

# FME® Transformer Reference Guide



# FME and Data Transformation

Moving data between different formats and applications often involves more than a format-to-format translation. Datasets can contain more complex components that may not fit the requirements of the destination system. To preserve key aspects of the data and load it seamlessly into the target application, you may need to adjust the data model, contents, descriptive elements, and/or the coordinate system. This is known as **data transformation** and it is one of FME's core capabilities.

FME® contains over 500 transformers that perform different types of data operations. In the FME Workbench interface, transformers are stored in the Transformer Gallery and grouped in categories based on their function. You can also search for transformers by keyword.

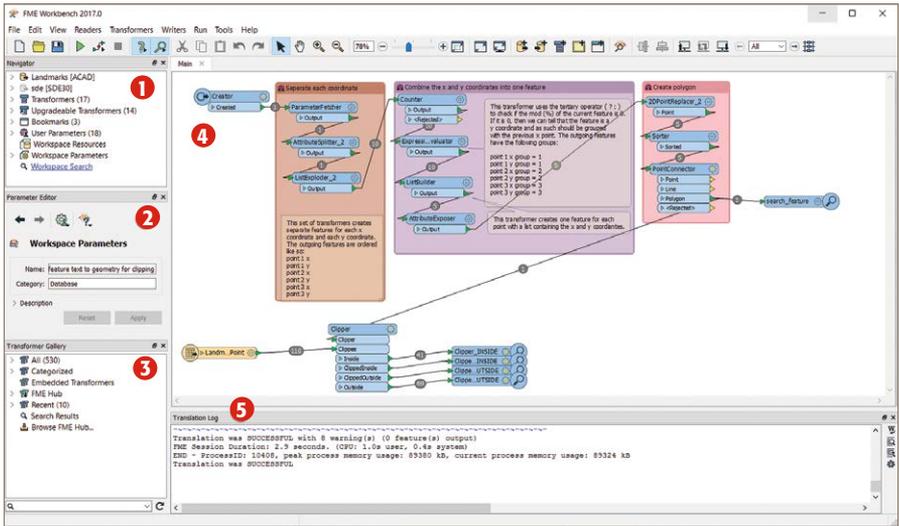


*This guide provides a high-level summary of FME Workbench, data inspection, and each transformer's functionality. For detailed information, select FME Transformers from the FME Workbench Help menu, select a transformer on the canvas and press F1, or visit [support.safe.com/KnowledgeDocumentation](http://support.safe.com/KnowledgeDocumentation).*

## FME Workbench Overview

FME Workbench is a powerful tool for data conversion, sharing, transformation, validation, and integration.

Workbench elements are represented graphically on the Workbench canvas, and saved as a **workspace**. By default, the workspace workflow reads from left to right: the **reader** (source data) is on the left, the transformers are in the center, and the **writer** (destination data) is on the right. Connections between each item represent the flow of data: connections can branch in different directions, and through different objects.

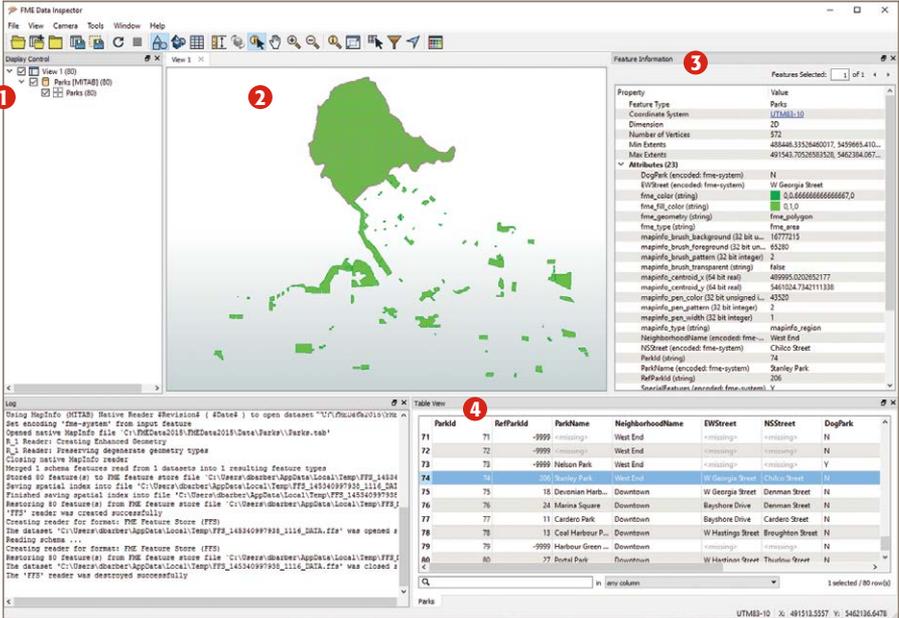


- 1 Navigator:** Shows a hierarchical view of workspace objects.
- 2 Parameter Editor:** Shows configurable settings for any object selected on the canvas.
- 3 Transformer Gallery:** Contains over 500 transformers to restructure features between source and destination data.
- 4 Canvas:** Displays a graphical workflow of the objects and connections that represent data and data transformation.
- 5 Translation Log:** Contains details about the workspace translation.

# FME Data Inspector Overview

The FME Data Inspector is used primarily to preview data before translation and verify data after translation, but it can also be used to check data at any point during translation.

One of FME's key abilities is the communication between Workbench and the Data Inspector – an Inspector transformer can start the Data Inspector at almost any point while a workspace is running, and inspection tools allow feature-by-feature analysis.



- 1 Display Control:** Shows a list of open datasets and their feature types.
- 2 View:** Displays a single dataset, or multiple datasets at the same time.
- 3 Feature Information:** Displays information about a queried feature, including feature type, attributes, and geometry details.
- 4 Table View:** Displays the Feature Information values that are exposed to the end user, in tabular format.

## Components of a Simple FME Workspace

In a workspace, translation components are represented in a visible, related hierarchy. Hierarchy is important because it affects how components are added to a translation and, more importantly, how they are controlled. Components consist of (but are not limited to):

- Readers (source format and data)
- Writers (destination format and output data location)
- Reader and Writer Feature Types (in FME, feature types represent a subset of records; for example, layer, table, or sheet)
- Attributes
- Transformers

This guide is primarily a transformer resource – but it's also important to see why transformers are key to FME's power and versatility. A very simple workspace example on page 4 shows how transformers work; and the rest of this guide describes what each transformer can do.

# The Basics: Placing and Editing Transformers

There are many ways to place a transformer on the Workbench canvas. To start, however, you can simply double-click a transformer name in the Transformer Gallery and it will appear in the workspace.

Every transformer has a Properties button. This button is color-coded to show the status of its parameters.



If the Properties button is the same color as the transformer, you can use the transformer with its existing parameters.



A yellow Properties button indicates that the transformer contains default settings, but you have not yet accepted them. You can use the transformer in this state, but your workspace might produce unexpected results.



A red Properties button means that there is at least one parameter for which FME cannot supply a default value. You must provide a value for all required fields before you can use the transformer in the workspace.

When you click a Properties button, the dialog that appears will usually have some of the common elements shown in this example. The content of this dialog depends on the transformer, and sometimes even on connections to the transformer. Most transformers have some common user interface elements, however, and those are described here.

The screenshot shows the 'Reprojector Parameters' dialog box. It has a title bar with a close button (X) and a small icon. The dialog is divided into sections: 'Transformer', 'Coordinate Systems', and 'Raster Parameters'. The 'Transformer' section has a 'Transformer Name' field with the value 'Reprojector'. The 'Coordinate Systems' section has 'Source Coordinate System' set to 'Read from feature' and 'Destination Coordinate System' highlighted in red. The 'Raster Parameters' section has 'Interpolation Type' set to 'Nearest Neighbor' and 'Cell Size' set to 'Preserve Cells'. At the bottom, there are buttons for 'Help', 'Defaults', 'OK', and 'Cancel'. Red arrows point from text annotations to these elements.

You can edit the default transformer name.

Required parameters are highlighted.

Transformer parameter menu button.

The Defaults menu gives you options for using default values.

Click OK to accept changes and close the dialog. (This button is disabled if required parameters have not been populated.)

## Working with Transformer Parameters

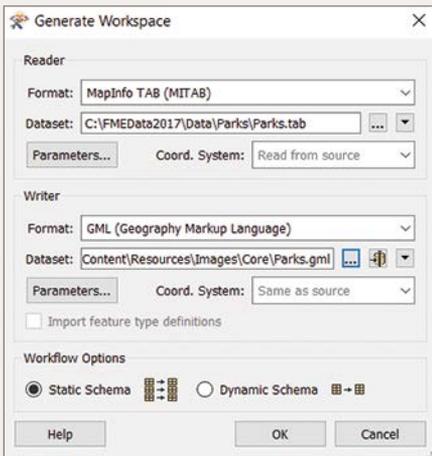
Most transformer parameters can be integrated with other pieces of a workspace. This means that the parameters can be easily configured to work with elements of the source data as well as with other transformers. More advanced functions, such as text and arithmetic editors, are also available in some transformers. In most cases, you can use a transformer with its displayed default values.



For detailed information on transformer parameters, see the *FME Transformers help*, or select a transformer on the Workbench canvas and view the *Help* tab in the bottom pane.

## The Basics: Setting up and Running a Simple Workspace

This simple example shows how to set up a new workspace. The source data used for this example contains information about 80 city parks.

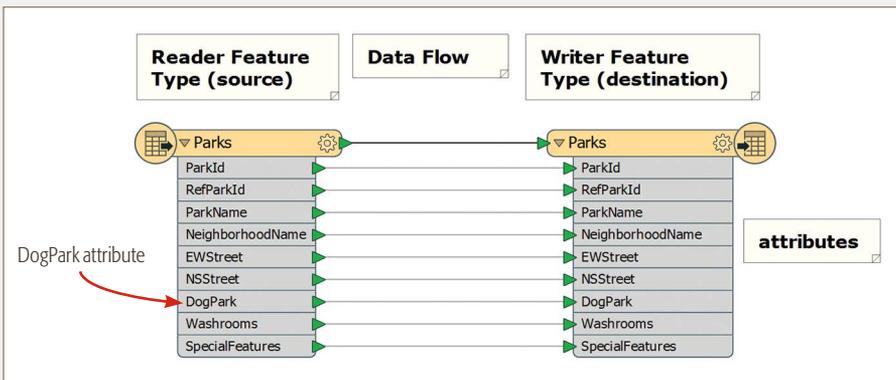


Set up a new workspace by clicking **File > Generate Workspace**. Then:

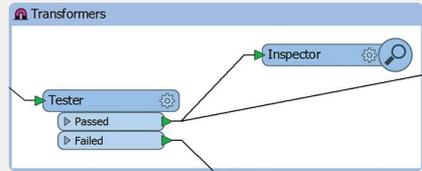
1. Select the format and location of the source data (the Reader),
2. Specify the format and location for the destination data (the Writer), and
3. Accept the defaults in the remaining dialog fields.

