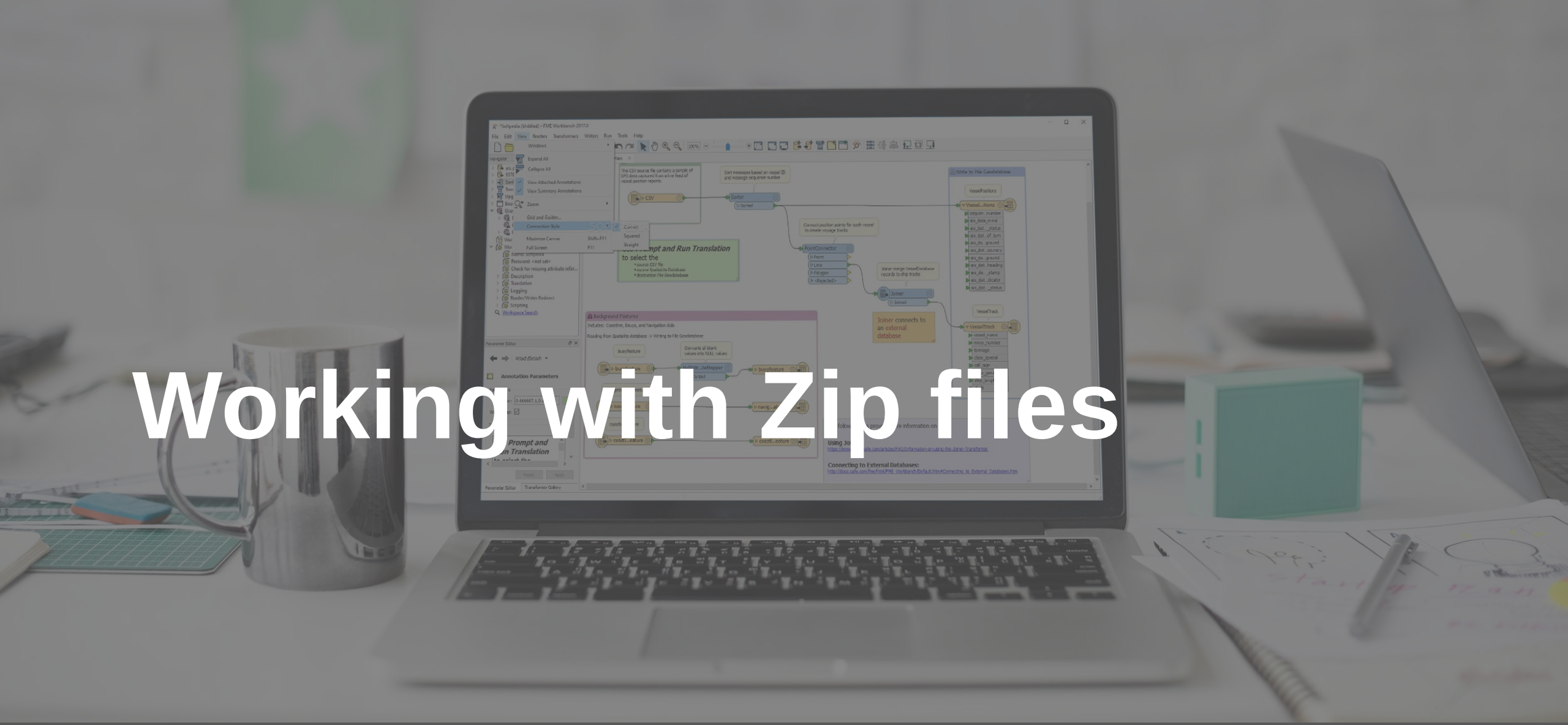
- A Dataset Fanout delivers **multiple datasets**
- This is set within the Navigator Panel at the Writer level







- For File-based formats you will also need to specify the file extension



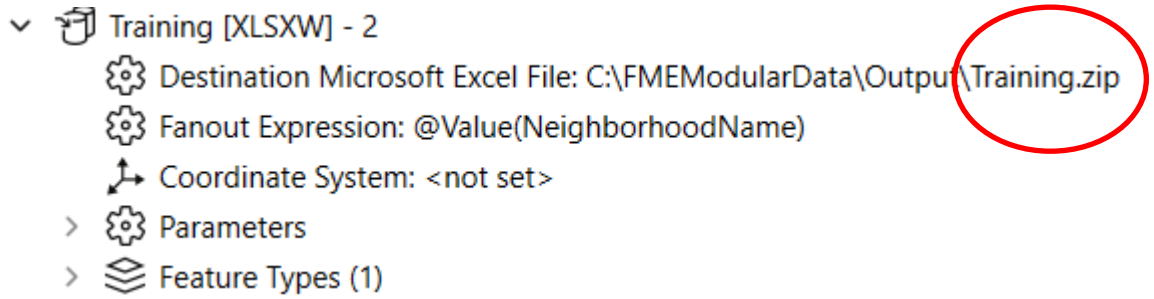
Working with Zip files

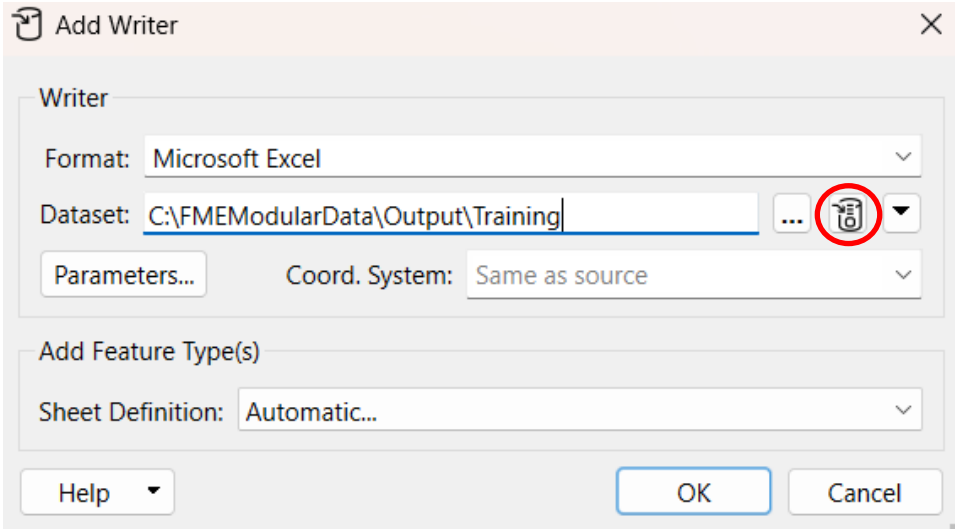
Connect. Transform. **Automate**

Reading from and Writing to Archive Files

- Both FME readers and writers are capable of working with compressed (zip) files.
- Zip files are a convenient way to store datasets that need to be handled as a single unit; for example, a set of multiple files can be contained within a single zip file.

- The simplest way is to simply **change the file extension to .ZIP** or use the zip file icon on the Writer.





Exercise 4.1

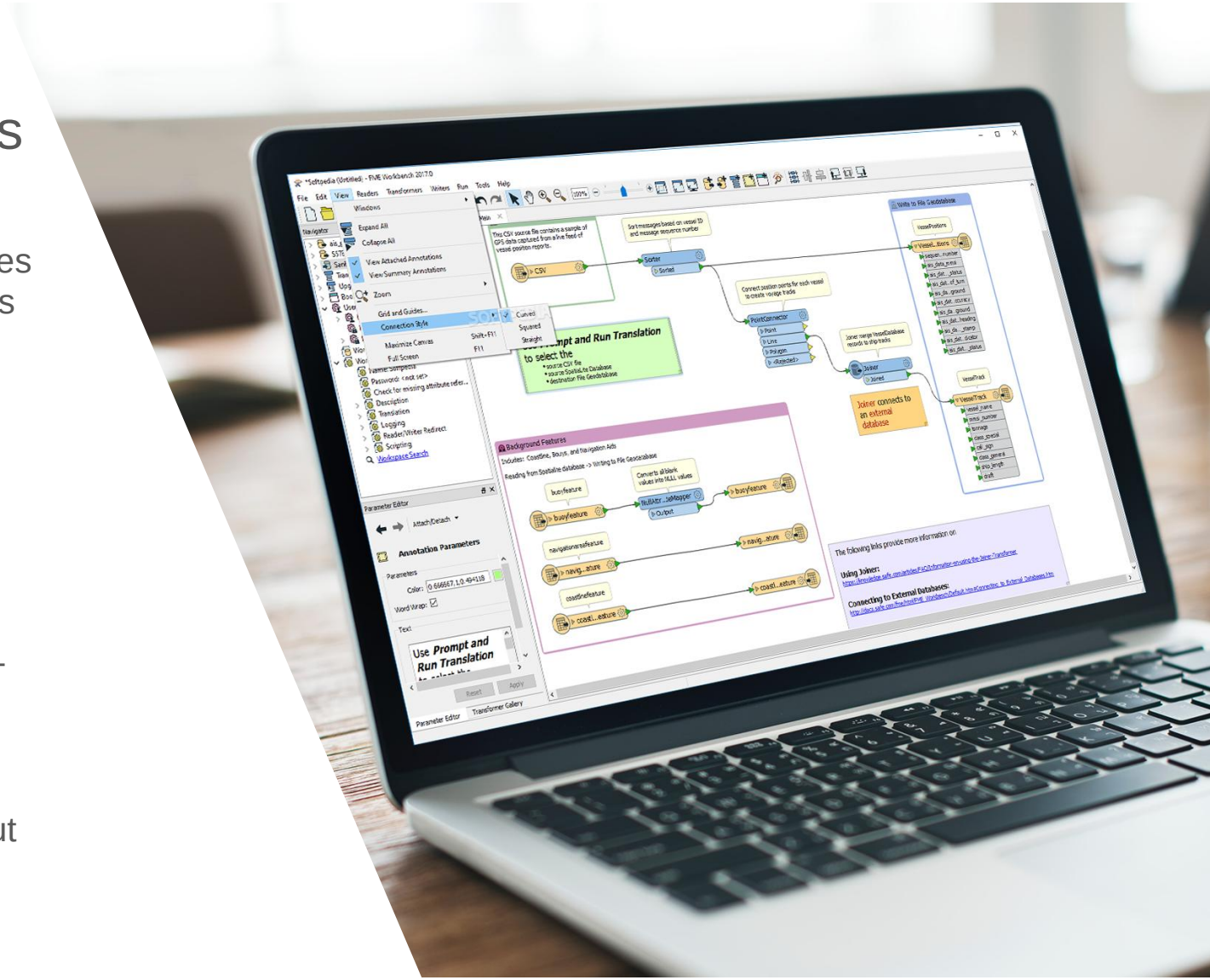
Reading Multiple Input Files and splitting output into Multiple Datasets

- You have been given the task of combining multiple tiles of contour data into a single coverage. This then needs to be divided into subsets for each elevation ‘band’
- The multiple output files need to be Zipped.

Data – Contours (ESRI SHP)

Starter workspace – C:\FMEModularData\Workspaces\4.01-Workflow-MultipleFiles-Begin.fmw

Goal - Read in multiple files using wildcard and single merged feature type, creating a single holding. Then output into subsets using fanout.



Exercise 4.2

Building Flexible Workflows

- We have an ongoing need to convert community plans from DGN format to ESRI Shapefiles every year. It would be good if we could handle updated schemas without having to rebuild our workspace

Data - CommunityPlan2019 (Bentley MicroStation Design V8)
CommunityPlan2020 (Bentley MicroStation Design V8)

Starter workspace –
C:\FMEModularData\Workspaces\4.02-Workflow-Flexible-Begin.fmw

Goal – Create a flexible workspace to handle changing feature type names in source data

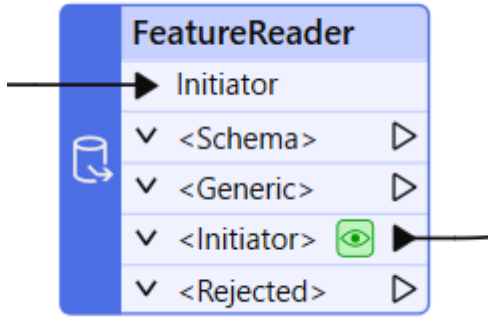
Transformers for Reading & Writing

Connect. Transform. **Automate**

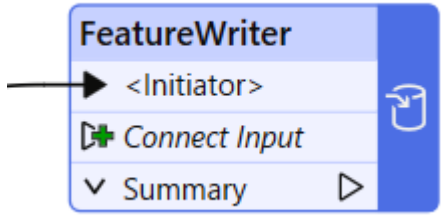
FeatureReader and FeatureWriter transformers

- When designing some workflows the FeatureReader and FeatureWriter transformers can have advantages over standard Readers and Writers
- Amongst other things, they enable us to read and write data within the workflow, not just at the start and end of a workspace

- the FeatureReader performs a complete read for each feature that enters the *Initiator* port.
- You can specify a WHERE clause or use a spatial filter



- the FeatureWriter allows post-processing of writer results
- After writing the output data it passes a single feature out of the Summary port



We'll see examples of these in action later…..

Error Trapping & Rejected Features

Connect. Transform. **Automate**

Error Trapping

- Error trapping is a way to design a workspace to trap unexpected data - so it does not have the chance to cause problems further downstream
- Error trapping can be as simple as adding a test or filter transformer to weed out bad or unwanted features, or it can be more complex.
- This is especially important in a production environment and where the workspace is reused repeatedly with resupplies of input data *where data changes may inadvertently be introduced.*

As a workspace author you should attempt to foresee data problems that might arise, and build in methods to handle them.

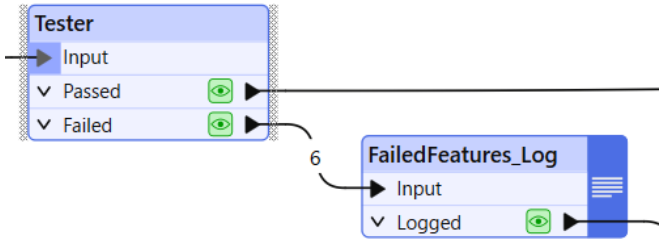
Error Trapping - Logging

Here we are filtering our data, using a test on an attribute value to identify unexpected data.

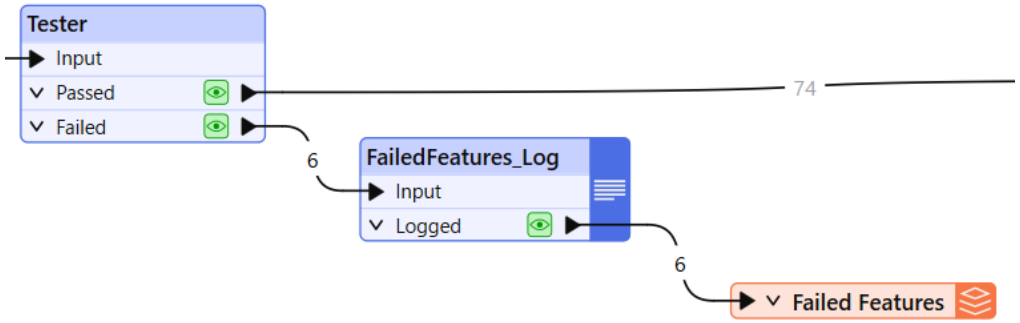
The question is, what should we do with the features we have filtered out?
There are a number of things we could do:

- Leave the features to drop out of the workflow at this point

- Record the data using a Logger transformer
  - this transformer will record all incoming features to the log

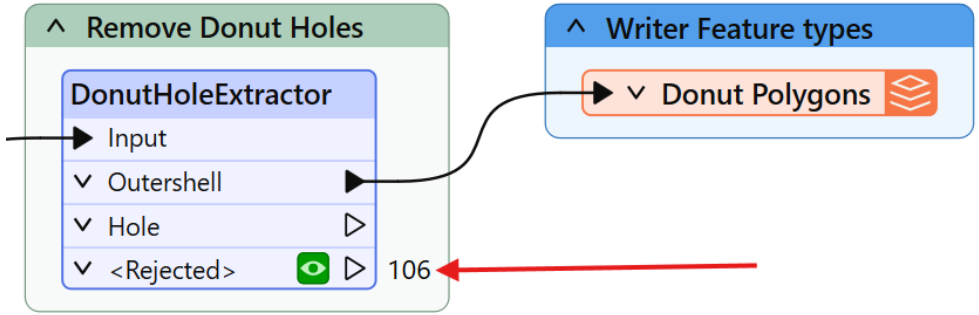


- Write the features out to a CSV file (or other format)



Rejected Features

- Being able to identify when features are rejected (and excluding from the workflow) is important.
- Many transformers include a <Rejected> port to output these invalid features:



- features are automatically counted and stored on a <Rejected> port, even if feature caching is off.
- As an additional benefit, the rejected features will often include a rejection code attribute explaining the problem:

Table

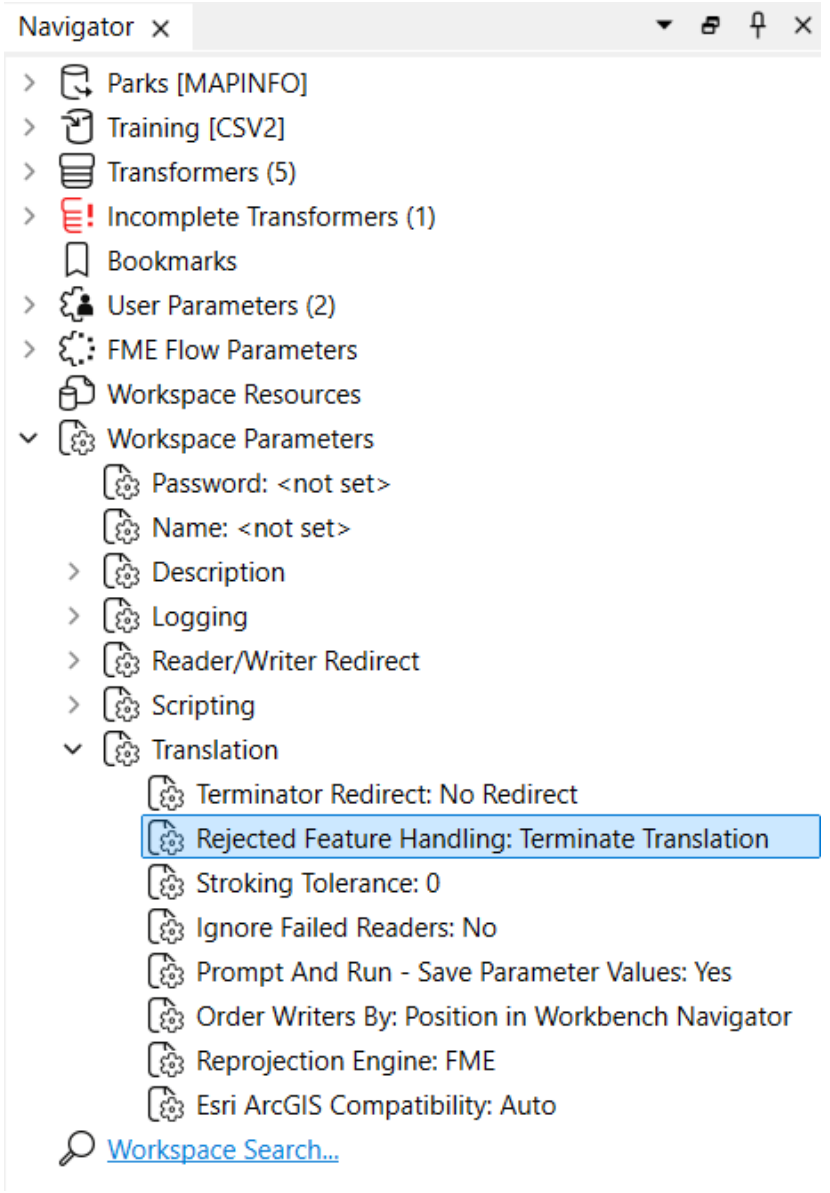
DonutHoleExtractor: <Rejected>

	ParkName	fme_rejection_code
1	Tea Swamp Park	INVALID_GEOMETRY_TYPE
2	Mcbride Park	INVALID_GEOMETRY_TYPE
3	Creekside Park	INVALID_GEOMETRY_TYPE
4	Arbutus Greenway Park	INVALID_GEOMETRY_TYPE
5	<missing>	INVALID_GEOMETRY_TYPE

Rejected Features – Workspace Parameter

- Note: There is a Workspace Parameter which by default is set to **terminate translation** if features are rejected
- This can catch-out users, as its hidden in the Navigator Panel!
- This parameter can be changed to *Continue Translation*

  - This is particularly useful if the workspace is running as a scheduled task or you need the workspace to run to completion even if some features are rejected. In these scenarios capture the details of any rejected features by using a Logger or by writing them out to a file (e.g. CSV)

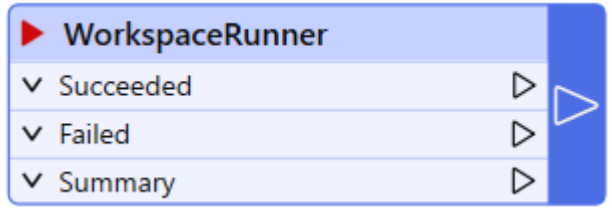


Workspace Runner

Connect. Transform. **Automate**

Introduction to the WorkspaceRunner

- The WorkspaceRunner transformer runs an additional FME Workbench workspace on the local computer by spawning a new FME process

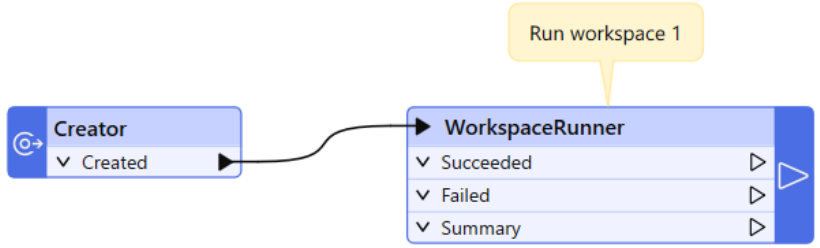


- This transformer can be useful in a number of scenarios:
  - **chaining** multiple workspaces to run in series
  - workflows where different workspaces need to be triggered to run based on criteria (useful for **self-serve or production environments**)
  - in conjunction with Emailers for translation **status notifications**
  - **Batch processing bulk data** – for performance

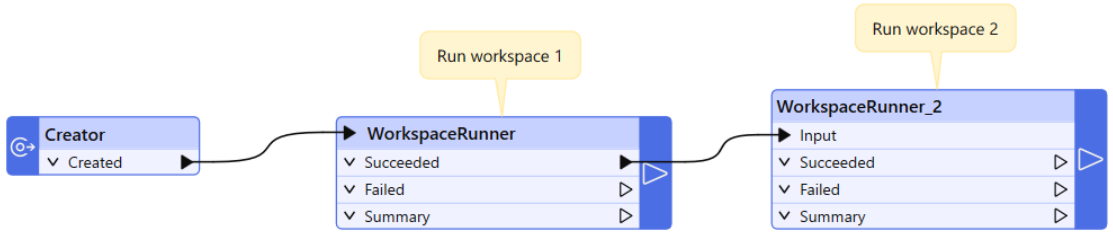
- Many of the above workflow design techniques require intermediate-advanced FME skills to deploy - *and some are covered in our 'Advanced Workflow Design' training module*
  However we will now take a look at the fundamentals of using this transformer

Introduction to the WorkspaceRunner

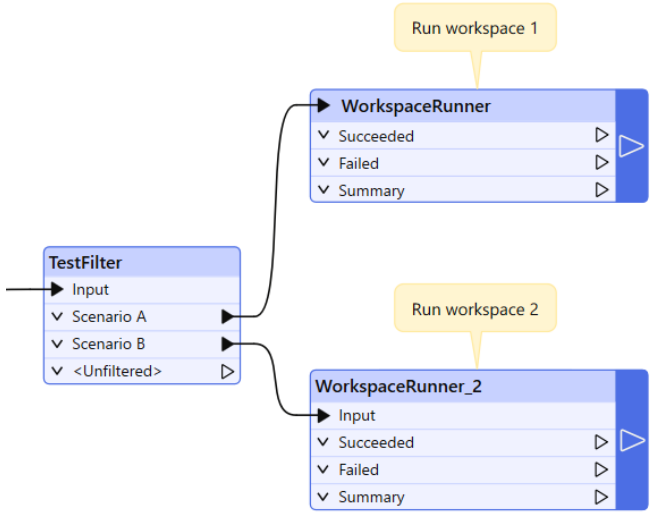
Single workspace triggered



Two workspaces chained to run in series



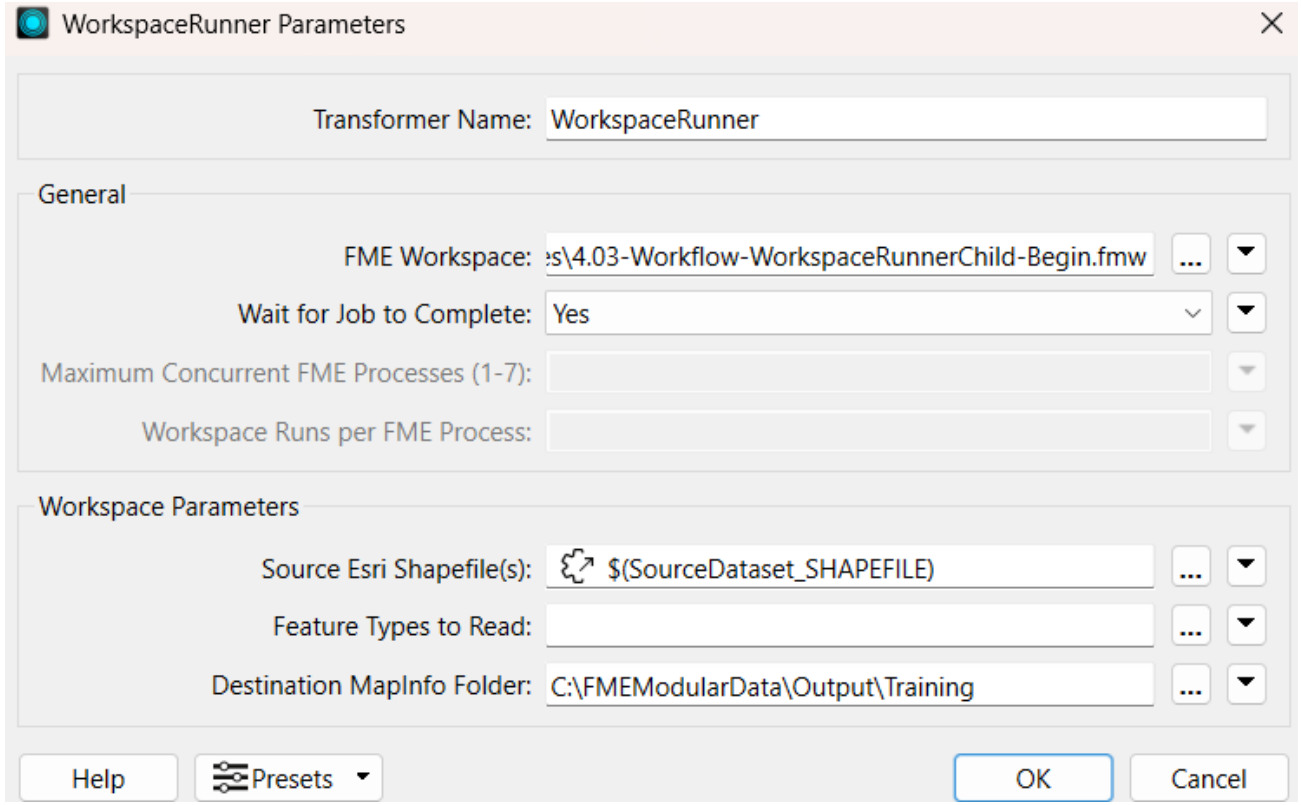
Criteria determining which workspace is required



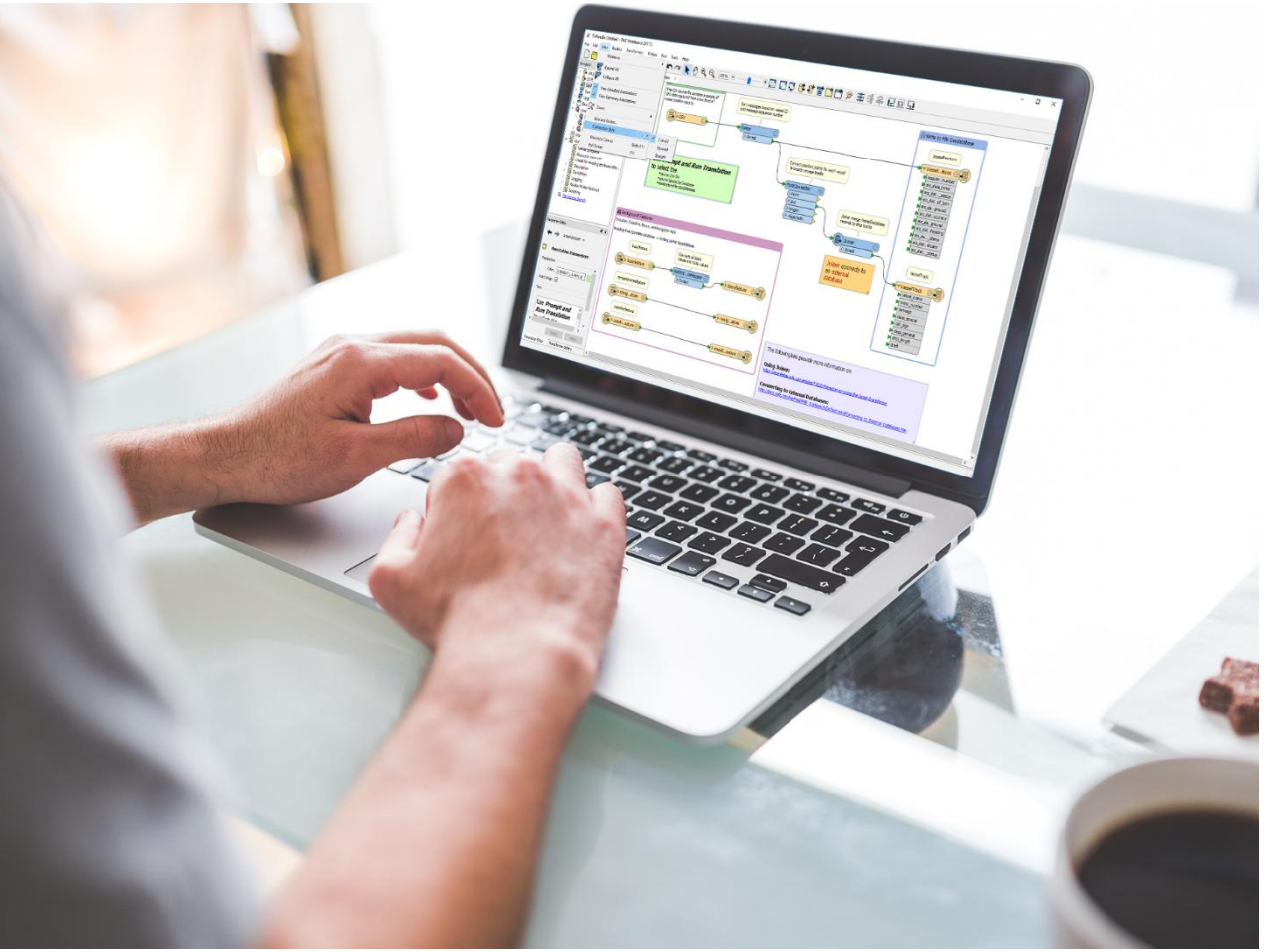
Using the WorkspaceRunner

- Setup the '**child**' workspace first – as this will determine what parameters need to be passed to it by the WorkspaceRunner from the 'parent' workspace *e.g. source data and output destination*
- Within the **parent** workspace add the WorkspaceRunner

- Within the WorkspaceRunner transformer specify:
  - The child workspace that it needs to run
  - Wait for Job to Complete: Yes/No
  - Parameters that are required by child workspace.



Exercise 4.3



Using the WorkspaceRunner

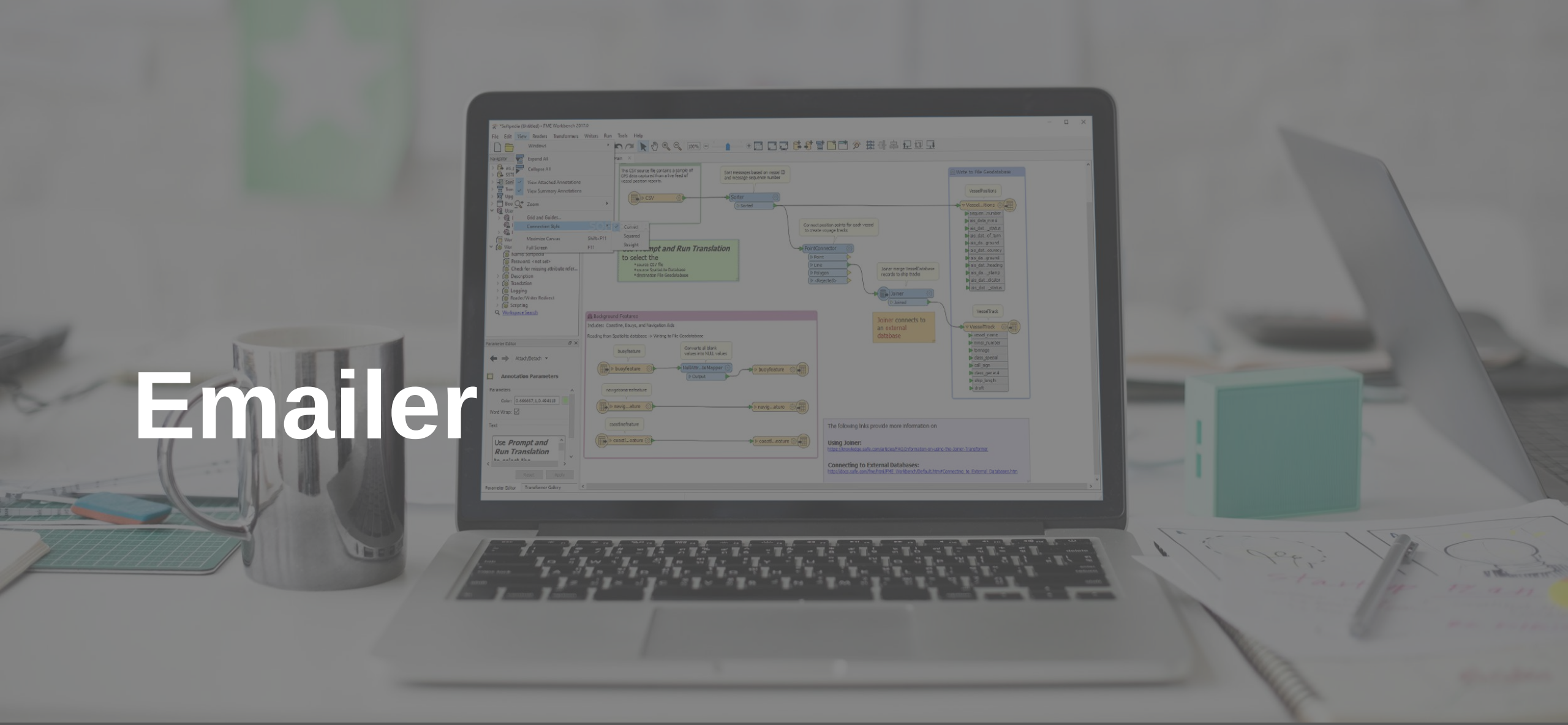
- We have a future need to enhance our production environment deployment of FME Form; batch processing of bulk data, generating email success/failure notifications for scheduled workspaces, and more.
- But before we can employ these techniques, we first need to understand the fundamentals of using the WorkspaceRunner transformer.