Click **OK**. Workbench reads the data, and generates the initial workspace.

The objects on the canvas represent the data and data flow. The **Reader Feature Type** shows that the data contains an **attribute** called *DogPark*.

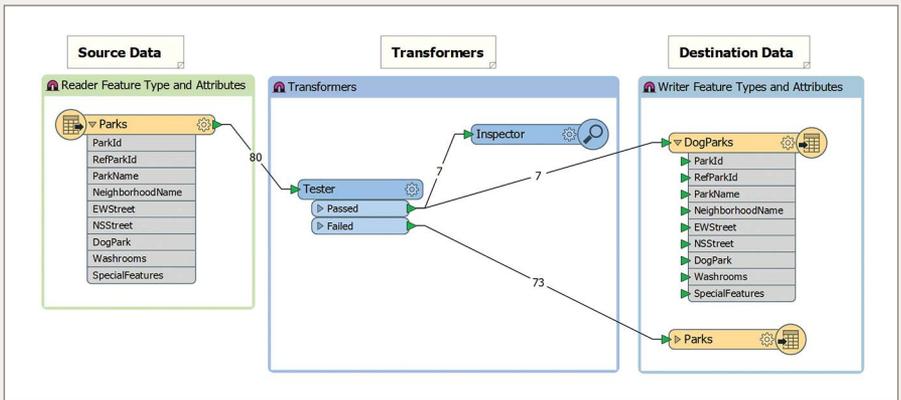


Because we want to determine which parks allow dogs, we add two transformers: a Tester transformer (to filter data) and an Inspector transformer (to view results). The Tester parameters are set to filter only parks that allow dogs, and the Inspector transformer opens the **Data Inspector** to show the results on a map.

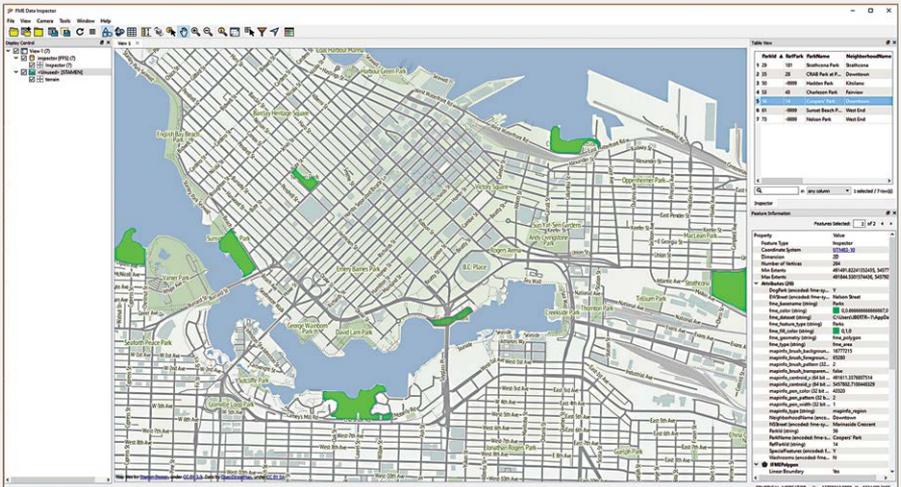


The resulting workspace shows that 7 parks allow dogs. These results are sent through the **Passed** port of the Tester transformer to a Writer Feature Type that we have added and named *DogParks*.

The workspace also shows that 73 parks do not allow dogs, and we have directed these results through the **Failed** port of the Tester transformer to the original *Parks* writer feature type.



Because we added an Inspector transformer to the Tester transformer's Passed port, the Data Inspector opens automatically. Here, the Background Map option allows us to view the exact locations of the 7 dog parks.



# Workbench Keyboard Shortcuts *for Windows*

General Viewing	
New (create a new workspace)	Ctrl+n
Generate workspace	Ctrl+g
Open (workspace)	Ctrl+o
Exit (workbench)	Ctrl+q
Close (workspace)	Ctrl+w
Change to next tab	Ctrl+Tab
Change to previous tab	Ctrl+Shift+Tab
Select tab number	Ctrl+number_key
Close current tab	Ctrl+F4
Open containing folder (datasets)	Ctrl+o
Maximize canvas to current window size	Shift+F11
Maximize canvas to full screen	F11
Zoom-in	Ctrl+
Zoom-out	Ctrl-
Zoom 100%	Ctrl+0
Zoom in and out	Ctrl+scroll wheel
Zoom to next/previous bookmark	Space/Ctrl+Space <i>Note: Show Bookmark Navigator must be enabled on the toolbar.</i>
Pan	Click scroll wheel (or middle mouse button) and drag cursor.
Return cursor to action arrow	Right-click anywhere on the canvas.
Search: - Workspace if the focus is in the workspace or the Navigator - Log if the focus is in the Log window	Ctrl+f F3
Connection Style	Ctrl+Shift+C
Print	Ctrl+p
Help	Select an object, then F1

General Editing	
Cut	Ctrl+x
Copy	Ctrl+c
Paste	Ctrl+v
Redo	Ctrl+y
Save	Ctrl+s
Select All	Ctrl+a
Undo	Ctrl+z
Smart Delete (repair connections)	Delete key
Delete (without repair)	Shift+Delete key
Readers, Writers, and Transformers	
Add Reader	Ctrl+Alt+r
Add Writer	Ctrl+Alt+w
Show Parameters	Select an object, then Enter
Connect Inspector	Select the object(s), then Ctrl+Shift+l
Connect Logger	Select the object(s), then Ctrl+Shift+L
Create custom transformer	Select one or more transformers, then Ctrl+t
Duplicate transformer	Ctrl+d  <i>Using Quick Add:</i> If you add a transformer and want to add the same transformer again, press the slash "/" key. The Quick Add box will appear showing the last selected transformer. Press Return to include it, then press Return again to edit its parameters.
Rename	Select an object, then F2
Search for a transformer by name	When the cursor focus is on the canvas, press the slash "/" key to enable a quick transformer search. Click the arrow to toggle the search between name and keyword.

<b>Other Workspace Authoring</b>	
Add Bookmark	Ctrl+b
Attach annotation	Select the object(s), then Ctrl+k
Attach summary annotation	Select the object(s), then Ctrl+Shift+K
Insert Junction	Ctrl+Shift+J
Enable/disable objects (including links and feature types)	Ctrl+e
<b>Running Workspaces</b>	
Run translation	F5
Prompt and run translation	Ctrl+r
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Run with breakpoints	Ctrl+Shift+F5
Toggle breakpoints	Select connection, then F9

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### Symbol Reference

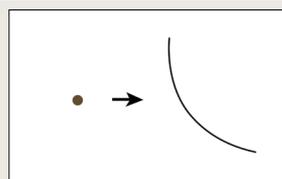


Transformers with this symbol are available at extra cost. Please contact Safe Software for more information.



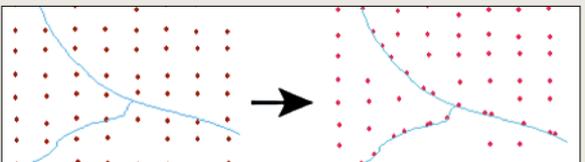
Transformers with this symbol are new in this version of FME.

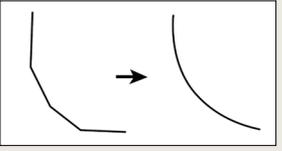
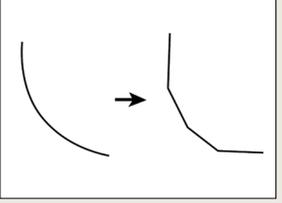
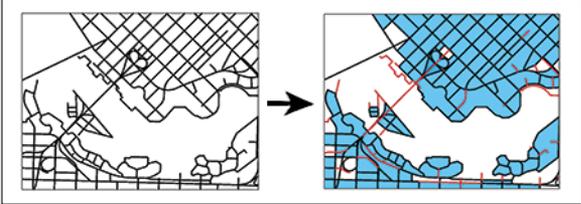
2D	
<b>2DArcReplacer</b>	Replaces the geometry of the feature with a two-dimensional arc whose shape is set by the parameters, which can be either constant floating point values or the values of existing attributes. <i>(Geometries category)</i>
<b>2DBoxReplacer</b>	Replaces the geometry of the feature with a two-dimensional box whose minimums and maximums are fixed values or are taken from attributes in the original feature. <i>(Geometries category)</i>
<b>2DEllipseReplacer</b>	Replaces the feature's geometry with a two-dimensional ellipse whose shape is set by the parameters, values, or the values of existing attributes. <i>(Geometries category)</i>
<b>2DForcer</b>	Removes any elevation (Z) coordinates which may (or may not) have been present on the original feature. <i>(Coordinates, Geometries categories)</i>
<b>2DGridAccumulator</b>	Replaces the input features with a grid of two-dimensional point or polygon features that have the specified spacing and which cover (at least) the bounding box area of all features that enter the transformer. <i>(Geometries category)</i>
<b>2DGridCreator</b>	Creates a grid of two-dimensional point or polygon features, at the origin and uses the offsets specified. Each created feature has a row and column attribute that indicates its position in the grid. <i>(Geometries category)</i>

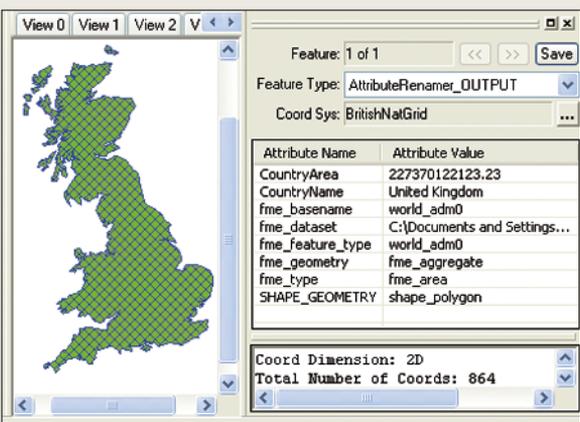
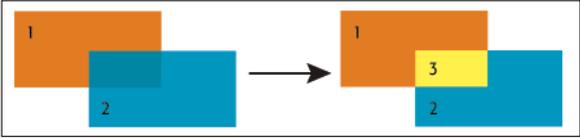