Data - Contours (ESRI SHP)

Starter Workspace – C:\FMEModularData\Workspaces\4.03-Workflow-WorkspaceRunnerChild-Begin.fmw

Goal – Chain two workspaces using the WorkspaceRunner

Emailer



Connect. Transform. **Automate**

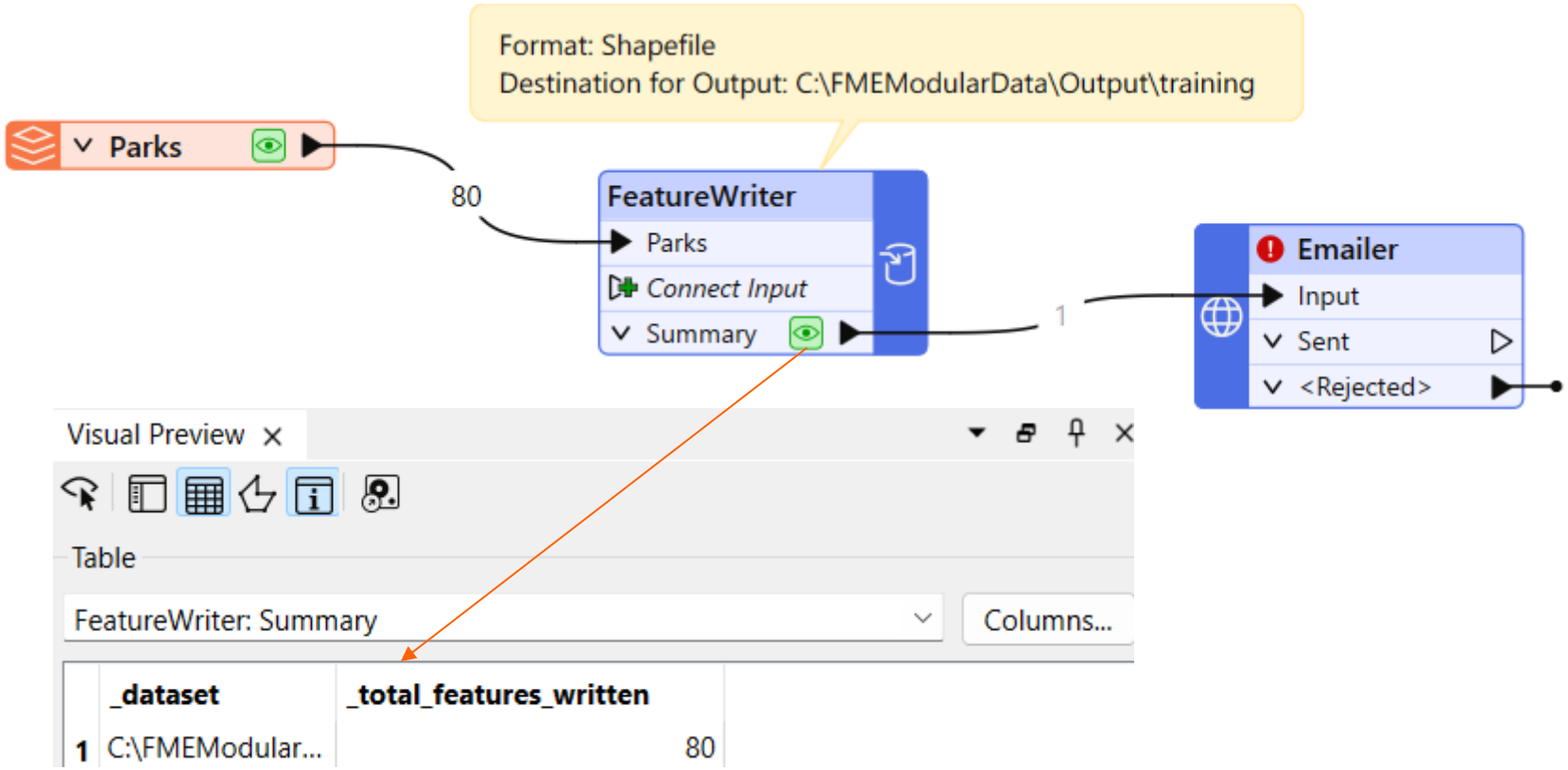
Emailer transformer

- The Emailer transformer uses Simple Mail Transfer Protocol (SMTP) to send email notifications as part of a workspace
- Both HTML and Plain Text emails may be sent

- Considerations:
  - The Emailer transformer will send one email per input feature *– so if multiple features are received, multiple emails will be sent*
  - If a workspace run **fails** and no features are passed to the Emailer, it will not be triggered *- so no email*

Use Emailer to Notify Data Written

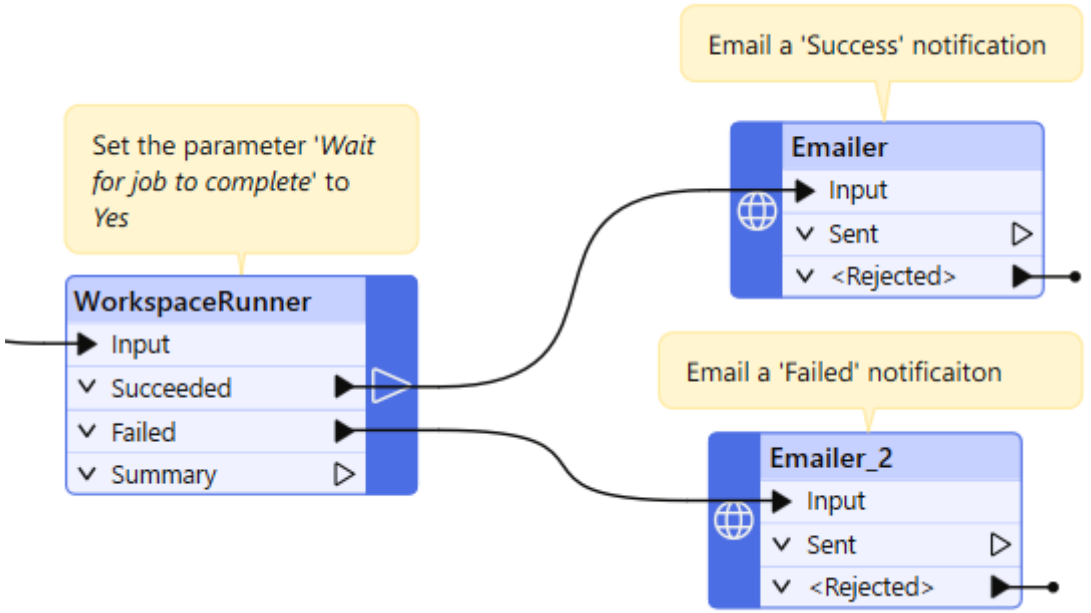
- Instead of a standard Writer, use a **FeatureWriter** transformer in conjunction with the Emailer
- the FeatureWriter allows post-processing of writer results
- After writing the output data it passes a single feature out of the Summary port

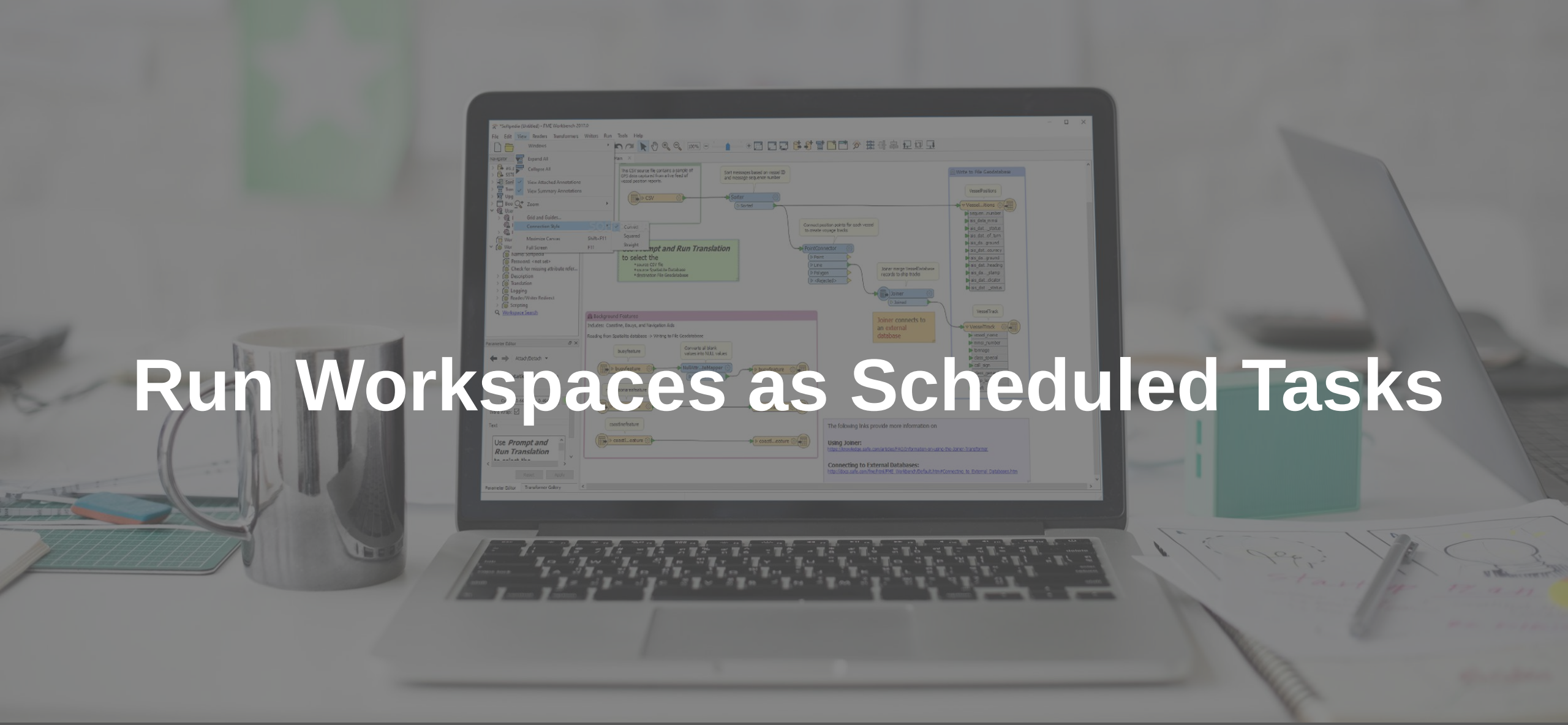


Use Emailer to Notify Success or Failure of Workspace

Triggering the Emailer when data is written is easy. But if a workspace run fails and no features are passed to the Emailer, how do you trigger a failure notification email?

- Use the Emailer transformer in conjunction with a **WorkspaceRunner** to notify of translation status (success/failure)



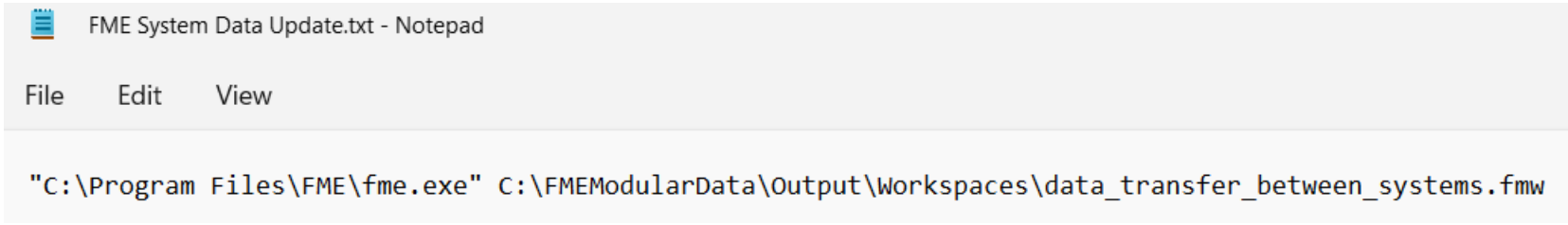


Run Workspaces as Scheduled Tasks

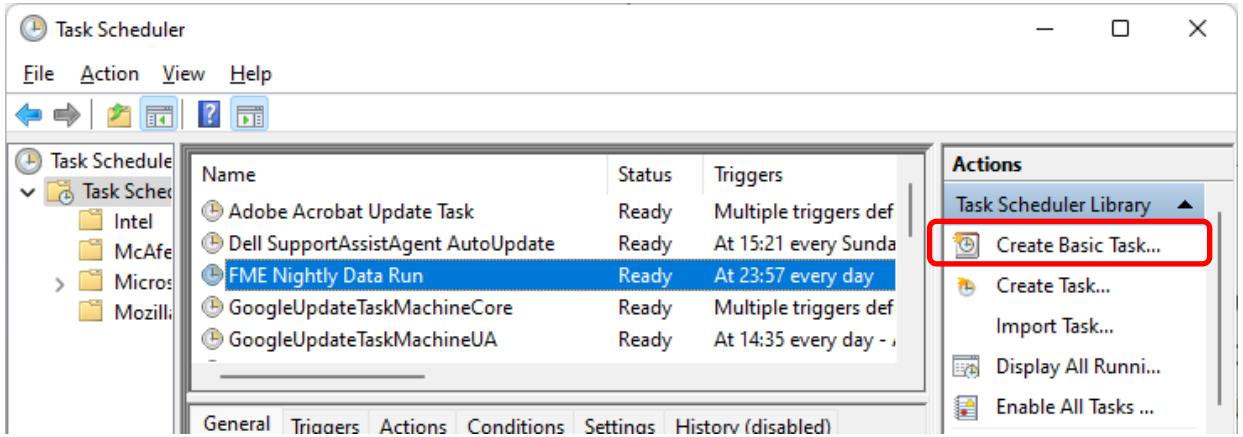
Connect. Transform. **Automate**

Scheduling Workspaces to Run

- **FME Flow** is the ultimate method to schedule workspaces to automatically run on a regular basis
- But if you only have **FME Form**, then you can use **Task Scheduler** – a tool included with Microsoft Windows:
  - create a .txt file detailing the location of your fme.exe and the workspace that needs to be run. Then change the file extension to ***.bat***

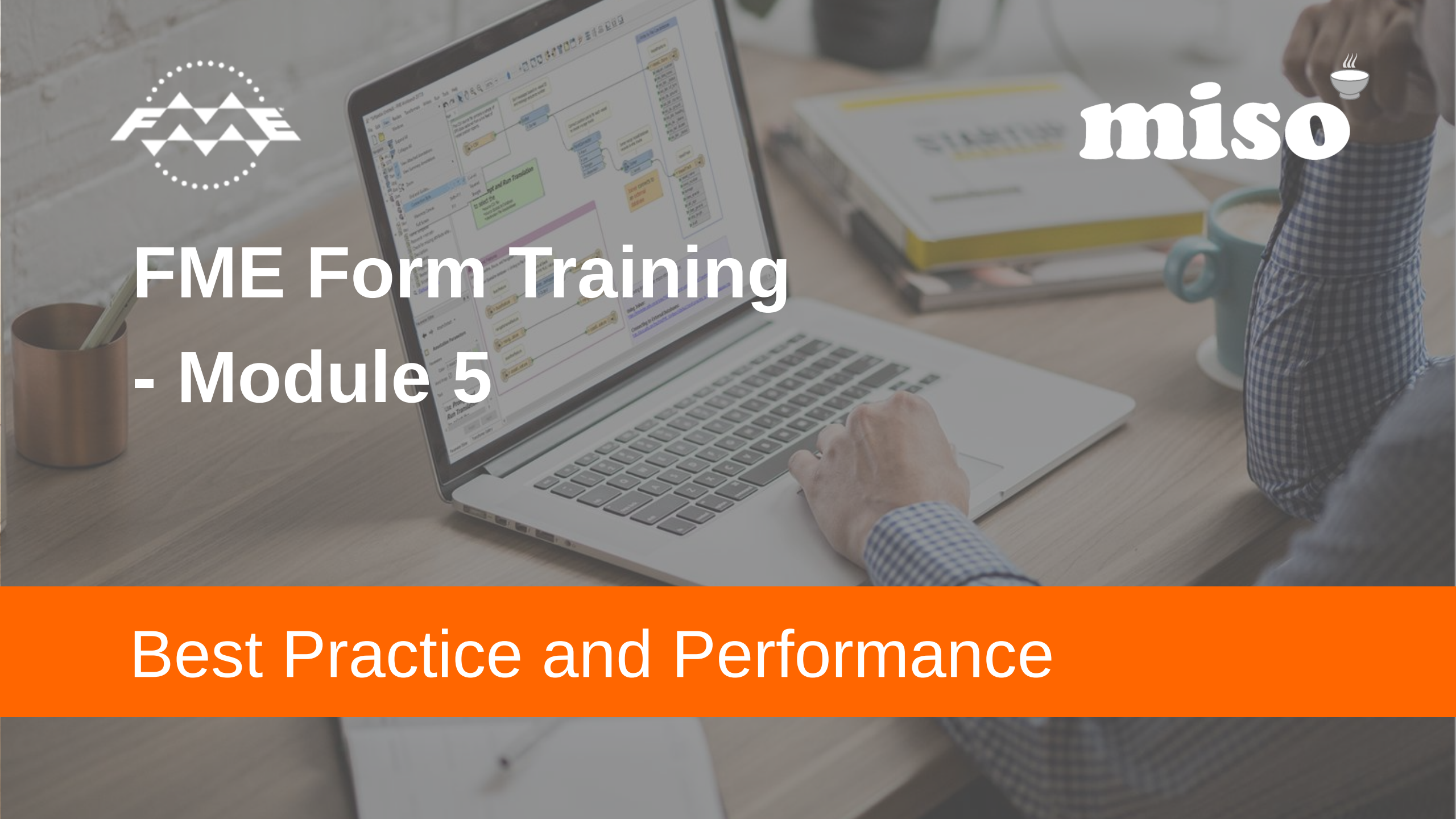


  - Within the Task Schedule Windows tool:
    - Create a Basic Task…
    - Give the task a Name and Description
    - Choose when and how often it needs to run
    - Action is to *Start a program*
    - Browse and select the .bat file



Thanks for joining!

Any questions?



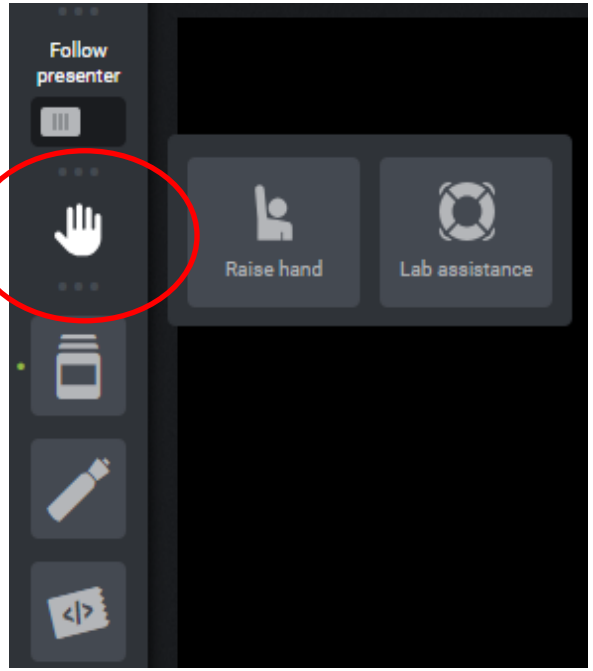
FME Form Training - Module 5

Best Practice and Performance

Training Environment

< keep '**Follow presenter**' on

< **Lab**



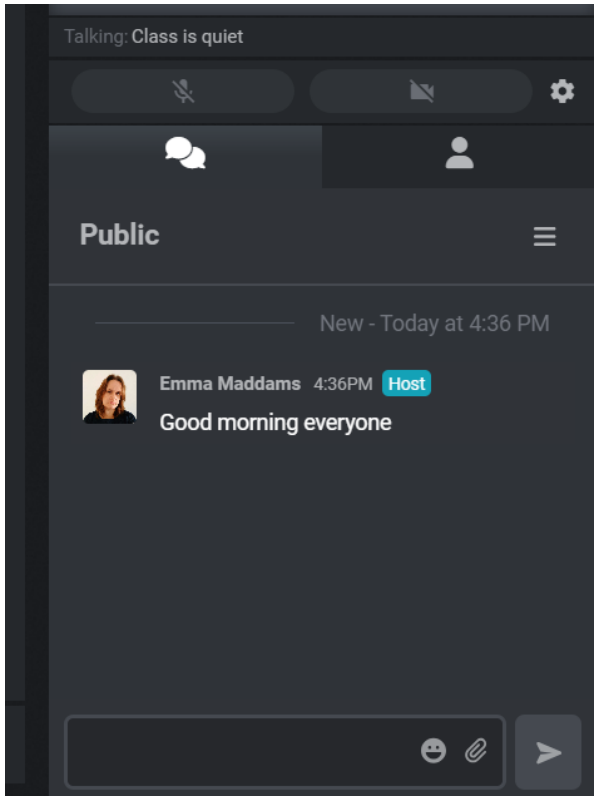
need help when using your Lab

Use either:

- 'Raise hand' or
- 'Lab Assistance'

Chat

- to everyone
- to trainer



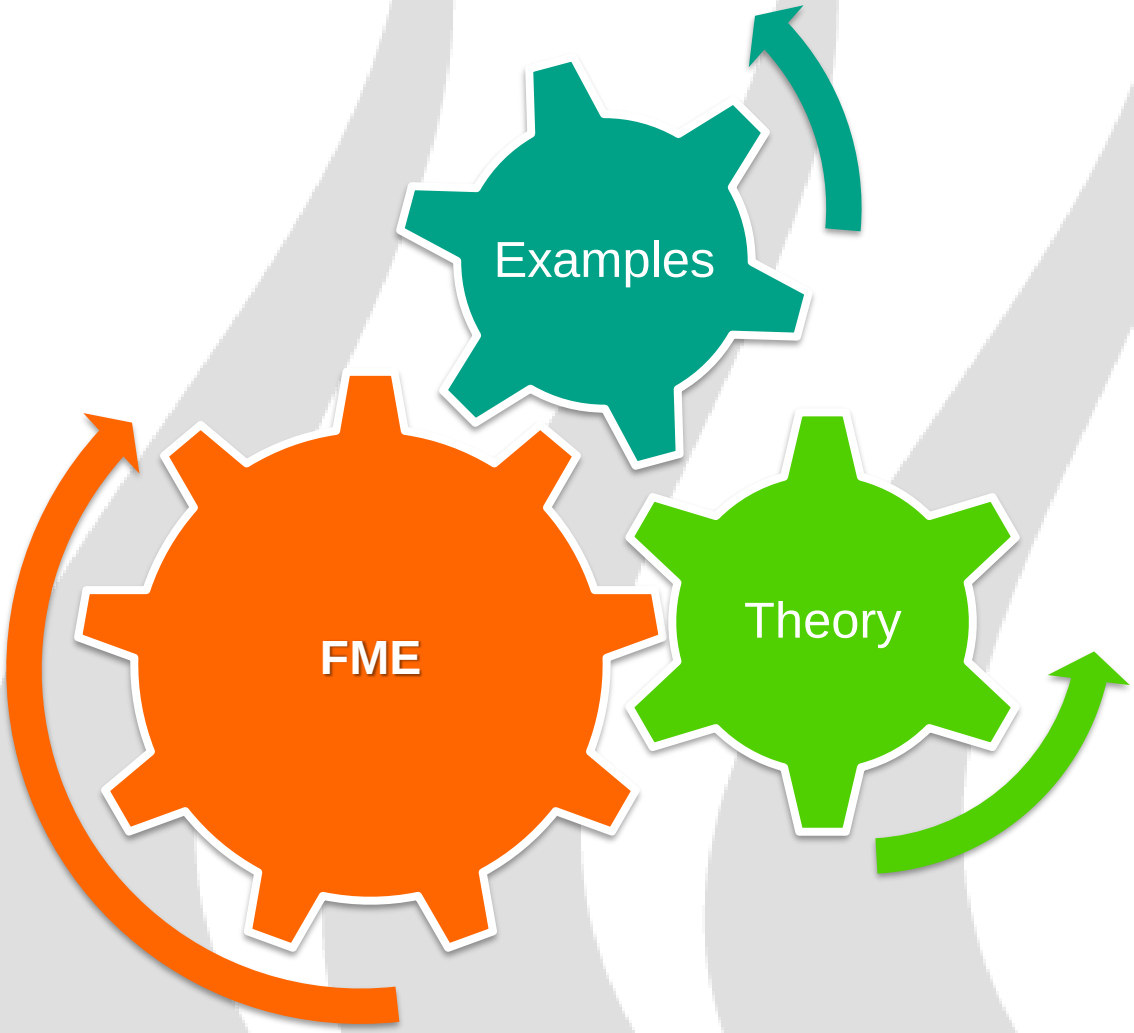
Training Environment

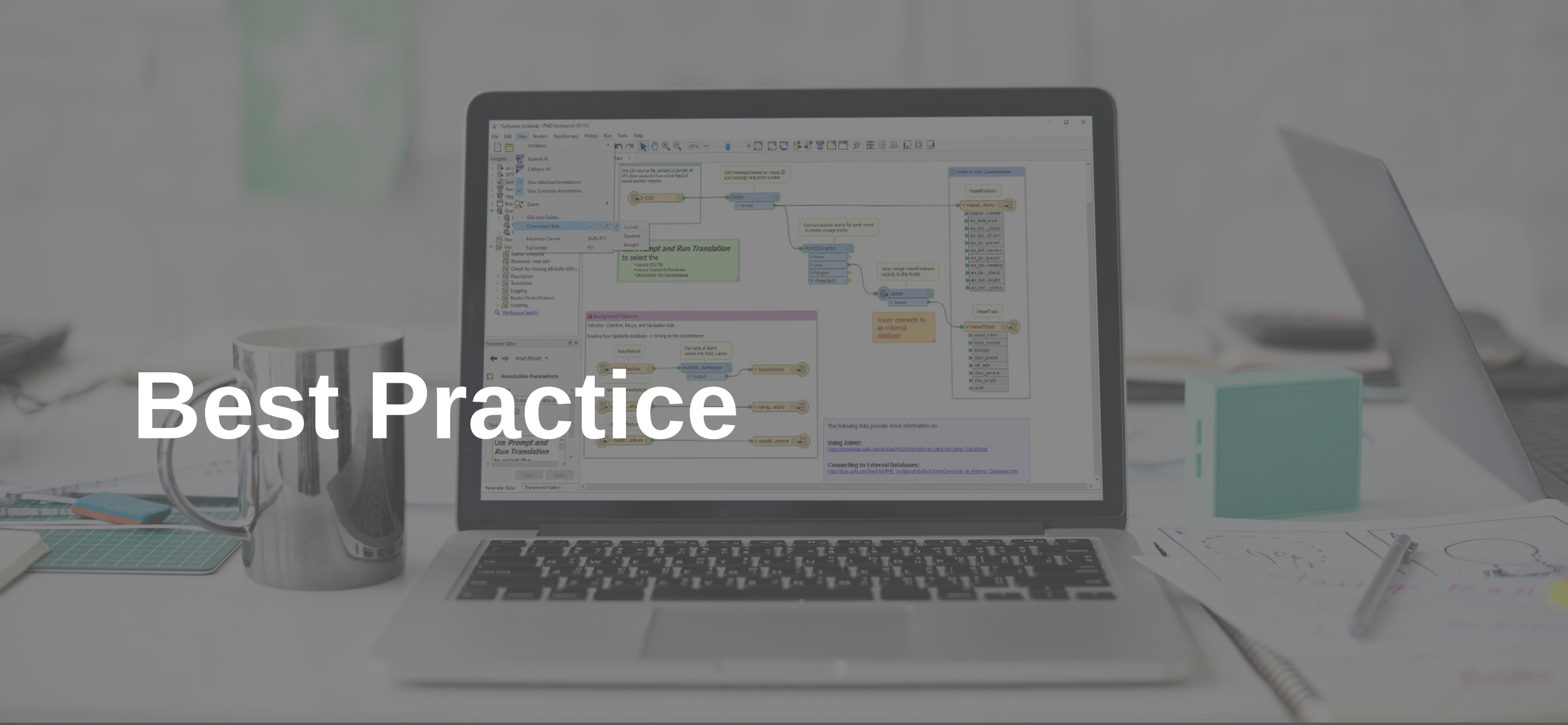
- Training Data folders **C:\FMEModularData**
  - Data
  - Output
  - Resources
  - Workspaces
- Slides
- Workbook – you need to download using link sent by the trainer

What we'll be covering today…

Agenda

- Best Practice
- Maintenance/Upscaling
- Error Trapping
- Debugging Workspaces
- Performance
- Documenting & Styling Workspaces





Best Practice

Connect. Transform. **Automate**

Best Practice

How to carry out a task in the most effective and efficient manner in FME?

Just remember some Best Practice rules!

Best Practice can help us to…

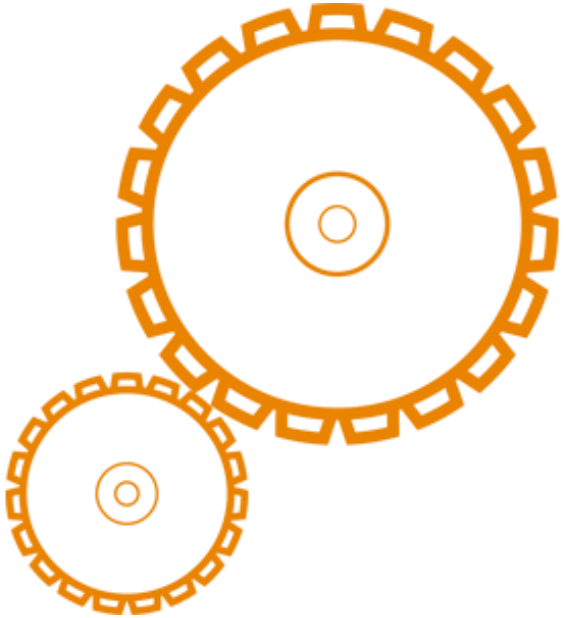
- Use FME in a project-based environment
- Create workspaces that use the correct functionality in the correct place
- Create workspaces that can be easily maintained and are scalable
- Create high-performance workspaces
- Create well-styled workspaces that are self-documenting
- Debug a workspace when it doesn't work the way intended
- Use FME Workbench in the most efficient way

Maintenance Methodology

Connect. Transform. **Automate**

Maintenance Methodology

The ability to update the workspace, and scale it up to a larger solution.



Number of Transformers

Complexity

Connections

How easily will you and other users be able to maintain and expand your workspace?

Maintenance Methodology

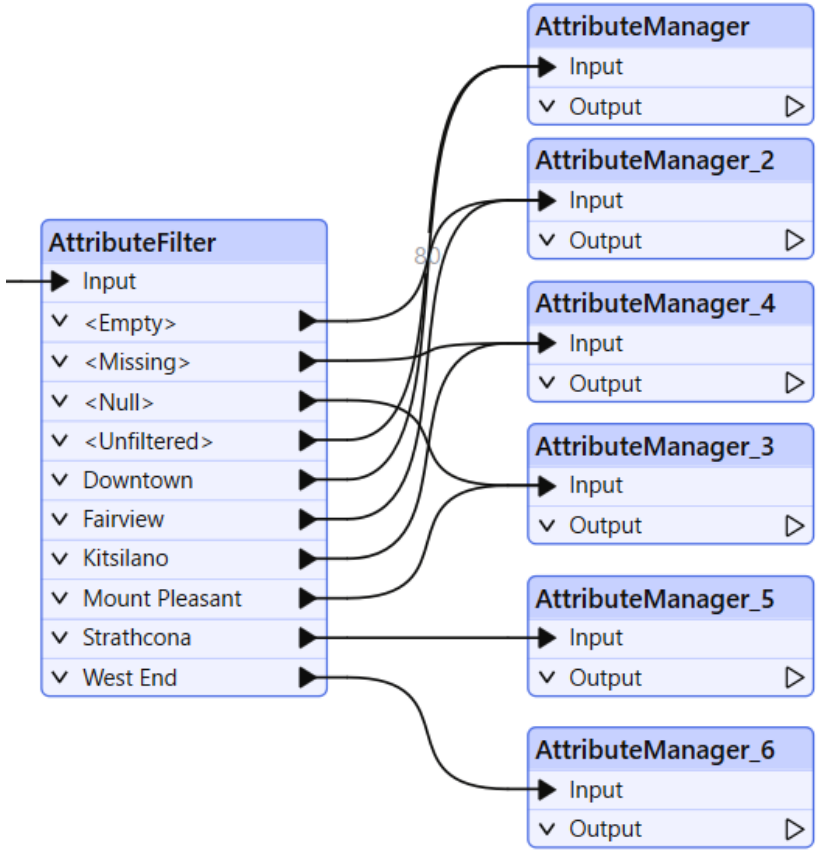
A weak workspace will be hard to update and expand. Things to watch out for:

- **Duplicated Transformers** - these can be cumbersome to edit.