3D	
<b>3DAffiner</b>	Performs 3D affine transformation on the coordinates of the feature. An affine transformation preserves parallelism of lines and planes in geometry. Affine transformations include translations, rotations, scalings, and reflections. <i>(3D, Coordinates categories)</i>
<b>3DArcReplacer</b>	Replaces the feature's geometry with a two-dimensional arc whose shape is set by the parameters, which can be either constant floating point values or the values of existing attributes. <i>(3D, Geometries categories)</i>
<b>3DForcer</b>	Turns two-dimensional data into three-dimensional data by adding a z-value to every coordinate. <i>(3D, Coordinates, Geometries categories)</i>
<b>3DInterpolator</b>	Interpolates elevation values along a non-aggregated linear feature from a starting value to an ending value. The resulting feature's elevation monotonically increases (or decreases) from the starting value to the ending value. If the feature was two-dimensional, it becomes three-dimensional. If the feature was three-dimensional, its previous elevations are removed and replaced. <i>(3D, Geometries categories)</i>
<b>3DRotator</b>	Rotates features according to the right-hand rule, and in a counter-clockwise direction about the specified axis of rotation. <i>(3D, Geometries categories)</i>

A	
<b>Affiner</b>	Performs an affine transformation on the coordinates of the feature. <i>(Coordinates category)</i>

<b>AffineWarper</b>	Performs warping operations on the spatial coordinates of features. It is used to adjust a set of observed input features according to a spatial transform defined by a set of control vectors. ( <i>Geometries, Spatial Analysis categories</i> )
<b>AggregateFilter</b>	Routes features differently depending on whether their geometry consists of an aggregate of several primitive geometries or a simple, single piece of geometry. ( <i>Filters and Joins category</i> )
<b>Aggregator</b>	<p>Combines feature geometries into heterogeneous or homogeneous aggregates. Alternatively, combines feature attributes without any geometry. (<i>Attributes, Calculated Values, Filters and Joins categories</i>)</p> 
<b>AnchoredSnapper</b>	<p>Takes a series of features that match the input specification and performs snapping on the features that lie within the specified tolerance from other features that match the input specification. (<i>Geometries, Spatial Analysis categories</i>)</p> 
<b>AngleConverter</b>	Converts angles of a feature's geometry and/or attributes from one representation to another. ( <i>Calculated Values, Geometries, Strings categories</i> )
<b>AngularityCalculator</b>	Calculates the "angularity" of a linear or area feature. Angularity indicates the degree of curvature of a feature. The higher the value, the more curved its geometry. ( <i>Calculated Values, Data Quality categories</i> )
<b>AppearanceExtractor</b>	Extracts appearance style(s) from the front and/or back side of the geometries. ( <i>3D, Rasters categories</i> )
<b>AppearanceMerger</b>	Sets the front and/or back appearance style(s) of specified geometries to be identical to that which is on a specific source geometry. ( <i>3D, Rasters categories</i> )
<b>AppearanceRemover</b>	Removes appearances from the front and/or back side of geometries. Removing the appearance of a geometry causes that geometry to inherit its appearance from its parent, if a parent with an appearance exists. ( <i>3D, Rasters categories</i> )
<b>AppearanceSetter</b>	Sets appearance style(s) onto the front and/or back sides of geometries. ( <i>3D, Rasters categories</i> )
<b>AppearanceStyler</b>	Creates an appearance style that can later be applied to a surface (using the AppearanceSetter, for instance). ( <i>3D, Rasters categories</i> )

<b>ArcEstimator</b>	Replaces the geometry of the feature with a two-dimensional circular arc whose shape is estimated from the first, middle, and last point of the linear feature passed in. <i>(Geometries category)</i>	
<b>ArcPropertyExtractor</b>	Sets the given attributes to the properties of an arc geometry and works on a single feature at a time. <i>(Calculated Values category)</i>	
<b>ArcPropertySetter</b>	Sets the properties of an arc geometry to those specified. <i>(Geometries category)</i>	
<b>ArcSDEGridSnapper</b>	Simulates the ArcSDE conversion on a feature by performing ArcSDE translation, scaling, and coordinate snapping. Also removes duplicate vertices that result from snapping multiple, formerly separate, vertices to the same grid point. <i>(Coordinates, Format Specific, Geometries, Spatial Analysis categories)</i>	
<b>ArcSDEQuerier</b>	Performs queries on an ArcSDE™ spatial database. The queries can have both a spatial and a nonspatial component. <i>(Workflows category)</i>	
<b>ArcStroker</b>	Converts arc features into lines replacing the feature geometry with a series of edges interpolated along the arc boundary. Ellipse features are converted into polygons by interpolating edges along the elliptical boundary. <i>(Geometries category)</i>	
<b>AreaAmalgamator</b>	Generalizes polygonal input by connecting nearby geometries. The AreaAmalgamator accepts polygonal geometries – including donuts – as input, and produces triangles that join input features into connected pieces, or amalgams. <i>(Cartography and Reports, Geometries, Spatial Analysis categories)</i>	
<b>AreaBuilder</b>	Takes a set of topologically connected linework and creates topologically correct polygon features where the linework forms closed shapes. <i>(Geometries, Spatial Analysis categories)</i>	

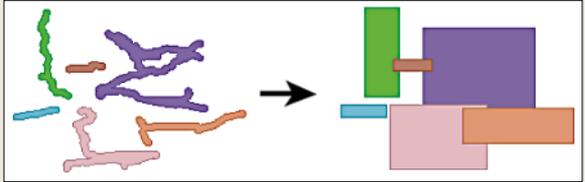
<p><b>AreaCalculator</b></p>	<p>Calculates the area of a polygonal object and stores the value in an attribute. The area is calculated in square map units, whatever they are. (<i>Calculated Values category</i>)</p> 
<p><b>AreaOnAreaOverlayer</b></p>	<p>Performs an area-on-area overlay so that all input areas are intersected against each other and resultant area features are created and output. The resultant areas have all the attributes of all the original features in which they are contained. (<i>Filters and Joins, Spatial Analysis categories</i>)</p> 
<p><b>AttributeCompressor</b></p>	<p>Compresses and (optionally) encrypts the values of the specified attributes. (<i>Attributes, Strings categories</i>)</p>
<p><b>AttributeCopier</b></p>	<p>Copies existing attributes to new attributes with user-specified names. The existing attribute remains intact and a new attribute is created that has a different name, but the same values. (<i>Attributes category</i>)</p>
<p><b>AttributeCreator</b></p>	<p>Adds one or more attributes to the feature and optionally assigns a value derived from constants, attribute values, and expressions. Values can reference adjacent features. (<i>Attributes category</i>)</p>
<p><b>AttributeDecompressor</b></p>	<p>Decompresses and decrypts the values of the specified attributes that were compressed and encrypted by the AttributeCompressor. (<i>Attributes, Strings categories</i>)</p>
<p><b>AttributeDereferencer</b></p>	<p>Copies the value of the attribute whose name is held in the source attribute to a newly created attribute. (<i>Attributes category</i>)</p>
<p><b>AttributeEncoder</b></p>	<p>Encodes the values of the specified attributes to the desired encoding. (<i>Strings, Web categories</i>)</p>
<p><b>AttributeExploder</b></p>	<p>Creates a new pair of attributes (attribute name/attribute value) from each attribute on the input feature and either outputs these on a new feature or adds them as a list element to the original feature. In both cases, it is possible to either conserve or delete the original attributes and geometry. (<i>Attributes, Strings categories</i>)</p>

<b>AttributeExposer</b>	Exposes hidden attributes so that they can be used by other transformers. ( <i>Attributes category</i> )
<b>AttributeFileReader</b>	Reads the contents of a file and stores them as the value for the specified attribute. ( <i>Attributes, Format Specific, Workflows categories</i> )
<b>AttributeFileWriter</b>	Writes the contents of the specified attribute to a file. ( <i>Attributes, Format Specific, Workflows categories</i> )
<b>AttributeFilter</b>	Routes features to different output ports depending on the value of an attribute. ( <i>Filters and Joins categories</i> )
<b>AttributeKeeper</b>	Removes all attributes and list attributes, except the specific ones you specify to be retained. ( <i>Attributes category</i> )
<b>AttributeManager</b>	Alters multiple attributes through adding, renaming, copying, deleting and re-ordering. Sets values for new, existing, and modified attributes to any combination of constants, attribute values, conditionals, expressions, and parameters. Values can reference adjacent features. ( <i>Attributes category</i> )
<b>AttributePivoter</b>	Restructures and regroups incoming features based on specified "Group by attributes" and calculates summary statistics based on a designated "Attribute To Analyze" in order to form a Pivot table output. ( <i>Calculated Values, Filters and Joins, Strings categories</i> )
<b>AttributeRangeFilter</b>	Performs a lookup on a range-based lookup table and routes the feature to the appropriate output port. ( <i>Filters and Joins category</i> )
<b>AttributeRangeMapper</b>	Performs a lookup on a range-based lookup table and stores the resulting value, or writes the value to, a new output attribute. ( <i>Strings category</i> )
<b>AttributeRemover</b>	Removes the selected attributes and list attributes from the feature. ( <i>Attributes category</i> )
<b>AttributeRenamer</b>	Renames one or more attributes, retaining the attribute's current values. ( <i>Attributes category</i> )
<b>AttributeReprojector</b>	Reprojects attributes from one coordinate system to another. ( <i>Coordinates, Strings categories</i> )
<b>AttributeRounder</b>	Rounds off an attribute to the specified number of decimal places. ( <i>Calculated Values, Strings categories</i> )
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <b>143.178435</b>    <math>\longrightarrow</math>    <b>143.18</b> </div>
<b>AttributeSplitter</b>	<p>Splits a selected attribute into a list attribute. Each item in the list will contain a single token split from the list. You would use this transformer, for example, to separate an attribute that has a comma-separated value list into its component pieces. (<i>Attributes, Strings categories</i>)</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> </div>
<b>AttributeTrimmer</b>	Removes leading and trailing trim characters from the selected attributes. ( <i>Strings category</i> )