- **Complexity**
  - **Excess Scripting –** Why put in Python Scripting when a Transformer will do?
  - **Under the hood functions –** using hidden/advanced functions, when a simple transformer does the same job. (e.g. use an ExpressionEvaluator transformer instead of Arithmetic Editor within an AttributeManager)
  - **Multiple Workspaces** – chaining workspaces unnecessarily
  - **Busy Workspace Style and Layout** – convoluted styling is hard to understand. Also, keep on eye on your connector lines; crisscrossing or poorly annotated tunnels

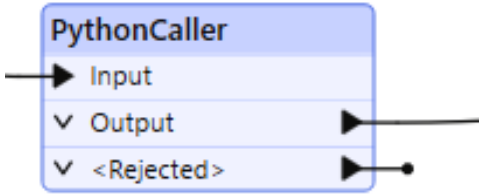
Maintenance Methodology - example

All three methods produce the same result... but …..

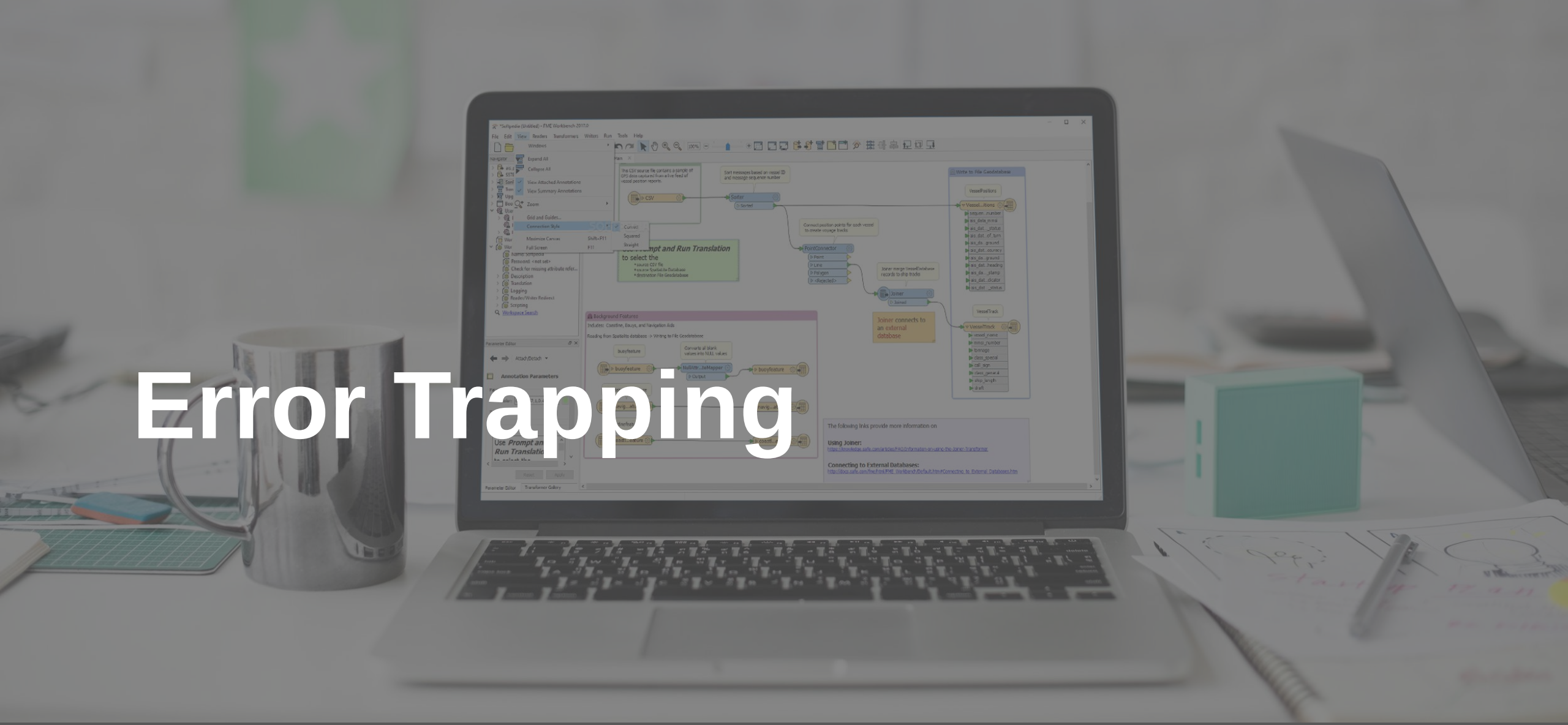


This method uses duplicate transformers and would be time consuming to scale-up in the event of extra years being added

Simple solution, and easily scalable



Over Complex - Python script is not easy to maintain



Error Trapping

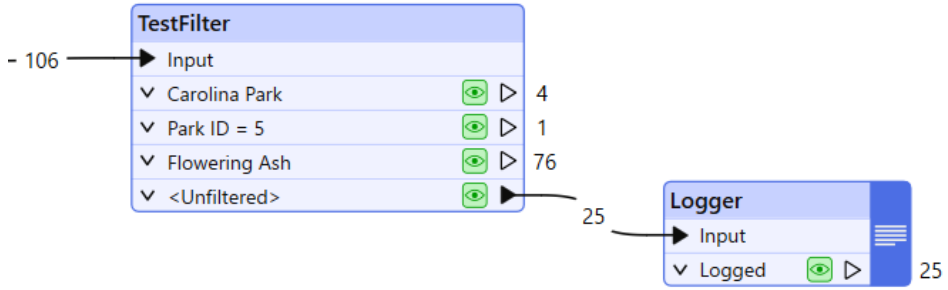
Connect. Transform. **Automate**

Error Trapping & Rejected Features

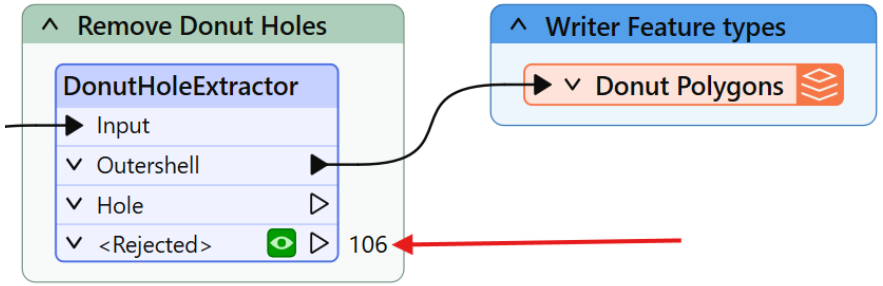
Another workspace best practice technique is Error Trapping:

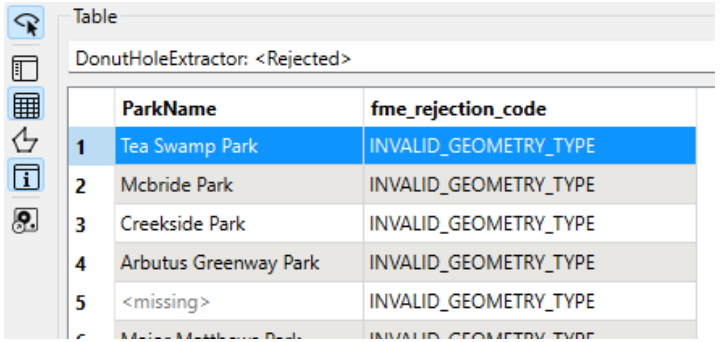
- Error trapping is a way to design a workspace to trap unexpected data
- Sometimes scaling up means using more datasets of varying types and quality. If data quality is not considered, future performance can be compromised.
- Use error trapping and logging to prevent unexpected data to cause workspace failure.

- Error trapping can be as simple as adding a test or filter transformer to weed out bad features. This could include:
  - Attribute validation or filtering
  - Geometry validation or filtering



- Error trapping and Rejected Feature attributes can be used to **debug a workspace**





Debugging Workspaces

Connect. Transform. **Automate**

Debugging

Don’t worry, this has nothing to do with coding!

- Debugging in FME consists of first determining whether a problem has occurred and then tracking down the problem's source
- Even skilled FME users seldom produce new workspaces with zero defects, so debugging is an important skill

The logical order of debugging is:

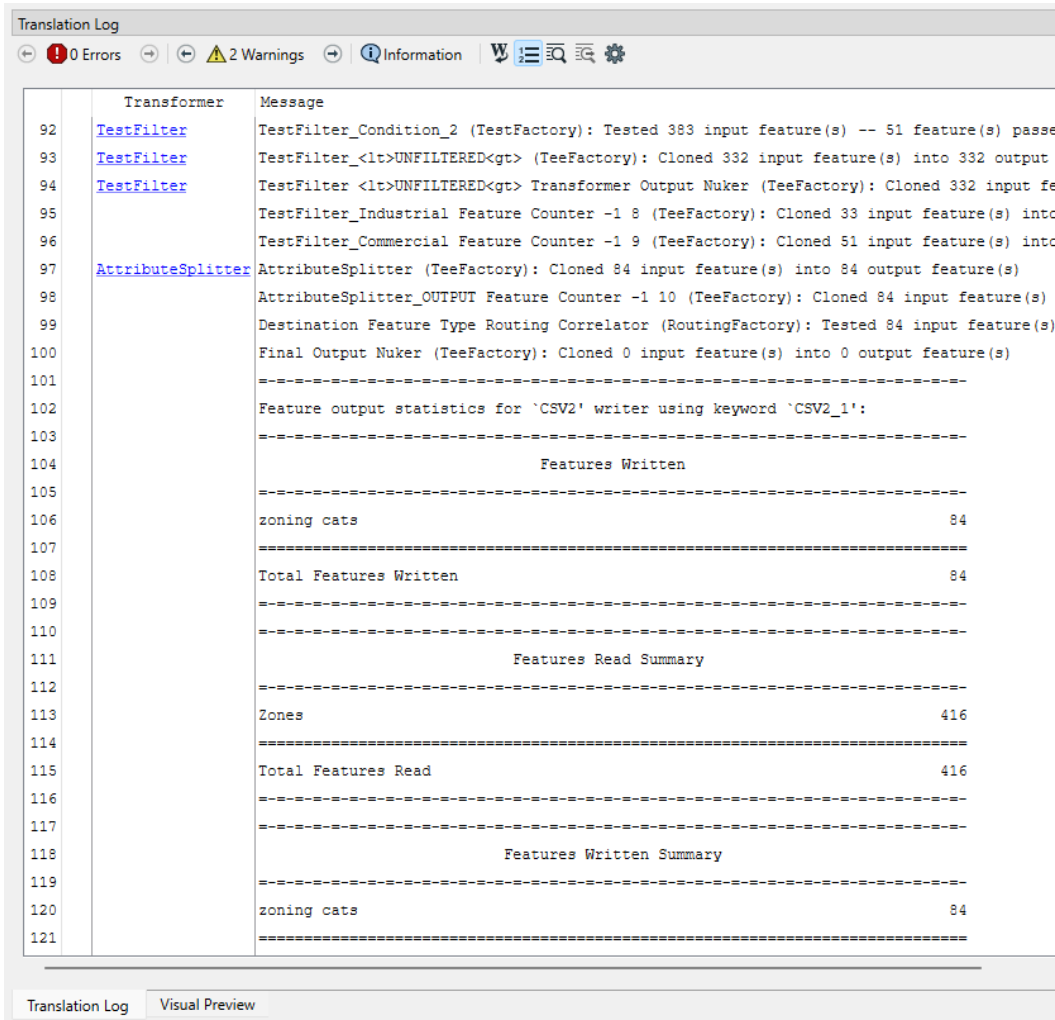
- Check for any problem
  - Interpret the **log** for warnings and errors
  - Inspect the **output datasets**
- Locate the problem
  - Review connection **feature counts**
  - Inspect the data at key stages of the translation
- Determine the problem
  - Check reader, writer, or transformer parameters at the point of failure

Debugging – Log Interpretation

FME logs contain a record of all stages and processes within a translation.
The contents are vital for debugging purposes

Log Message Types:

- **Error**: denoted in the log by red text and the term ERROR, indicates that a problem has caused FME to cease processing. For example, FME is unable to write the output dataset because of incorrect user permissions.
- **Warning**: denoted by blue text and the term WARN, indicates a processing problem. The problem is sufficiently minor to allow FME to complete the translation, but you may want to check if the output was adversely affected. For example, FME is unable to write features because its geometry is incompatible with the writer format. FME Workbench will drop the features from the translation and issue a warning in the log.
- **Information**: denoted by the term INFORM, indicate a piece of information that may help users determine whether their translation functioned correctly. For example, FME sometimes logs confirmation of a particular dataset parameter, such as the coordinate system.
- **Statistics**: denoted by the term STATS, provide information on various numbers relating to the translation; for example, the number of features FME read from a source dataset and the time it took to do so.



Debugging – Output and Feature Counts

Inspect Output

Even if a workspace ran to completion without warnings or errors, it does not follow that the output matches what is expected or required.

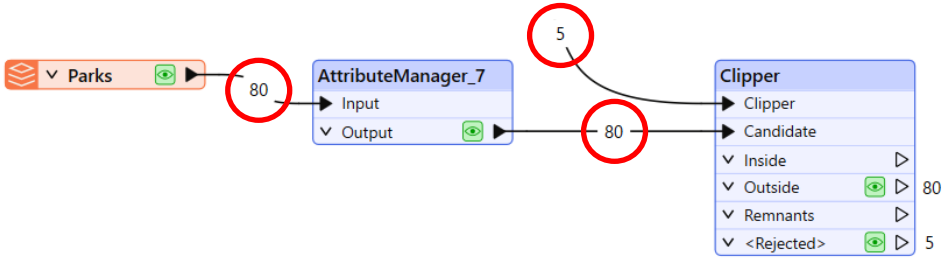
For whatever reason, the workspace may be producing data in the wrong manner

You should inspect several aspects of your output data:

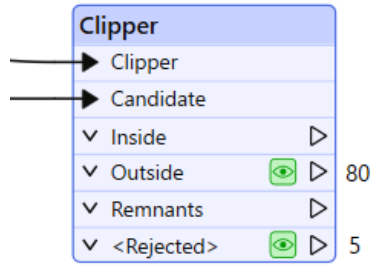
- **Format**: Is the data in the expected format?
- **Schema**: Is the data subdivided into the correct layers, categories, or classes?
- **Geometry**: Is the geometry in the correct spatial location? Are the geometry types suitable?
- **Symbology**: Is the colour, size, and style of each feature correct?
- **Attributes**: Are all the required attributes present? Are all integrity rules being followed?
- **Quantity**: Does the data contain the correct number of features?
- **Output**: Has the translation process restructured the data as expected?

Feature Counts

Once you find an error or problem, feature counts help us identify where that problem occurred



Turning on feature caching helps to confirm where features have gone



Exercise 5.1

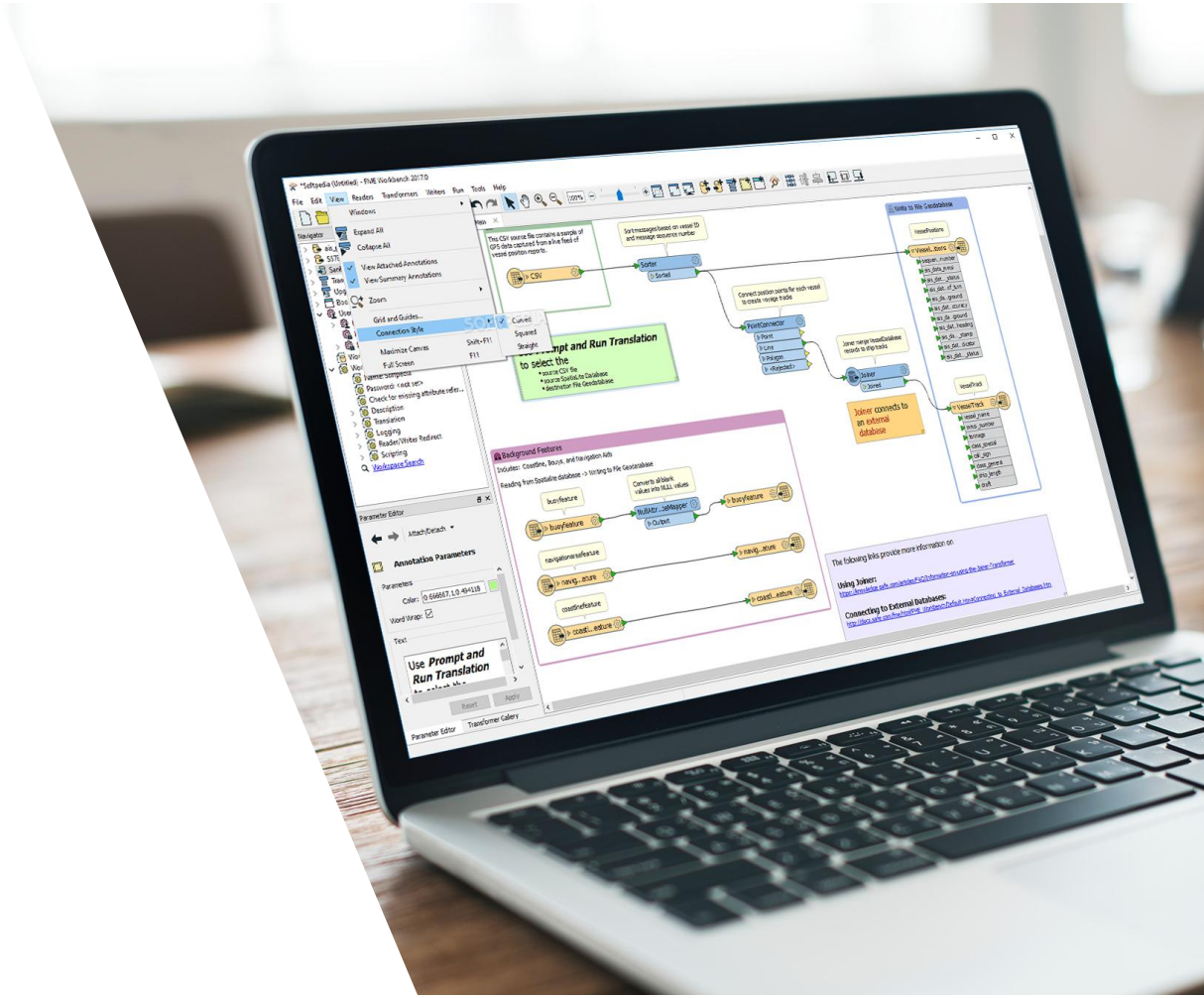
Debugging a Workspace

- You have just taken over a project from your colleague and they've passed their workspace on to you.
- This project is to calculate the "walkability" of each address in the city of Vancouver. Walkability is a measure of how easy it is to access local facilities on foot.
- Currently the workspace calculates a number of metrics but not walkability – lets add that in

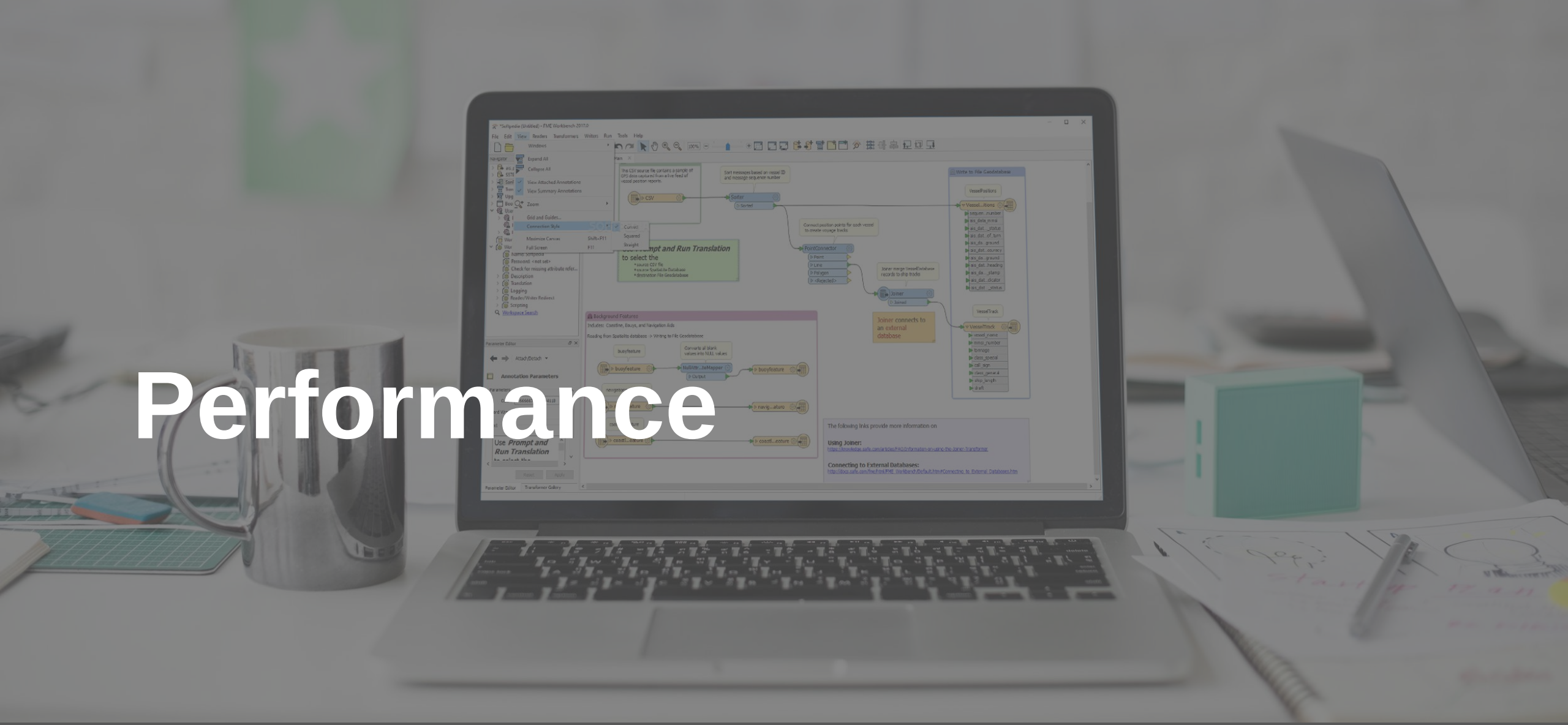
Data - Addresses (ESRI Geodatabase), Crime Data (CSV), Parks (MapInfo TAB), Swimming Pools (OSM)

Starter Workspace - C:\FMEModularData\Workspaces\5.01-BestPractice-Debugging-Begin.fmw

Goal – Add to the workspace and debug any issues



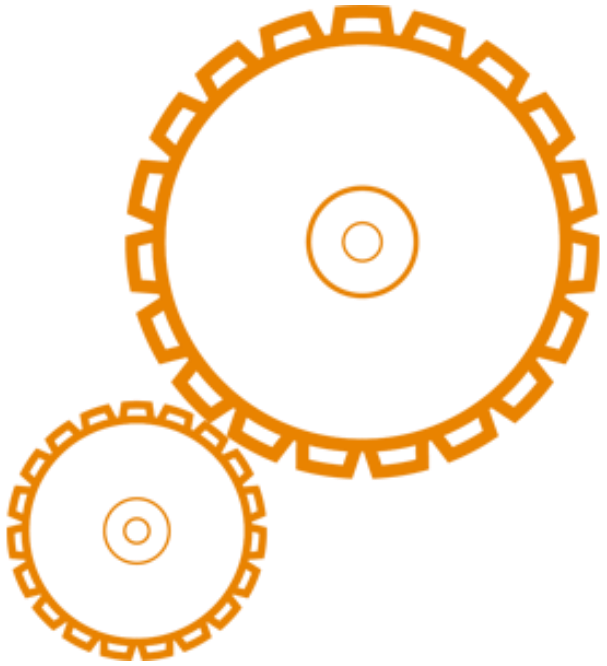
Performance



Connect. Transform. **Automate**

Performance Methodology

A weak workspace design causes the workspace to use more system resources (memory and CPU) than necessary.



Filtering Input

Excess Feature Types

Excess Attributes and Lists

Number of Transformers

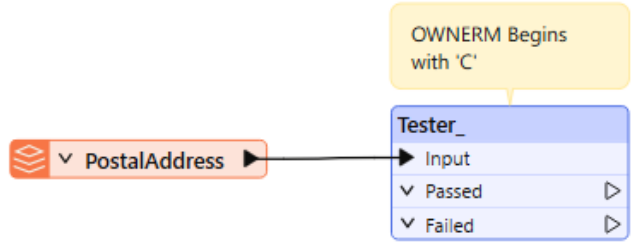
Transformer Choice

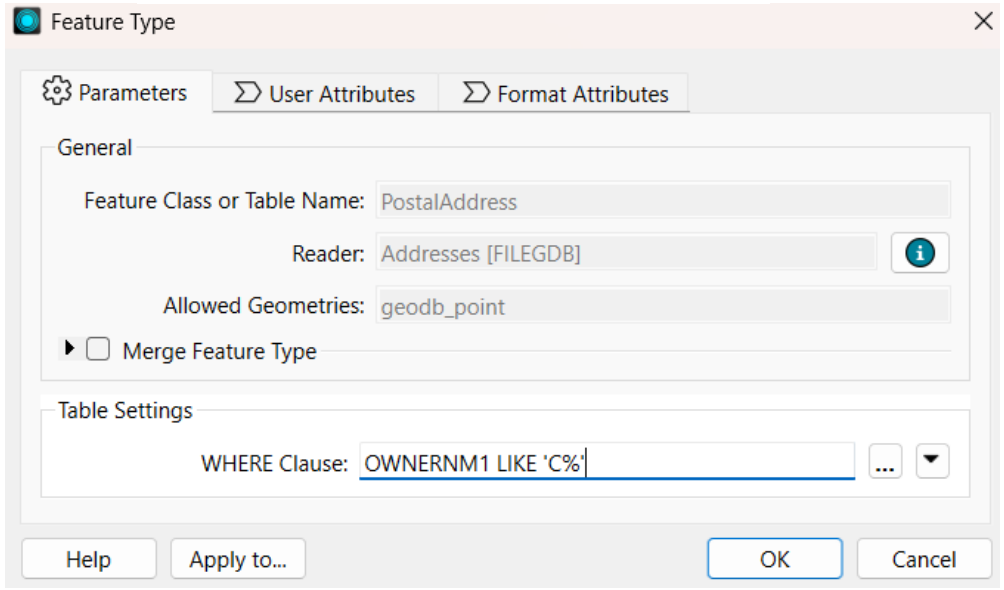
Performance - Excess Data

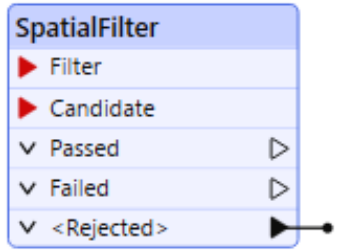
Remove unnecessary data – this has the biggest impact on performance

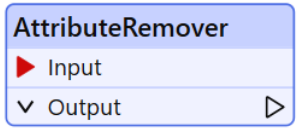
Things to think about:

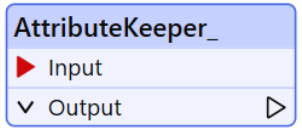
- **Filtering Input**
  - Filters / Testers
  - WHERE Clauses on Reader
- **Excess Feature Types**
- **Excess Attributes**
- **Lists**
- **Geometry**
  - geometry can be removed from a feature
  - spatial attributes can be very large





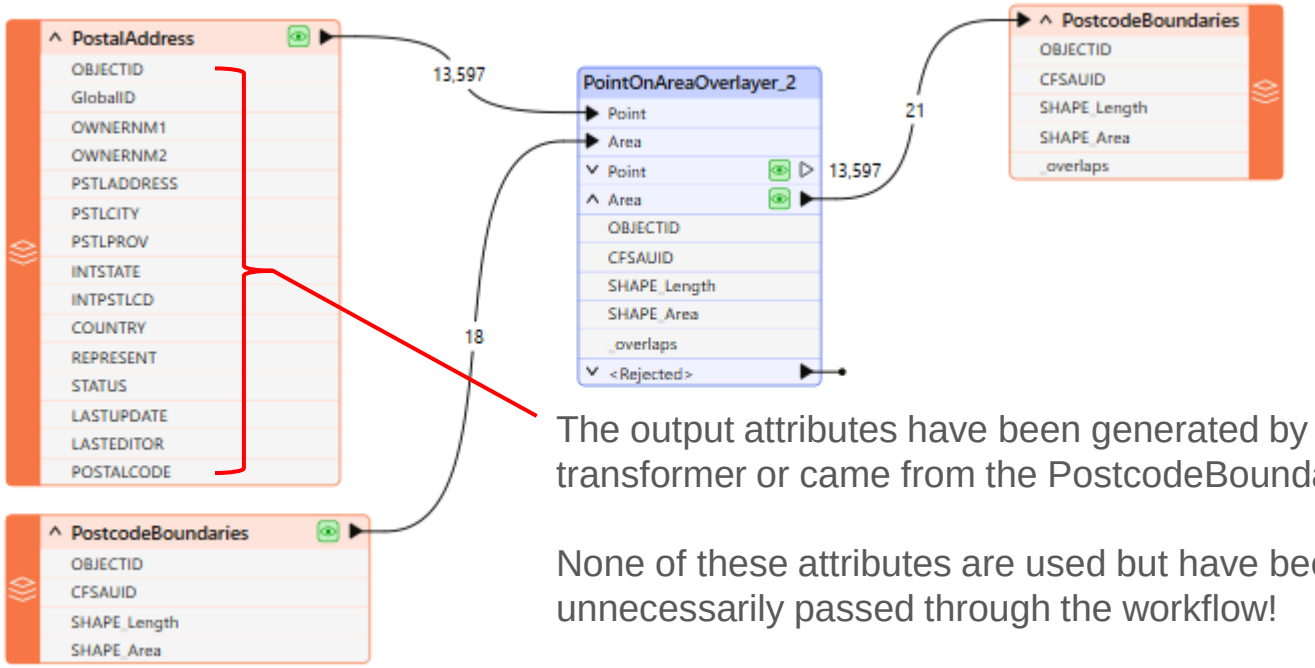






Performance - Excess Data

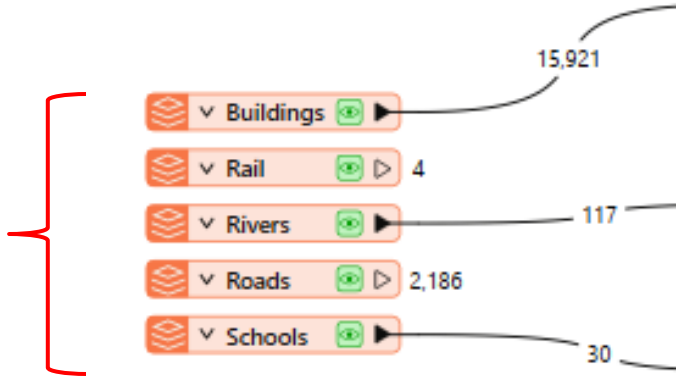
Excess Attributes



The output attributes have been generated by the transformer or came from the PostcodeBoundaries.

None of these attributes are used but have been unnecessarily passed through the workflow!

Excess Feature Types



Only three of these five feature types are being routed into the workflow.

However, features for all the feature types are being unnecessarily read in!