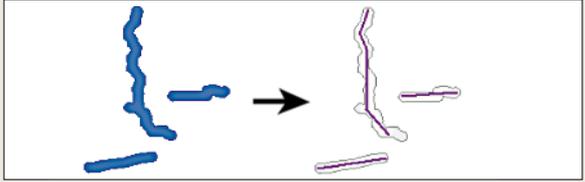
<b>AttributeValidator</b>	Validates any number of attributes against specific test conditions and routes the feature according to the outcome of the test(s). Features that fail one or more tests will have the reasons for failure documented on an attribute and list attribute on the output feature. <i>(Data Quality, Strings categories)</i>
<b>AttributeValueMapper</b>	Looks up and assigns attribute values based on other attributes, and stores the looked-up value in a new attribute. <i>(Strings category)</i>
<b>NEW AutodeskA360Connector</b>	Accesses the Autodesk A360 file storage service to upload or download files or list file and folder information from a Autodesk A360 account. <i>(Integrations, Workflows categories)</i>

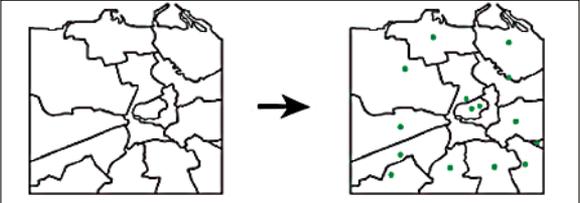
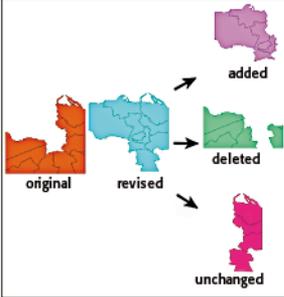
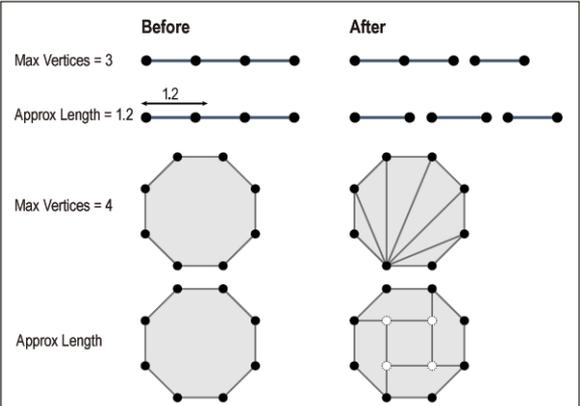


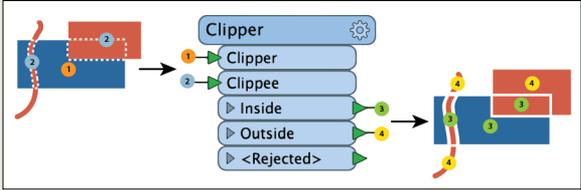
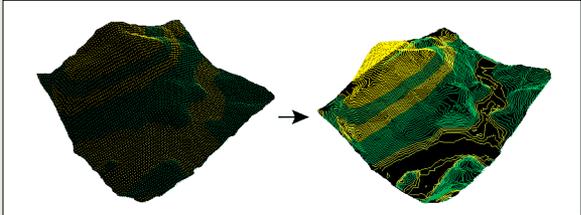
<b>B</b>							
<b>BaseConverter</b>	Converts an attribute's value from one numeric system (base) to another, putting the resulting value in a new attribute. <i>(Calculated Values, Strings categories)</i>						
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><b>Decimal</b></td> <td style="text-align: center;">→</td> <td style="text-align: center;"><b>Hex</b></td> </tr> <tr> <td style="text-align: center;">958713</td> <td></td> <td style="text-align: center;">EA0F9</td> </tr> </table>		<b>Decimal</b>	→	<b>Hex</b>	958713		EA0F9
<b>Decimal</b>	→	<b>Hex</b>					
958713		EA0F9					
<b>BinaryDecoder</b>	Converts ASCII text to binary data using Base64 or HEX decoding methods. <i>(Strings category)</i>						
<b>BinaryEncoder</b>	Converts binary data to ASCII strings using Base64 or HEX encoding methods. <i>(Strings category)</i>						
<b>BMGReprojector</b>	Reprojects feature coordinates from one coordinate system to another using the Blue Marble Geographic Calculator library. <i>(Coordinates, Integrations categories)</i>						
<b>BoundingBoxAccumulator</b>	Takes a set of point, linear, polygonal, and/or aggregate features and creates a two-dimensional bounding box, which contains all features. <i>(Spatial Analysis category)</i>						
<p>The diagram shows a collection of small black dots scattered on the left side of a white rectangular area. A black arrow points from this collection to a solid brown square on the right side of the same white area, representing the bounding box.</p>							

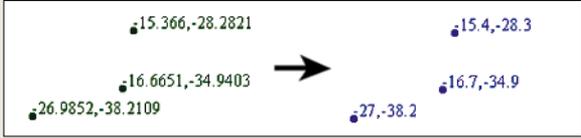
	<p><b>BoundingBoxReplacer</b></p> <p>Replaces the geometry of the feature with either its two-dimensional bounding box or its two-dimensional minimum oriented bounding box. (<i>Geometries category</i>)</p> 
<p><b>BoundsExtractor</b></p>	<p>Extracts the minimum and maximum values of the feature's coordinates into new attributes. (<i>Calculated Values category</i>)</p>
<p><b>NEW</b> <b>BoxConnector</b></p>	<p>Accesses the Box file storage service to upload, download, or delete files and folders or list file/folder information from a Box account. (<i>Integrations, Workflows categories</i>)</p>
<p><b>Bufferer</b></p>	<p>Expands or shrinks the boundary segments in the input geometry by a specified amount, and if necessary, connects them using stroked arcs. Aggregate geometries and groups are dissolved after the buffer operation. (<i>Spatial Analysis category</i>)</p>
<p><b>BulkAttributeRemover</b></p>	<p>Removes all attributes on incoming features that match a given regular expression. It can also be used to remove large numbers of attributes that have common naming. (<i>Attributes category</i>)</p>
<p><b>BulkAttributeRenamer</b></p>	<p>Renames attributes by adding or removing prefixes or suffixes, or replacing text in regular expressions or character strings. (<i>Attributes category</i>)</p>

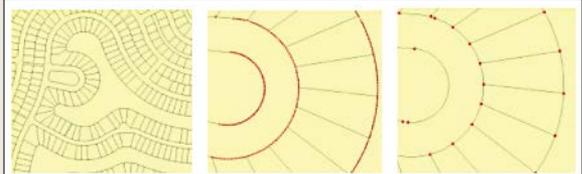
**B**  
**C**

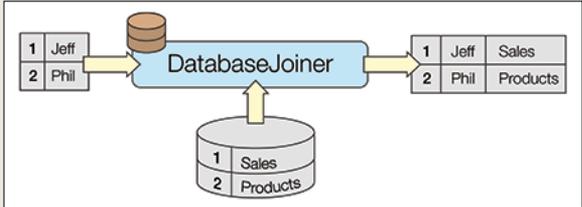
<p><b>C</b></p>	
<p><b>CenterLineReplacer</b></p>	<p>Replaces an area feature with its medial axis or a straight skeleton. This transformer works best with long, narrow areas. (<i>Geometries, Spatial Analysis categories</i>)</p> 
<p><b>CenterPointExtractor</b></p>	<p>Extracts and outputs the specified x, y, z attributes of a feature's point that is either in the center of the feature's bounding box, somewhere inside the feature's bounding box or at the center of mass of the feature. (<i>Calculated Values, Coordinates categories</i>)</p>

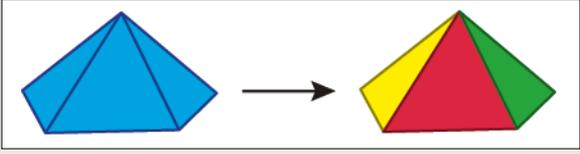
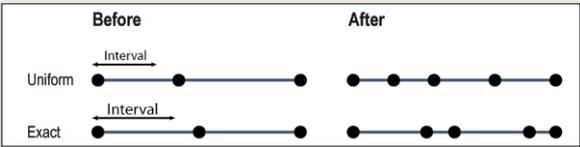
<b>CenterPointReplacer</b>	<p>Replaces the geometry of the feature with a point that is either in the center of the feature's bounding box, somewhere inside the feature's bounding box or replaces the geometry of the feature with a point at the center of mass of the feature. (<i>Geometries, Spatial Analysis categories</i>)</p> 
<b>ChangeDetector</b>	<p>Detects changes between two sets of input features. (<i>Data Quality, Filters and Joins categories</i>)</p> 
<b>CharacterCodeExtractor</b>	<p>Extracts the integral character code of the first character in the source string attribute, and adds its integer value in the character set to the feature as another attribute. This can be used to obtain the ASCII code of any character, including non-printable ones. (<i>Strings category</i>)</p>
<b>CharacterCodeReplacer</b>	<p>Sets the result attribute to the character whose numeric code was contained in the source code attribute (or the entered integer). (<i>Strings category</i>)</p>
<b>ChartGenerator</b>	<p>Creates a raster Line, Bar, Scatter, Histogram or Pie chart based on the values of selected attributes. (<i>Cartography and Reports, Rasters, Web categories</i>)</p>
<b>Chopper</b>	<p>Breaks input features into points, lines, or areas. Chopped features contain the same set of vertices as input features. (<i>Geometries category</i>)</p> 