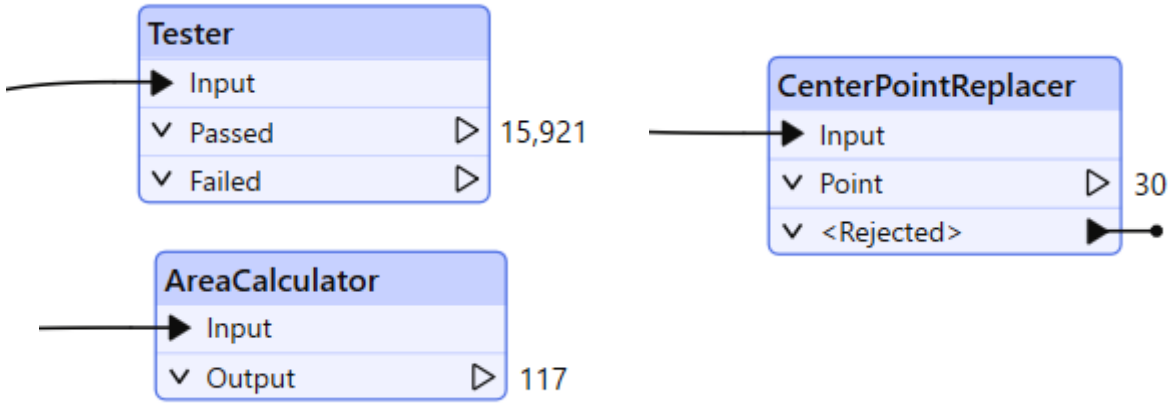
Group-based v Feature-based Transformers

Before we talk about Transformers and performance, first we need to understand the difference between Group-based and Feature-based transformers:

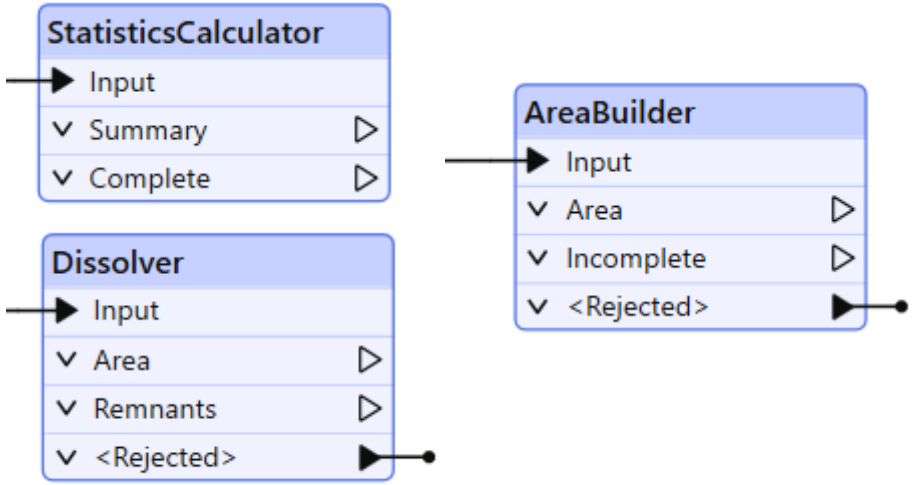
Transformers carry out transformations on either:

- One feature at a time – **Feature based**
- The whole set of features at once – **Group based** – *these are more resource intensive*

Feature based examples



Group based examples



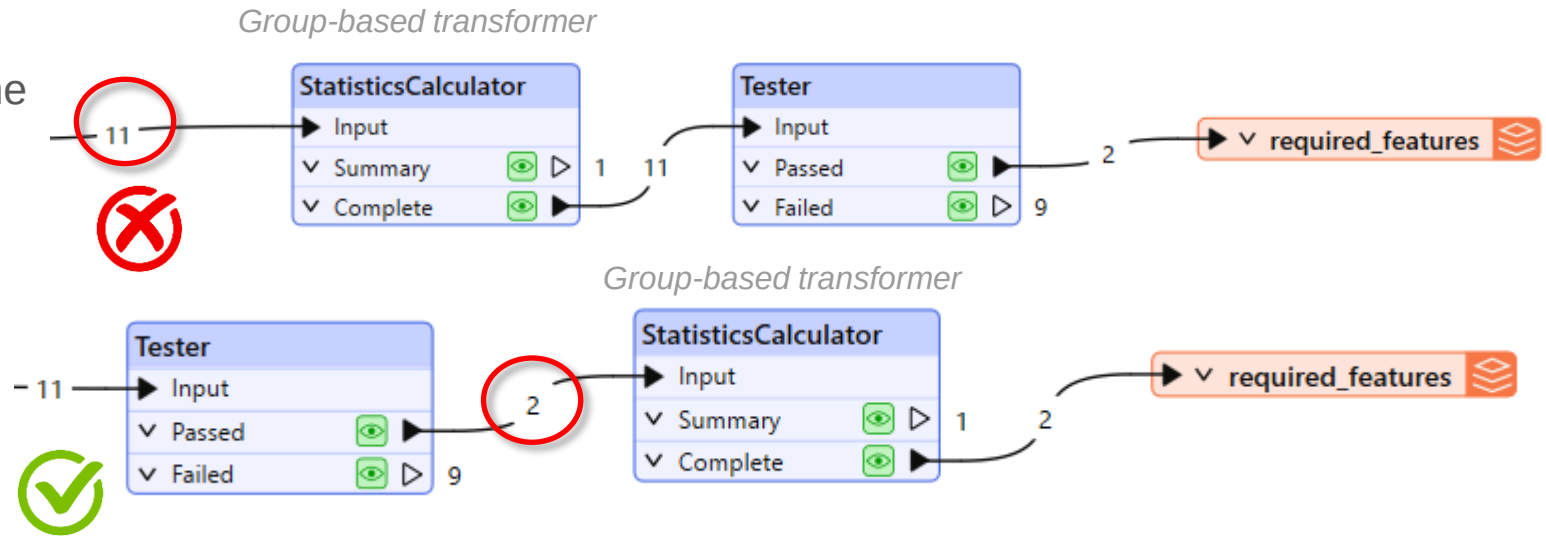
Performance - Transformers

The number of transformers, transformer order and transformer type affect workspace performance.

- The key to improving transformer performance is to reduce the amount of memory used
- As a general rule, the greater the **number of transformers** in a workspace, the more system resource (memory and CPU) and time is required to run the workspace
- Although the **order of transformers** can sometimes vary without affecting the result, at other times it is important to get the correct order for performance reasons.

e.g. where possible put feature-based filter transformers *before* the group-based process, not after

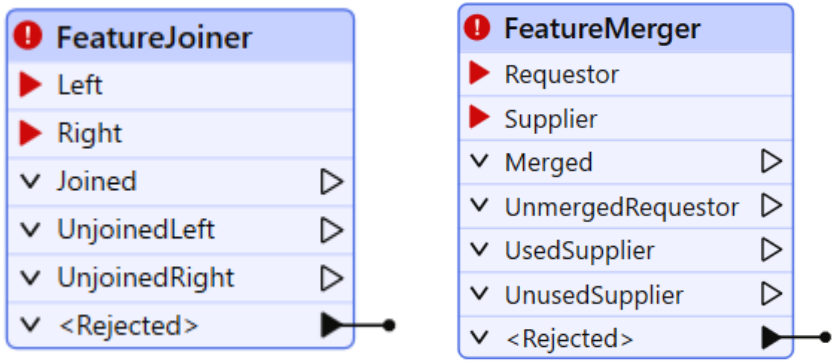
The best way to remember this is: ***Filter, Remove, Action!***



Transformer Use when thinking about performance

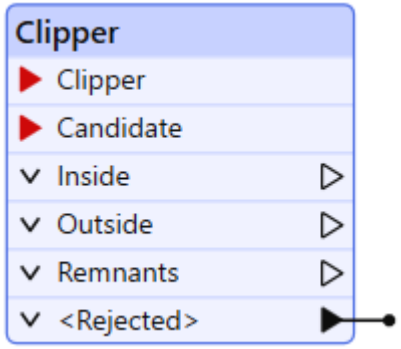
Joiner vs Merger

FeatureJoiner is faster than the Merger – use the Joiner it if you can



Clipper

Clip spatial data to remove unnecessary features, will reduce memory usage



Group based transformers

Utilize the ‘Group By’ mode where you can - less data is stored in memory and processing is more efficient.

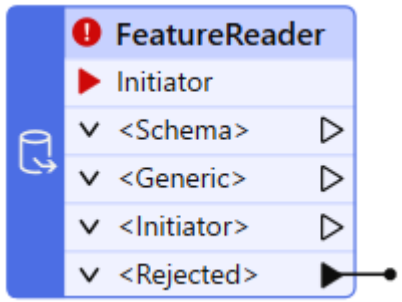
The condition for applying this parameter is that the incoming features are pre-sorted into their groups.

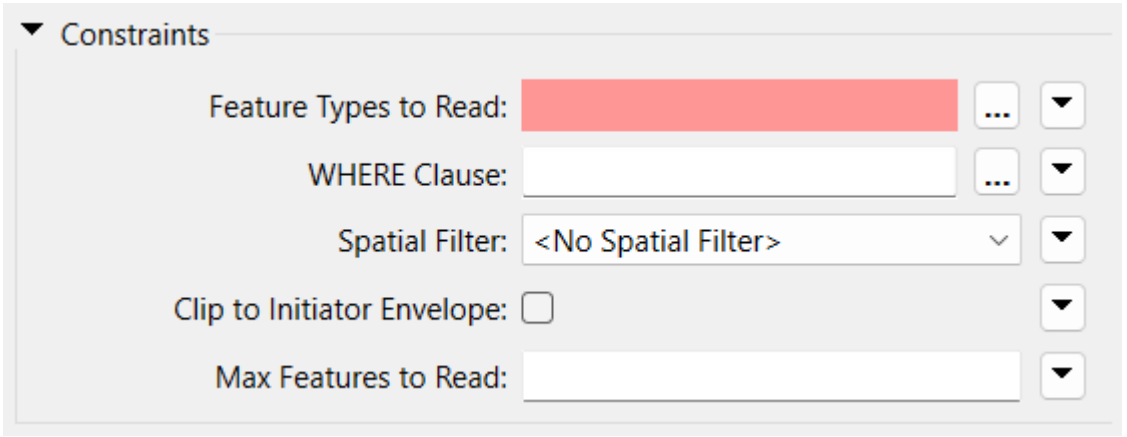
SpatialFilter vs SpatialRelator

SpatialFilter is more efficient than the Relator – however, the Clipper is even better!

Transformer Use when thinking about performance

FeatureReader is useful for not reading entire datasets when you don't need all the data

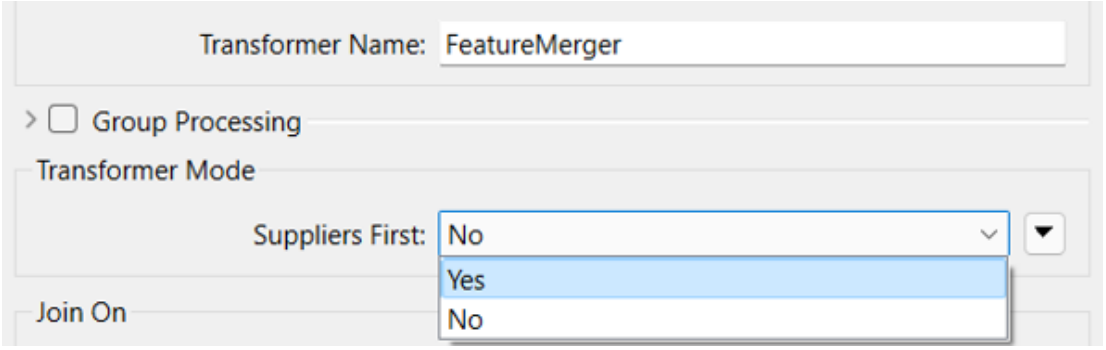




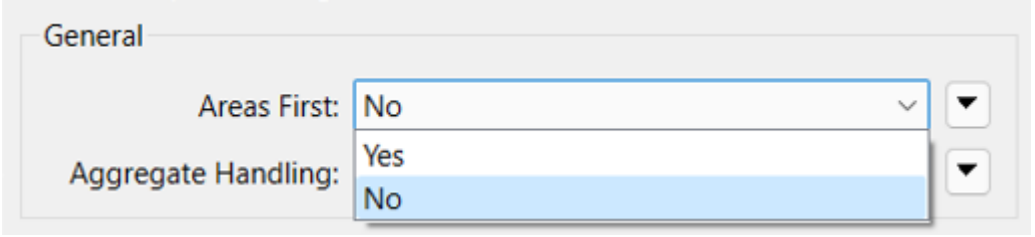
'Features First'

Some transformers have their own, unique, parameters for performance improvements.
Many of these specify one type of feature to arrive "first."

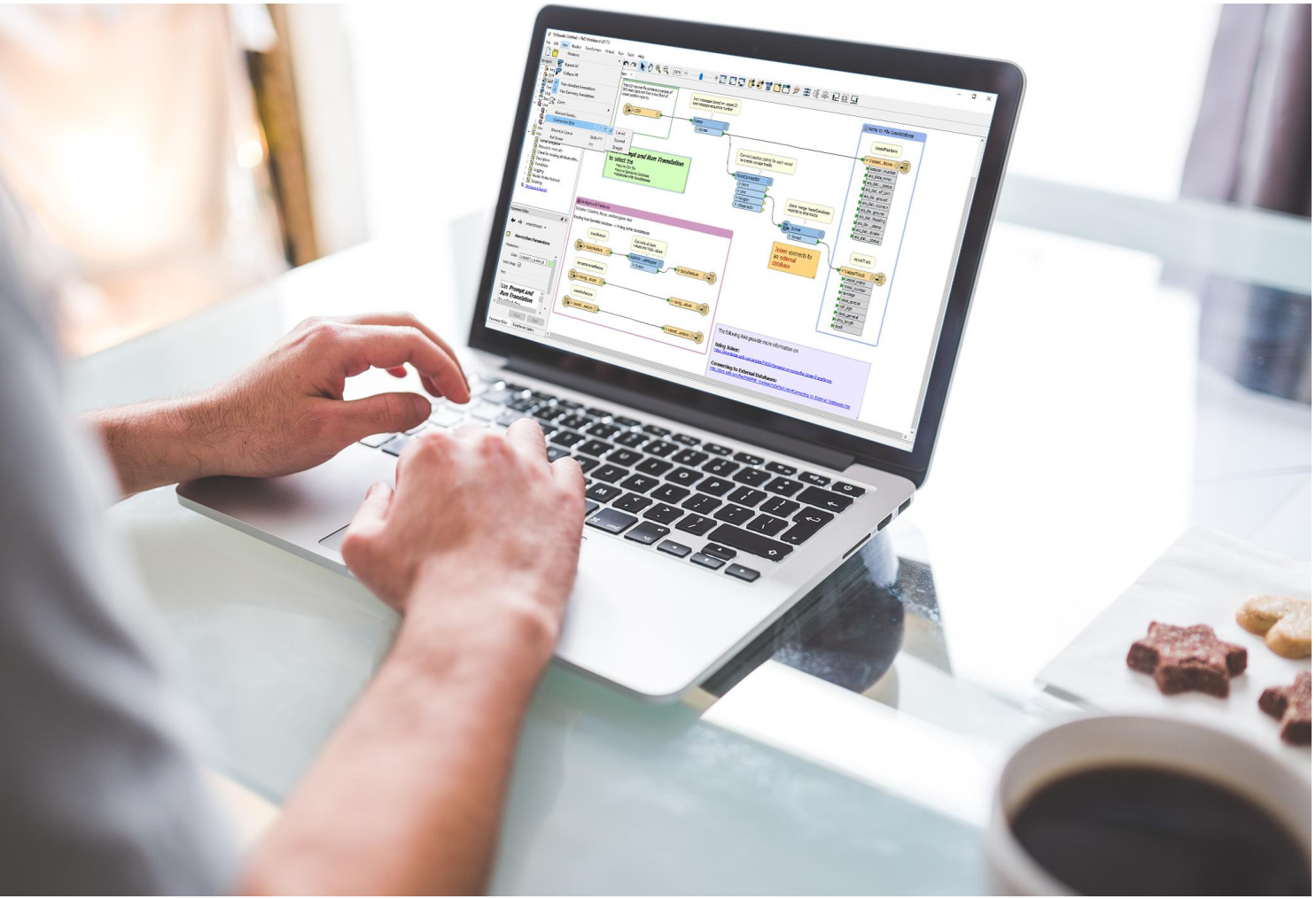
e.g. the FeatureMerger



or the PointOnAreaOverlayer



Exercise 5.2



Methodology – Performance

- You have inherited a workspace from a colleague and already made some changes to calculate a ‘walkability’ score.
- Next you now need to improve the performance of the workspace

Data - Addresses (ESRI Geodatabase), Crime Data (CSV), Swimming Pools (OSM)

Starter Workspace –

- C:\FMEModularData\Workspaces\5.02-BestPractice-Performance-Begin.fmw
- *or carry on from previous exercise*

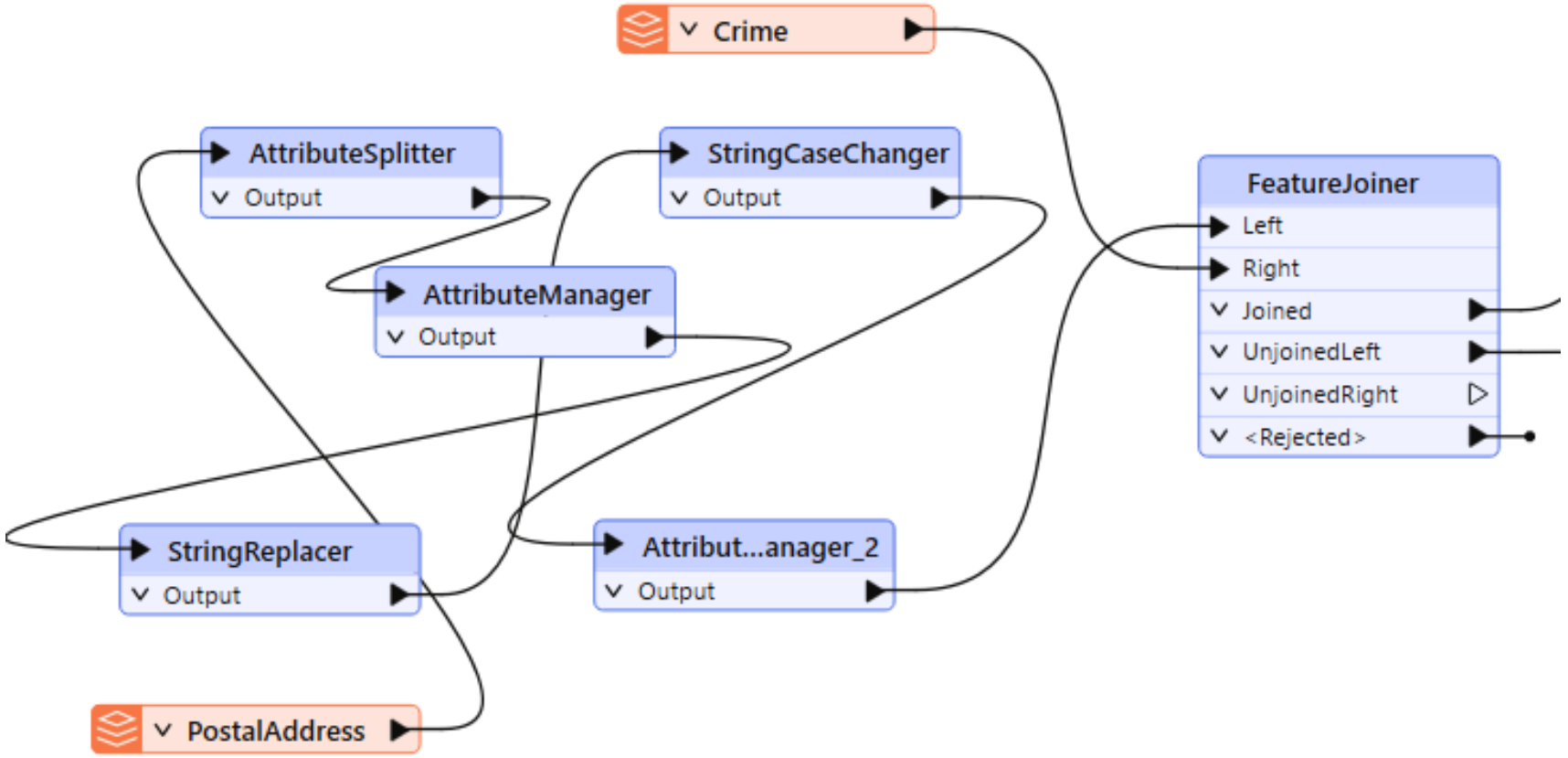
Goal – Improve the performance of the workspace

Workspace Layout & Styling

Connect. Transform. **Automate**

Style and Layout

Can you tell what this does and why?...