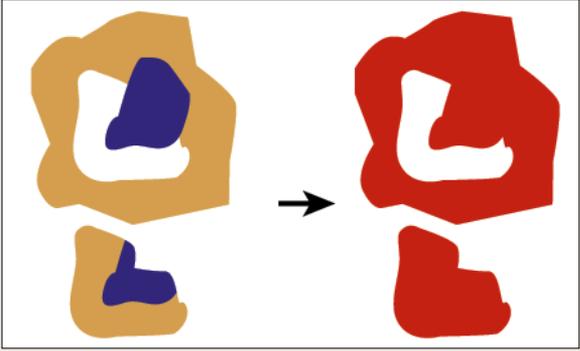
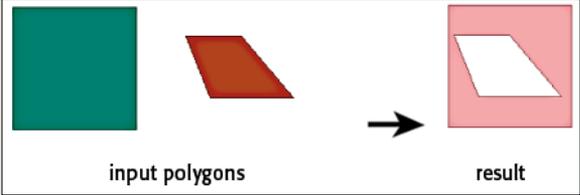
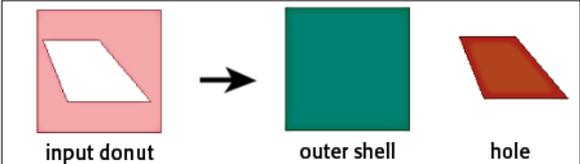
<b>CircularityCalculator</b>	Calculates the circularity of an area feature, which indicates how elongated the feature is. ( <i>Calculated Values, Data Quality categories</i> )
<b>Clipper</b>	<p>Performs a geometric clipping operation. (<i>Spatial Analysis category</i>)</p> 
<b>Cloner</b>	Makes the specified number of copies of the input features and outputs all copies through its single output port. ( <i>Workflows category</i> )
<b>ClosedCurveFilter</b>	Checks if curves form closed loops. Curves include lines, arcs, and paths. This transformer can also check aggregates of curves. An aggregate is closed if all of its elements are closed. If any element of an aggregate is not a curve, the aggregate is rejected. ( <i>Data Quality, Filters and Joins categories</i> )
<b>CommonLocalReprojector</b>	Reprojects a set of features to a local coordinate system with units of meters centered on the bounding box of the features. ( <i>Cartography and Reports, Coordinates categories</i> )
<b>CommonSegmentFinder</b>	Tests to see which of the CANDIDATE features have even one line segment in common with any BASE feature. ( <i>Data Quality category</i> )
<b>ContourGenerator</b>	<p>Constructs a Delaunay triangulation based on input points and breaklines. Contour lines are then generated from the triangulation. (<i>Spatial Analysis category</i>)</p> 
<b>ConvexityFilter</b>	Determines whether areas, surfaces, and solids are convex or concave. A polygon is simple when it is not self-intersecting and has a non-zero area. Simple polygons are convex if every internal angle is less than or equal to 180 degrees. All other polygons are considered concave. ( <i>Data Quality, Filters and Joins categories</i> )
<b>CoordinateConcatenator</b>	Retrieves the value of all of the feature's coordinates into an attribute, separated by the delimiter characters. ( <i>Calculated Values, Coordinates, Strings categories</i> )
<b>CoordinateCounter</b>	Stores the number of a feature's coordinates into an attribute. ( <i>Calculated Values, Coordinates, Data Quality categories</i> )
<b>CoordinateExtractor</b>	Retrieves the value of the x, y, and z coordinates at the specified index into attributes. ( <i>Calculated Values, Coordinates categories</i> )
<b>CoordinateRemover</b>	Removes one or more coordinates from the geometry of the feature. ( <i>Coordinates, Geometries categories</i> )
<b>CoordinateReplacer</b>	Finds and replaces user defined vertex coordinate values with specified values. ( <i>Coordinates, Geometries categories</i> )

<b>CoordinateRounder</b>	<p>Rounds off the feature's coordinates to the specified number of decimal places. Any consecutive points that become duplicates as a result of the rounding are thinned by removing the redundant points. (<i>Coordinates, Geometries categories</i>)</p> 
<b>CoordinateSwapper</b>	<p>Swaps coordinate axes of the input features. (<i>Coordinates, Geometries categories</i>)</p>
<b>CoordinateSystemDescription Converter</b>	<p>Converts coordinate systems between FME and Autodesk® WKT, EPSG, Esri® WKT, MapInfo®, OGC® WKT, Oracle® SRID, and PROJ.4 representations. (<i>Coordinates, Strings categories</i>)</p>
<b>CoordinateSystemExtractor</b>	<p>Retrieves the feature's coordinate system into an attribute. (<i>Coordinates category</i>)</p>
<b>CoordinateSystemRemover</b>	<p>Removes the coordinate system from all input features. This transformer does not reproject features or otherwise modify their geometry. (<i>Coordinates category</i>)</p>
<b>CoordinateSystemSetter</b>	<p>Tags all features with the specified coordinate system. It does not reproject features or otherwise modify their geometry. (<i>Coordinates category</i>)</p>
<b>Counter</b>	<p>Adds a numeric attribute to a feature and assigns a value. (<i>Calculated Values category</i>)</p>
<b>CRC Calculator</b>	<p>Calculates a CRC (Cyclic Redundancy Check) value for a feature and places the calculated CRC value into the attribute specified. (<i>Calculated Values, Data Quality categories</i>)</p>
<b>Creator</b>	<p>Creates features using the parameters supplied and sends them into the workspace for processing. (<i>3D, Workflows categories</i>)</p>
<b>CSG Builder</b>	<p>Creates Constructive Solid Geometry (CSG) from pairs of solid geometry features which are input through the A and B ports. (<i>3D, Geometries categories</i>)</p>
<b>CSG Evaluator</b>	<p>Recursively replaces the geometry of a feature that has CSG (Constructive Solid Geometry) by evaluating the tree of the CSG solid, effectively removing the constructive aspect of the geometry. (<i>3D category</i>)</p>
<b>CsmapAttributeReprojector</b>	<p>Reprojects attributes from one coordinate system to another using the CS-MAP library. (<i>Coordinates, Integrations categories</i>)</p>
<b>CsmapReprojector</b>	<p>Reprojects feature coordinates from one coordinate system to another using the CS-MAP library. (<i>Coordinates, Integrations categories</i>)</p>

<p><b>Curvefitter</b> </p>	<p>Smooths lines derived from line segments, points, or raster data, and replaces a series of line segments with the optimal combination of straight lines and embedded arc segments required to create smooth curving lines. This process provides a truer representation of real-world features and can reduce file sizes by up to 80%. In addition to processing simple line features, the Curvefitter preserves feature topology when smoothing boundaries of adjacent area features. <i>(Cartography and Reports, Geometries, Integrations categories)</i></p> <div data-bbox="394 305 976 505">  <p style="display: flex; justify-content: space-around;"><span>Parcel Data</span> <span>Before Curvefitter</span> <span>After Curvefitter</span></p> </div>
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<b>D</b>	
<p><b>DatabaseDeleter</b></p>	<p>Delete rows in a database table based on the condition specified. <i>(Format Specific, Integrations, Workflows categories)</i></p>
<p><b>DatabaseJoiner</b></p>	<p>Joins attributes from an external table to incoming features as they are being processed through a translation. <i>(Attributes, Filters and Joins categories)</i></p> <div data-bbox="394 704 976 911">  </div>
<p><b>DatabaseUpdater</b></p>	<p>Update fields in a database table based on the condition specified. <i>(Format Specific, Integrations, Workflows categories)</i></p>
<p><b>DateFormatter</b></p>	<p>Reformats and replaces date or time strings into a new date format. The source string must be in a date and/or time format supported by the transformer. Some valid examples include:</p> <ul style="list-style-type: none"> <li>• 20091206 15:05</li> <li>• 20091206150500</li> <li>• December 6, 2009</li> <li>• 06 December 09, 15:05</li> <li>• 3:05pm</li> </ul> <p><i>(Calculated Values, Strings categories)</i></p>
<p><b>NEW</b> <b>DateTimeCalculator</b></p>	<p>Performs arithmetic on date, time, datetime, and interval values. <i>(Calculated Values category)</i></p>

<b>Deagggregator</b>	<p>Decomposes an aggregate feature into its components. (<i>Attributes, Filters and Joins categories</i>)</p> 
<b>Decelerator</b>	<p>Slows down the flow of features through the workspace. (<i>Web, Workflows categories</i>)</p>
<b>DecimalDegreesCalculator</b>	<p>Calculates a decimal degree value from separate degrees, minutes, and seconds (DMS) values, stored in attributes. (<i>Calculated Values, Coordinates categories</i>)</p>
<b>DEMDistanceCalculator</b>	<p>Calculates the distance between a number of input vector lines and the elevation values of a reference DEM raster. Outputs a new DEM raster per input line. The data contained in the resulting DEM consists of the 3D distance between the line being considered and the corresponding point on the reference DEM. (<i>3D, Calculated Values, Rasters, Spatial Analysis categories</i>)</p>
<b>DEMGenerator</b>	<p>Constructs a Delaunay triangulation based on input points and breaklines. That triangulation is then uniformly sampled to produce a digital elevation model (DEM points). (<i>3D, Point Clouds categories</i>)</p>
<b>Densifier</b>	<p>Adds vertices to each feature by interpolating new coordinates at fixed intervals. (<i>Geometries category</i>)</p> 
<b>DensityCalculator</b>	<p>Determines the density of a group of CANDIDATE features based on the area of a corresponding AREA feature. (<i>Calculated Values category</i>)</p>
<b>DGNStyler</b>	<p>Prepares features for output to Bentley® Microstation® Design V7/V8 by providing a convenient interface to set a variety of format-specific attributes. (<i>Cartography and Reports, Format Specific categories</i>)</p>
<b>DimensionExtractor</b>	<p>Returns the dimension of the feature as a new attribute. (<i>3D, Calculated Values, Coordinates, Data Quality, Strings categories</i>)</p>
<b>DirectTweeter</b>	<p>Sends a direct Twitter™ message from Workbench. (<i>Integrations, Web categories</i>)</p>
<b>Displacer</b>	<p>Solves proximity conflicts between features using a variant of the Nickerson displacement algorithm. (<i>Cartography and Reports, Geometries, Spatial Analysis categories</i>)</p>

<p><b>Dissolver</b></p>	<p>Dissolves area features by removing common boundaries to create larger areas. Input attributes may be accumulated. <i>(Geometries, Spatial Analysis categories)</i></p> 
<p><b>DMSCalculator</b></p>	<p>Calculates degrees, minutes, and seconds (DMS) from a decimal degrees value stored in an attribute. <i>(Calculated Values, Coordinates categories)</i></p>
<p><b>DonutBridgeBuilder</b></p>	<p>Builds connections between donut holes with the outer boundary of a donut, resulting in a polygon-equivalent representation of the input donut. <i>(Geometries, Spatial Analysis categories)</i></p>
<p><b>DonutBuilder</b></p>	<p>Cuts holes in polygonal features by making polygons completely enclosed in other polygons into holes of the containing polygon. <i>(Geometries category)</i></p> 
<p><b>DonutHoleExtractor</b></p>	<p>Splits an area feature that has holes into its component rings. <i>(Geometries category)</i></p> 
<p><b>DropboxConnector</b></p>	<p>Accesses the Dropbox file storage service to upload, download, or delete files and folders or list the contents of a folder from a Dropbox account. <i>(Integrations, Web categories)</i></p>
<p><b>DuplicateFilter</b></p>	<p>Detects duplicate features based on the value of one or more key attributes. <i>(Data Quality, Filters and Joins categories)</i></p>
<p><b>DWGStyler</b></p>	<p>Prepares features for output to AutoCAD® DWG™/DXF™ by providing a convenient interface to set a variety of AutoCAD DWG/DXF format-specific attributes. <i>(Cartography and Reports, Format Specific categories)</i></p>

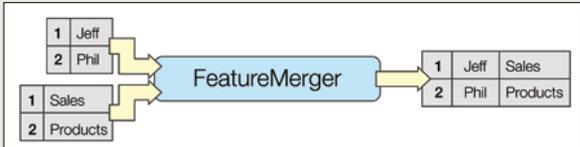
**E**

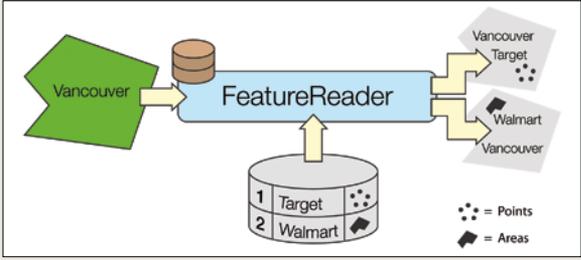
<b>ElevationExtractor</b>	Extracts the elevation of the first coordinate and assigns it to the named attribute. <i>(3D, Calculated Values, Coordinates, Data Quality, Strings categories)</i>
<b>EllipsePropertyExtractor</b>	Sets the given attributes to the properties of an ellipse geometry. <i>(Calculated Values category)</i>
<b>EllipsePropertySetter</b>	Sets the properties of an ellipse geometry. <i>(Geometries category)</i>
<b>Emailer</b>	Sends one email per input feature via Simple Mail Transfer Protocol (SMTP). Both HTML and Plain Text emails may be sent, each with one or more attachments. <i>(Integrations, Web categories)</i>
<b>EnvironmentVariableFetcher</b>	Fetches the specified environment variable and includes it in a new attribute. <i>(Workflows category)</i>
<b>EsriReprojector</b>	Reprojects feature coordinates from one coordinate system to another using the Esri reprojection library. <i>(Coordinates, Format Specific, Integrations categories)</i>
<b>ExpressionEvaluator</b>	Performs a mathematical calculation on an expression that consists of FME Feature Functions, String Functions, Math Functions, and Math Operators. <i>(Calculated Values, Strings categories)</i>
<b>Extruder</b>	Creates line, surface or solid geometries with a fixed cross-sectional profile taken from the original geometry of the feature. <i>(3D, Geometries categories)</i>

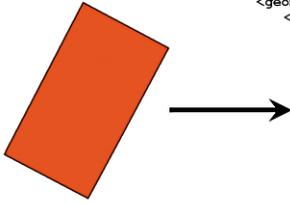


**F**

<b>FaceReplacer</b>	Replaces the geometry of a feature from donut, raster or polygon to face. <i>(3D, Geometries categories)</i>
<b>FeatureColorSetter</b>	Assigns colors to incoming features. <i>(Cartography and Reports category)</i>
<b>FeatureHolder</b>	Stores incoming features until they have all arrived and then releases them in their original order. <i>(Workflows category)</i>
<b>FeatureMerger</b>	Copies and merges the attributes/geometry from one feature (or multiple features) onto another feature (or multiple features). <i>(Filters and Joins category)</i>



<b>FeatureReader</b>	<p>Reads features from any FME-supported format. (<i>Filters and Joins, Format Specific, Spatial Analysis, Workflows categories</i>)</p> 
<b>FeatureTypeExtractor</b>	<p>Adds an attribute containing the original feature type of a feature. (<i>Workflows category</i>)</p>
<b>FeatureTypeFilter</b>	<p>Routes input features to different output ports based on their original feature type. (<i>Data Quality, Filters and Joins categories</i>)</p>
<b>FeatureWriter</b>	<p>Writes features to any FME-supported Writer. (<i>Format Specific, Workflows categories</i>)</p>
<b>FilenamePartExtractor</b>	<p>Extracts specified parts of a filename path and returns the results as string attributes. (<i>Strings category</i>)</p>
<b>FMEFunctionCaller</b>	<p>Calls the specified FME function, optionally putting the resulting value in the Result Attribute. (<i>Workflows category</i>)</p>
<b>FMEServerJobSubmitter</b>	<p>Submits FME Spatial ETL jobs to be run on an FME Server. A job consists of a workspace (housed within a repository on an FME Server) together with values for each of its published parameters. (<i>Integrations, Web, Workflows categories</i>)</p>
<b>FMEServerJobWaiter</b>	<p>Waits until submitted FME Spatial ETL jobs are completely processed by an FME Server. The list of jobs to wait for is identified by the job IDs of the input features. When a job that the transformer is waiting for is completed, it outputs the corresponding feature immediately. (<i>Integrations, Web, Workflows categories</i>)</p>
<b>FMEServerLogFileRetriever</b>	<p>Accesses the translation log for a specified FME Server-run translation. The translation log to access is identified by the job ID input parameter. (<i>Integrations, Web, Workflows categories</i>)</p>
<b>FMEServerNotifier</b>	<p>Sends a notification to a specified FME Server. The notification may be used for a variety of actions, such as triggering a downstream workspace, or sending an e-mail message to subscribed clients. (<i>Integrations, Web, Workflows categories</i>)</p>
<b>NEW FMEServerResource Connector</b>	<p>Accesses the FME Server file storage service to upload, download, or delete files and folders or list information about files/folders from a FME Server account. (<i>Integrations, Web, Workflows categories</i>)</p>
<b>FTPCaller</b>	<p>Uploads and downloads data from an FTP server. (<i>Integrations, Web, Workflows categories</i>)</p>
<b>G</b>	
<b>GCMMessenger</b>	<p>Sends messages to Android devices using Google Cloud Messaging (GCM). (<i>Integrations, Web categories</i>)</p>

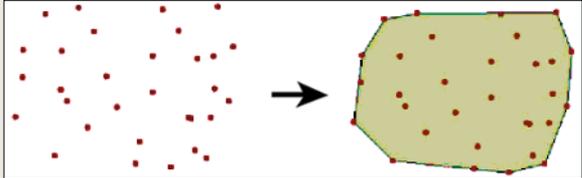
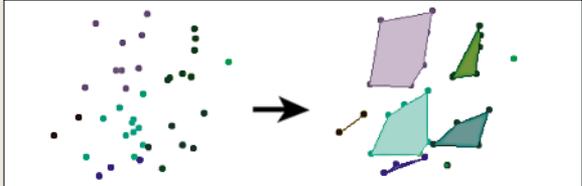
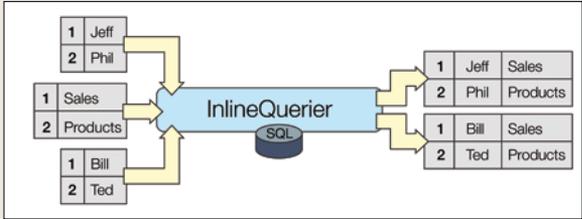
<b>Generalizer</b>	<p>Transforms or measures geometry features based on a specified algorithm. There are four algorithm types:</p> <ul style="list-style-type: none"> <li>Generalizing algorithms reduce the density of coordinates by removing vertices.</li> <li>Smoothing algorithms determine a new location for each vertex.</li> <li>Measuring algorithms calculate the location of points and return a list of these points (for example, to measure the sinuosity of a feature).</li> <li>Fitting algorithms replace the original geometry completely, with a new feature fitted to a specified line (for example, to minimize the orthogonal distance to the original).</li> </ul> <p><i>(Cartography and Reports, Geometries, Web categories)</i></p>
<b>Geocoder</b>	<p>Uses various external web services to convert addresses to latitude/longitude coordinates, or to find the closest addresses to latitude/longitude coordinates (reverse geocode). Some services have additional information available, such as time zone or elevation. <i>(Integrations, Web categories)</i></p>
<b>GeographicBufferer</b>	<p>Expands or shrinks the boundary segments in the input geometry by a specified amount, and if necessary, connects them using stroked arcs. <i>(Spatial Analysis category)</i></p>
<b>GeometryCoercer</b>	<p>Resets the geometry type of the feature. <i>(Geometries, Point Clouds categories)</i></p>
<b>GeometryColorSetter</b>	<p>Sets colors, via appearances, on geometries (such as surfaces) that support appearances, and match a Geometry XQuery. <i>(Cartography and Reports category)</i></p> <div data-bbox="370 764 951 1081" style="text-align: center;">  <p><b>Random</b>                      <b>Randomize by Trait</b></p> </div>
<b>GeometryExtractor</b>	<p>Extracts the geometry of a feature according to the setting of the geometry encoding parameter. The resulting encoded geometry is added to the feature in an attribute. This attribute can later be restored as the feature's geometry using the GeometryReplacer transformer.</p> <p><i>(Calculated Values, Format Specific, Geometries, Workflows categories)</i></p> <div data-bbox="370 1243 951 1507" style="text-align: center;">  <pre data-bbox="655 1247 940 1503"> &lt;?xml version="1.0"?&gt; &lt;geometry&gt;   &lt;polygon&gt;     &lt;line&gt;       &lt;coord x="3128835.08"             y="10085908.66" /&gt;       &lt;coord x="3128900.58"             y="10085874" /&gt;       &lt;coord x="3128963.41"             y="10085992.41" /&gt;       &lt;coord x="3128896.66"             y="10086028.33" /&gt;       &lt;coord x="3128835.08"             y="10085908.66" /&gt;     &lt;/line&gt;   &lt;/polygon&gt; &lt;/geometry&gt; </pre> </div>