….. NO!

Style and Layout

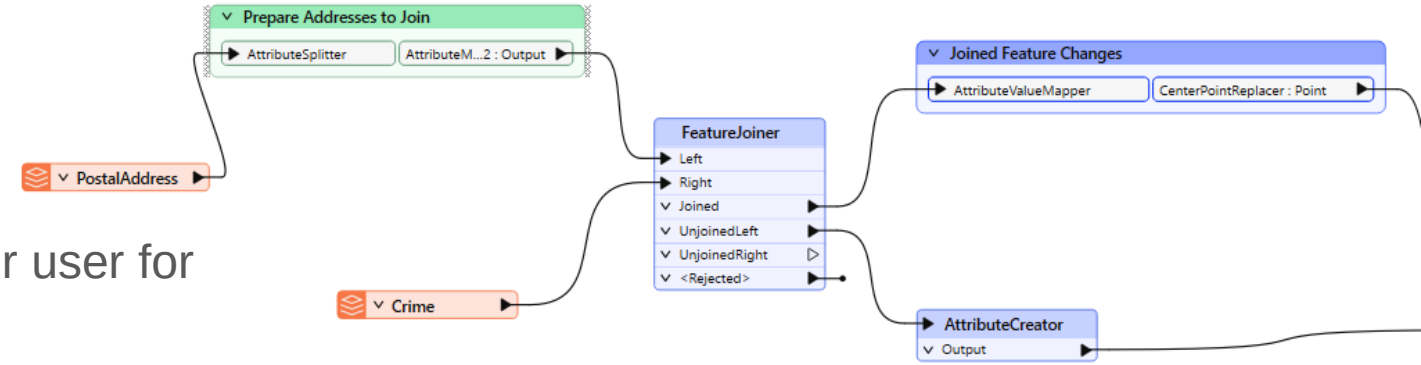
- Most obvious component of FME Best Practice!
- Well-designed Workspace demonstrates competence
- Benefits:
  - easier to navigate and understand an existing workspace
  - distinctly define different sections or components of a workspace
  - quickly navigate to a specified section or particular transformer
  - easier to pass a workspace on to another user for editing
  - easier to develop existing FME projects

Annotations

Bookmarks

Object Layout

Connection Style



Style and Layout

Annotations

- User annotation – created by the user and can be connected to an object or float freely
- Summary annotation – FME generated comment, automatically updates when parameters change

Bookmarks

- Logically group together parts of a process
- Now Collapsible, feature caching only caches the output

Object Layout

- Choose a sensible order – left to right – Avoid Overlaps
- Grids & Guides - Helps structure and line up workspace objects. Can snap to grid or guides
- Attribute Order – up/down to avoid connector line crossover
- AutoLayout

Connection Lines

- Straight / Curved / Squared
- Hiding Connections – Tunnels
- Junctions / Vertexes

Exercise 5.3

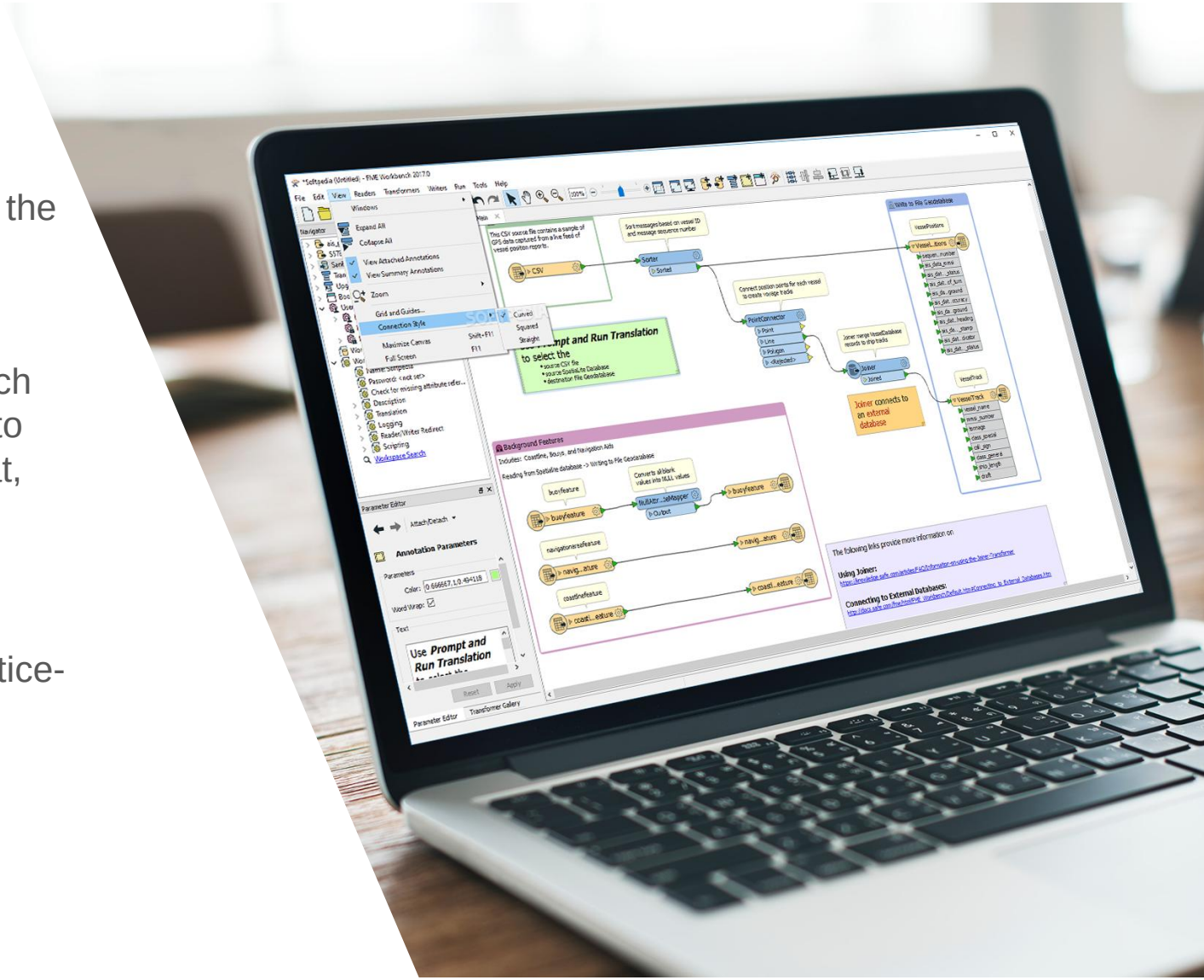
Workspace Layout and Styling

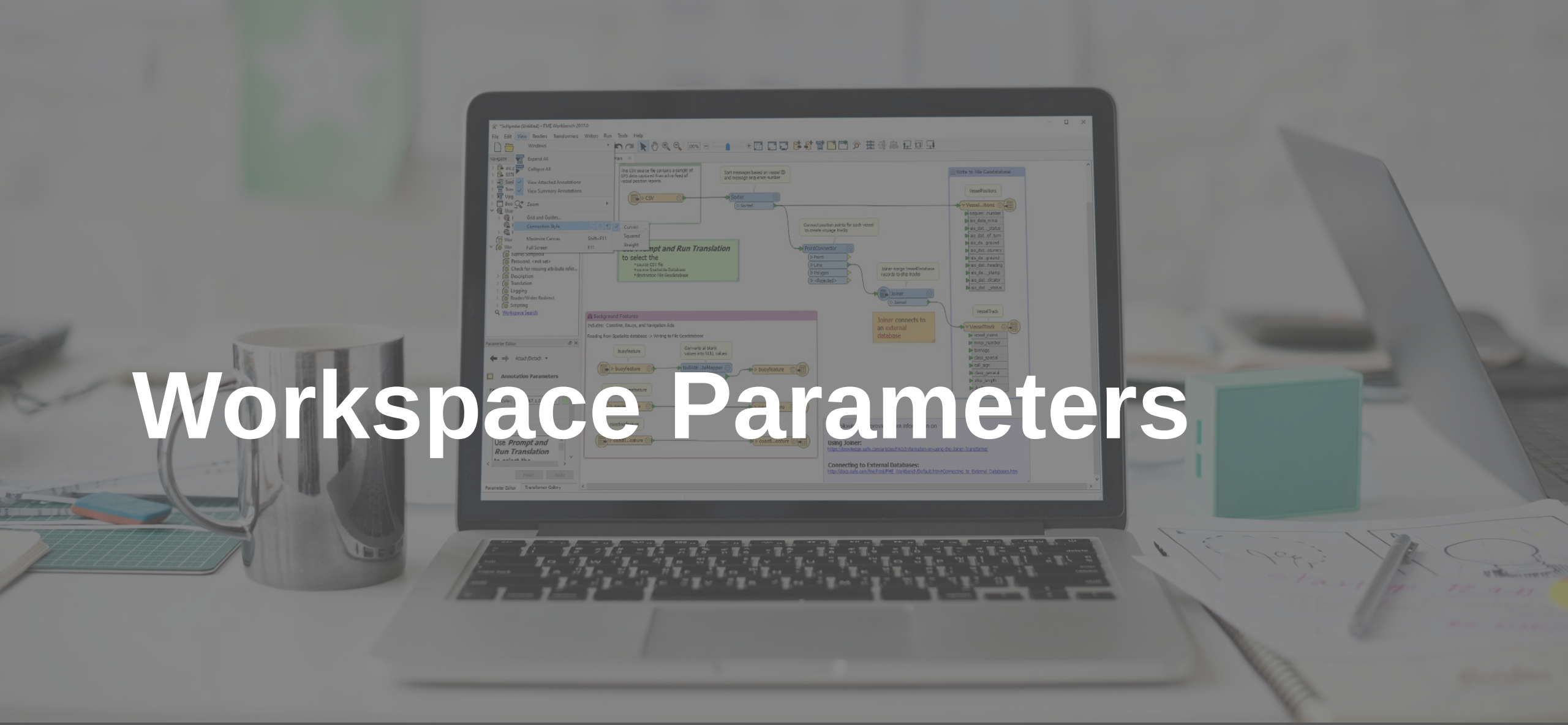
- You have been assigned to a project to calculate the ‘walkability’ of each address in the city.
- Your colleague wasn't aware of FME style best practices when they gave us the workspace, which made working with it a bit challenging. We need to present our workspace, so we want it to look neat, organized, and well-documented

Starter Workspace –

- C:\FMEModularData\Workspaces\5.03-BestPractice-WorkspaceStyling-Begin.fmw
- or carry on from previous exercise

Goal – Implement best practice styling





Workspace Parameters

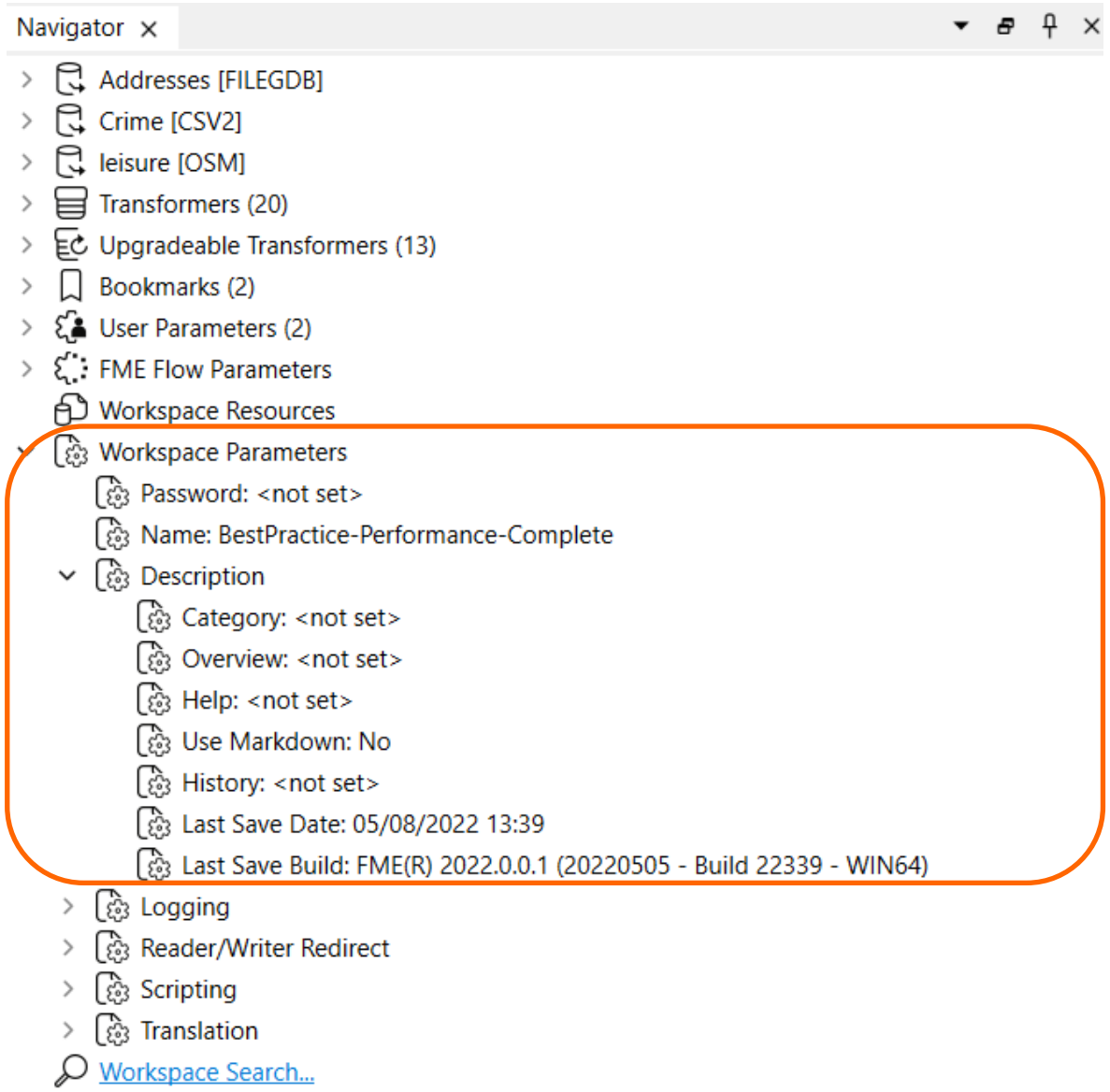
Connect. Transform. **Automate**

Workspace Description

The **Workspace Parameters** are located in the Navigator Panel

This includes a **Description** section, which should be populated with details of the workspace.

- This is especially important and good practice if you are sharing or publishing the workspace



Workspace Description

- **Name** - Update the default name, if desired. The name is displayed on the title bar of the Workbench window.

- **Overview** - Enter a description. This is particularly important. You can also use this area or the **Help** area to:
  - List any requirements that must be met before using the workspace or template, such as where the source data resides or minimum FME version required. You should also list any dependencies (for example, if you need a third-party application or an extra-cost transformer).
  - Record any legal information (for example, copyrights or data restrictions).

  - When you are using the workspace via an FME Server the information in this Overview section is seen on the web page to describe what the process is intended to carry out.

- **History** - use this section to record changes made to the workspace.

- **Last Save Date, Last Save Build** - the date and FME build on which the workspace was last saved – these will automatically populate/update upon saving the workspace

Resources

Transformer Gallery

Community pages and forums

Knowledge Base

Each Other


Thanks for watching!
Good luck getting started with FME.