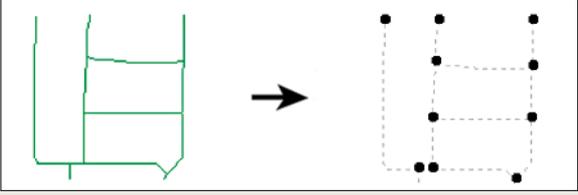
<b>GeometryFilter</b>	Routes a feature based on its geometry type. ( <i>Data Quality, Filters and Joins categories</i> )
<b>GeometryInstantiator</b>	Replaces a geometry definition with independent geometry instances that are copies of the original geometry definition. The affine transformation that defined the position of each instance in the geometry definition, including position, scale, and rotation, is applied to each instance. ( <i>3D category</i> )
<b>GeometryPartExtractor</b>	Extracts or removes selected geometry parts based on a Geometry XQuery. ( <i>3D category</i> )
<b>GeometryPropertyExtractor</b>	Extracts selected geometry names or traits to feature attributes. ( <i>3D category</i> )
<b>GeometryPropertyRemover</b>	Removes selected geometry names or traits. ( <i>3D category</i> )
<b>GeometryPropertyRenamer</b>	Renames geometry names or traits. ( <i>3D category</i> )
<b>GeometryPropertySetter</b>	Sets selected geometry names or traits from feature attributes or constants. ( <i>3D category</i> )
<b>GeometryRefiner</b>	Performs the following refinements on the feature's geometry: <ul style="list-style-type: none"> <li>• Any homogeneous IFMEAggregate becomes a multi (IFMEMultiCurve, IFMEMultiArea, IFMEMultiPoint, or IFMEMultiText).</li> <li>• Any IFMEAggregate or multi with only one member is replaced by its single part.</li> <li>• Any IFMEDonut with no holes becomes an IFMEPolygon or IFMEEllipse.</li> <li>• Any IFMEPath with only one segment is replaced by that segment.</li> <li>• Consecutive IFMELine segments within an IFMEPath are combined</li> </ul> ( <i>Geometries category</i> )
<b>GeometryRemover</b>	Completely removes the geometry of the feature, for example, if you want to turn spatial data into non-spatial data. ( <i>Geometries category</i> )
<b>GeometryReplacer</b>	Replaces the feature's geometry according to the setting of the geometry encoding parameter. This transformer is typically used to restore geometry previously extracted into an attribute by the GeometryExtractor. ( <i>Format Specific, Geometries, Workflows categories</i> )
<b>GeometryValidator</b>	Detects selected issues in input features, and optionally repairs detected issues. Each input feature is processed individually. ( <i>Data Quality category</i> ) <div data-bbox="394 1105 977 1419" data-label="Diagram"> <p>The diagram shows two stages of a geometry transformation. On the left, labeled 'Donut Area', there is a light blue square with an outer boundary (red line with vertices 1-8) and an inner boundary (blue line with vertices A-D) forming a yellow diamond-shaped hole. The entire area is labeled 'Universe'. An arrow points to the right, where the 'Polygon Area' is shown. The outer boundary remains the same (red line with vertices 1-8), but the inner boundary is now a blue diamond with vertices B-C-D-A, and the area between the boundaries is now a single light blue polygon. This is also labeled 'Universe'.</p> </div>
<b>GeoRSSFeatureComposer</b>	Constructs GeoRSS documents from the input features and stores them in the specified attribute for the features that are output by the GeoRSS port. ( <i>Format Specific, Web categories</i> )

	<b>GeoRSSFeatureReader</b>	Constructs features out of GeoRSS documents/URLs that are stored in a specified attribute of the input features. The features from the GeoRSS document/URL are output with the attributes from the original feature and are merged, if desired. ( <i>Format Specific, Web categories</i> )
	<b>GMLFeatureComposer</b>	Writes out GML features corresponding to feature types from existing GML application schema. ( <i>Format Specific category</i> )
	<b>GOIDGenerator</b>	Calculates a GOID (Geographic Object IDentifier) for each incoming feature, and adds it as a new attribute. The GOID is a unique 128-bit number that incorporates the position of a feature with other numbers. The result is a unique value that may be used to distinguish features from each other. ( <i>Calculated Values category</i> )
<b>NEW</b>	<b>GoogleDriveConnector</b>	Accesses the Google Drive file storage service to upload, download, or delete files and folders or list the contents of a folder from a Google Drive account. ( <i>Integrations, Workflows categories</i> )
<b>G H</b>	<b>GridInquestIIReprojector</b>	Reprojects feature coordinates from one coordinate system to another using the Grid InQuestII reprojection library. ( <i>Coordinates, Integrations categories</i> )
	<b>GridInquestReprojector</b>	Reprojects feature coordinates from one coordinate system to another using the Grid InQuest reprojection library. ( <i>Coordinates, Integrations categories</i> )
	<b>GtransAttributeReprojector</b>	Reprojects attributes holding coordinate values from one coordinate system to another using the Gtrans reprojection library (from the National Land Survey of Sweden), and the specified translation file. ( <i>Coordinates, Integrations categories</i> )
	<b>GtransReprojector</b>	Reprojects features from one coordinate system to another using the Gtrans reprojection library (from the National Land Survey of Sweden) and the specified translation file. ( <i>Coordinates, Integrations categories</i> )

## H

	<b>HoleCounter</b>	Adds a new attribute whose value is the number of holes in the feature. ( <i>Calculated Values, Data Quality categories</i> )
<b>NEW</b>	<b>HTMLExtractor</b>	Extracts structured data from web page or other HTML sources that are formatted for human readability (screen scraping), using CSS selectors to extract portions of HTML content into feature attributes. ( <i>Integrations, Strings, Web, Workflows categories</i> )
	<b>HTMLLayouter</b>	Allows users to combine web reports generated by the HTMLReportGenerator into a bootstrap grid or vertical layout. ( <i>Format Specific, Web categories</i> )
	<b>HTMLReportGenerator</b>	Allows users to create a basic web report of vertically-stacked elements using the geometry and selected attributes from features. ( <i>Format Specific, Web categories</i> )
	<b>HTMLToXHTMLConverter</b>	Converts HTML document into valid XHTML document. ( <i>Format Specific, Strings, Web categories</i> )
	<b>HTTPCaller</b>	Accesses a URL via HTTP or HTTPS, performing a GET, PUT, POST, DELETE, HEAD, PATCH or OPTIONS operation. ( <i>Web, Workflows categories</i> )

<b>HullAccumulator</b>	<p>Creates convex or concave hulls for groups of features. One hull feature is output for each unique combination of values of the attributes specified in the Group By parameter. <i>(Spatial Analysis category)</i></p> 
<b>HullReplacer</b>	<p>Replaces the geometry of the feature with a polygon representing its hull. <i>(Geometries category)</i></p> 
<b>I</b>	
<b>IFCPropertySetDefinition Creator</b>	<p>Creates a feature whose attributes contain the definition of an IFC property set. The features output from this transformer are similar to the PropertySetDefinition features produced by the IFC reader. <i>(3D, Format Specific categories)</i></p>
<b>IFCQuantitySetDefinition Creator</b>	<p>Creates a feature whose attributes contain the definition of an IFC quantity set. The features output from this transformer are similar to the QuantitySetDefinition features produced by the IFC reader. <i>(3D, Format Specific categories)</i></p>
<b>ImageFetcher</b>	<p>Fetches an image by performing an HTTP GET operation on the specified URL, and then returning the resulting data as the geometry of a raster feature. <i>(Rasters, Workflows categories)</i></p>
<b>ImageRasterizer</b>	<p>Draws input point, line, and polygon features onto a color raster filled with the background color. <i>(Cartography and Reports, Rasters categories)</i></p>
<b>InlineQuerier</b>	<p>Executes SQL queries against a temporary database consisting of tables created from incoming features, returning the results as new features. <i>(Workflows category)</i></p> 
<b>Inspector</b>	<p>Sends features to the FME Data Inspector for display. <i>(Data Quality, Workflows categories)</i></p>

<b>Intersector</b>	<p>Computes intersections between all input features, and breaks lines and polygons wherever an intersection occurs. (<i>Geometries, Spatial Analysis categories</i>)</p> 
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## J

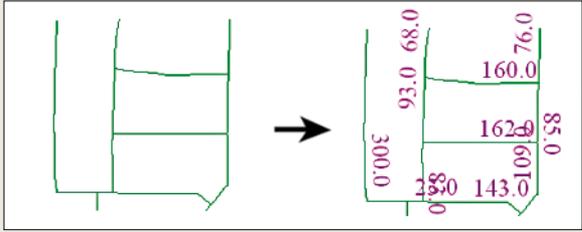
<b>JavaScriptCaller</b>	Executes a JavaScript script to manipulate the feature. ( <i>Web, Workflows categories</i> )
<b>JMSReceiver</b>	Using the Java Message System (JMS), receives messages from a message broker. ( <i>Integrations, Web categories</i> )
<b>JMSSender</b>	Using the Java Message System (JMS), sends messages to a message broker. ( <i>Integrations, Web categories</i> )
<b>JSONExtractor</b>	Extracts portions of JSON (JavaScript Object Notation) formatted text into feature attributes. ( <i>Format Specific, Web categories</i> )
<b>JSONFlattener</b>	Flattens JSON objects, extracting the object keys and values into FME feature attributes. ( <i>Format Specific, Web categories</i> )
<b>JSONFormatter</b>	Provides options for formatting JSON text. ( <i>Format Specific, Web categories</i> )
<b>JSONFragmenter</b>	Extracts portions of JSON formatted text into new FME features. ( <i>Format Specific, Web categories</i> )
<b>JSONTemplater</b>	Populates a JSON document with FME feature attribute values. ( <i>Format Specific, Web categories</i> )
<b>JSONUpdater</b>	This transformer creates, modifies, replaces or deletes object and array values in a JSON document. ( <i>Format Specific, Web categories</i> )
<b>JSONValidator</b>	Validates the syntax of JSON text. ( <i>Data Quality, Format Specific, Web categories</i> )

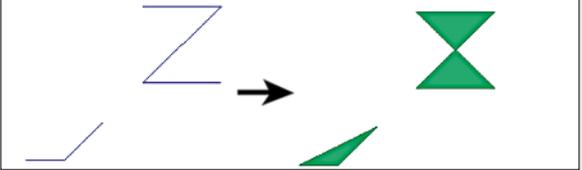
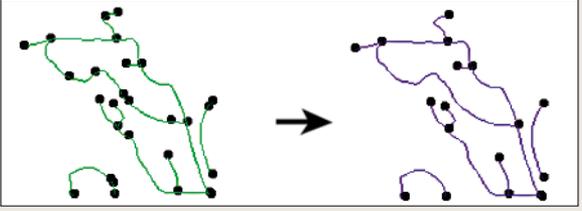
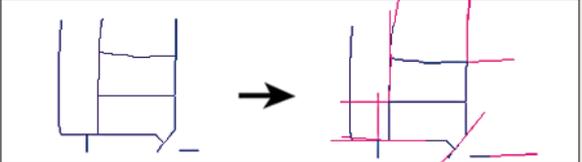
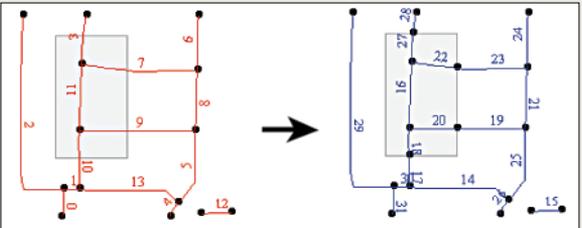
## K

<b>KinesisReceiver</b>	Using the Amazon Kinesis service, receives data records from an Amazon Kinesis stream. ( <i>Integrations category</i> )
<b>KinesisSender</b>	Using the Amazon Kinesis service, sends data records to an Amazon Kinesis stream. ( <i>Integrations category</i> )
<b>KMLPropertySetter</b>	Sets common properties for groups of vector and raster features destined for the OGCKML Writer. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>KMLRegionSetter</b>	Sets the region-related KML attributes for a group of features destined for the OGCKML Writer. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>KMLStyler</b>	Creates a common style for a group of features destined for the OGCKML writer. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>KMLTimeSetter</b>	Sets the time-related KML attributes for a group of features destined for the OGCKML Writer. ( <i>Cartography and Reports, Format Specific categories</i> )

<b>KMLTourBuilder</b>	Generates a KML Tour from the input features. The tour consists of four stops that correspond to each input feature. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>KMLViewSetter</b>	Sets the view-related KML attributes for a group of features that are destined for the OGCKML Writer. Creation of LookAt or Camera views are supported. ( <i>Cartography and Reports, Format Specific categories</i> )

## L

<b>Labeller</b>	Interpolates labels along a linear or polygonal feature. ( <i>Cartography and Reports category</i> )
	
<b>LabelPointReplacer</b>	Replaces the geometry of the feature with a label point. The insertion point of the text is guaranteed to be inside (in case of polygons) or on (lines and points) the original object. Note that since the text itself may be larger than an input area feature, the bounds of the label may exceed the bounds of the area. ( <i>Cartography and Reports, Geometries categories</i> )
	
<b>LatLongToMGRSConverter</b>	Calculates a Military Grid Reference System (MGRS) code based on the latitude and longitude values supplied in a feature's attributes. ( <i>Coordinates category</i> )
<b>LeftRightSpatialCalculator</b>	Computes relative position of CANDIDATE input features relative to BASE input features. The geometry of a BASE feature is restricted to lines. ( <i>Calculated Values category</i> )
<b>LengthCalculator</b>	Calculates the length of a feature and adds it as a new attribute. ( <i>Calculated Values category</i> )
<b>LengthToPointCalculator</b>	Calculates the length of a feature from its start until the closest spot to a point and adds it as a new attribute. The point coordinates are taken from attributes in the original feature. ( <i>Calculated Values category</i> )
<b>LicenseChecker</b>	Checks whether the license file is valid and the specified product name is licensed, based on a vendor key and vendor registration code. ( <i>Workflows category</i> )

<p><b>LineBuilder</b></p>	<p>Connects input point features in the order they enter, forming linear or polygonal features. <i>(Geometries category)</i></p> 
<p><b>LineCloser</b></p>	<p>Turns input linear features into areas by adding their start point as the end point. <i>(Geometries category)</i></p> 
<p><b>LineCombiner</b></p>	<p>Takes lines and connects them to form longer lines. Each connecting line must meet at the exact same start/end point, but otherwise they must not intersect. <i>(Geometries category)</i></p> 
<p><b>LineExtender</b></p>	<p>Creates two-point extensions to linear features that extend the feature by a user-specified length. This transformer can also output the original feature with the first and last segments stretched by a user-specified amount. <i>(Geometries category)</i></p> 
<p><b>LineOnAreaOverlayer</b></p>	<p>Performs a line-on-area overlay. Each input line is split at any area boundaries it intersects. <i>(Filters and Joins category)</i></p> 

L

<b>LineOnLineOverlayer</b>	Performs a line-on-line overlay in which all input lines are intersected against each other and resultant line features are created and output. <i>(Filters and Joins category)</i>
<b>ListBasedFeatureMerger</b>	Copies and merges the attributes/geometry from one feature (or multiple features) onto another feature (or multiple features). <i>(Filters and Joins category)</i>
<b>ListBuilder</b>	Combines attributes of the input features into a single list structure. <i>(Attributes category)</i>
<b>ListConcatenator</b>	Concatenates all values of a list into a single attribute. <i>(Attributes category)</i>
<b>ListCopier</b>	Copies a complete attribute list, including all nested attributes, from one list name to another. <i>(Attributes category)</i>
<b>ListDuplicateRemover</b>	Removes all duplicate values from a list attribute. In the resulting list, only distinct values for the list attribute will be present. <i>(Data Quality, Strings categories)</i>
<b>ListElementCounter</b>	Stores the number of member elements found in the specified list into an attribute. <i>(Data Quality category)</i>
<b>ListExploder</b>	Explodes each list member on each input feature out into its own feature. <i>(Attributes category)</i>
<b>ListExpressionPopulator</b>	Populates a new list from a series of attributes, specified using a regular expression. <i>(Attributes category)</i>
<b>ListHistogrammer</b>	Computes a histogram of the values found in a list and returns these in a new list attribute on the feature. <i>(Calculated Values, Data Quality categories)</i>
<b>ListIndexer</b>	Copies the attributes of the list element specified by the index to become main attributes of the feature. <i>(Attributes category)</i>
<b>ListPopulator</b>	Populates a new list from a series of attributes. The attributes to be used are specified by the prefix parameter. <i>(Attributes category)</i>  <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Example:</p> <p><i>myattrib0</i></p> <p><i>myattrib1</i></p> <p><i>myattrib2</i></p> <p>becomes a list <i>myattrib{}</i> containing entries <i>myattrib{0}</i>, <i>myattrib{1}</i>, <i>myattrib{2}</i></p> </div>
<b>ListRangeExtractor</b>	Extracts the minimum and maximum values found in a list. <i>(Calculated Values category)</i>
<b>ListRenamer</b>	Renames or promotes list names or components. <i>(Attributes category)</i>
<b>ListSearcher</b>	Searches a list to find a value and returns the index of the value in the list. <i>(Strings category)</i>
<b>ListSorter</b>	Sorts the elements of the given list into a new list. <i>(Attributes category)</i>
<b>ListSummer</b>	Computes the sum of all elements of a list. <i>(Strings category)</i>
<b>LocalCoordinateSystemSetter</b>	Tags all features with the local coordinate system defined by the specified parameters. It does not reproject features, or otherwise modify their geometry. <i>(Coordinates category)</i>

<b>Logger</b>	Logs each feature to the translation log. All attributes and geometry of the feature will be output. ( <i>Workflows category</i> )
<b>LogMessageStreamer</b>	Captures messages from the FME logfile and/or the Logger transformer. The messages are loaded onto features created by the transformer. Limitations: Messages outside the lifetime of the transformer cannot be captured. ( <i>Workflows category</i> )

## M

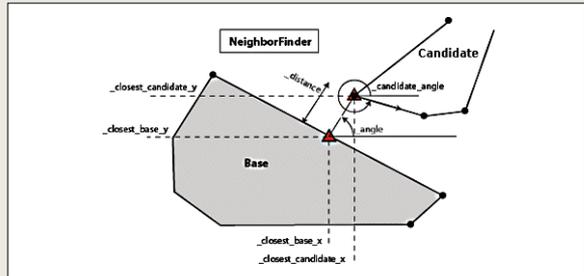
<b>MapboxStyler</b>	Creates a common style for a group of features destined for the GeoJSON writer. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>MapInfoStyler</b>	Prepares features for output to Mapinfo® MIF/MID or MapInfo TAB by providing a convenient interface to set a variety of format-specific attributes. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>MapnikRasterizer</b>	Draws input point, line, polygon, and raster features onto a raster using the Mapnik toolkit. ( <i>Cartography and Reports, Rasters categories</i> )
<b>MapTextLabeller</b> 	Creates text labels for features using the MapText Label Manager. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>MapTextStyler</b>	Prepares features for labelling by the MapTextLabeller by specifying no-label zones around features. ( <i>Cartography and Reports, Format Specific categories</i> )
<b>Matcher</b>	<p>Detects features that are matches of each other. Features are declared to match when they have matching geometry, matching attribute values, or both. (<i>Data Quality category</i>)</p> <div data-bbox="370 784 950 984" data-label="Image"> <p style="text-align: center;"><b>features to match</b> <span style="margin-left: 200px;">→</span> <b>matched</b></p> </div>
<b>MeasureExtractor</b>	Extracts the measures of geometries that match the given type, and places them in attributes or list attributes. ( <i>Calculated Values category</i> )
<b>MeasureGenerator</b>	Creates a set of measures attached to the geometry of the feature, where each value is the distance from the start of the line to that vertex, multiplied by the given Multiplier. ( <i>Calculated Values category</i> )
<b>MeasureRemover</b>	Removes measures from a feature's geometry. ( <i>Geometries category</i> )
<b>MeasureSetter</b>	Sets measure(s) on a point, line, arc, area geometry or a vertex of a linear geometry to attribute value(s) of given attribute(s) or list attribute. ( <i>Geometries category</i> )
<b>MeshMerger</b>	Merges mesh features (features with IFMEMesh geometries) into a single output mesh. ( <i>3D, Geometries categories</i> )
<b>MGRSToLatLongConverter</b>	Converts Military Grid Reference System (MGRS) code to longitude and latitude coordinates. ( <i>Coordinatess category</i> )
<b>MinimumAreaForcer</b>	Ensures that features with polygon geometry have an area that is equal to, or in excess of, the specified minimum area. ( <i>Geometries category</i> )

<b>MinimumSpanningCircle Replacer</b>	Replaces the geometry of the feature with a polygon representing its minimum spanning circle. The minimum spanning circle is defined as the smallest circle that encloses all vertices of the passed-in feature. ( <i>Geometries category</i> )
<b>ModuloCounter</b>	Adds an attribute holding the next integer in a sequence, restarting the count at 0 whenever the sequence reaches the specified maximum value. ( <i>Calculated Values category</i> )
<b>MRF2DCleaner</b> ☺	Fixes geometric problems in input data, such as line overshoots and undershoots within the user-specified tolerance. It is useful for multi-layer and multi-tolerance two-dimensional data cleaning. ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DConflator</b> ☺	Changes the geometry of a feature to match that of another, if the two have approximately the same shape and location, and have matching endpoints. ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DDangleRemover</b> ☺	Removes features that have at least one free endpoint and have lengths smaller than (Dangle Factor * Cleaning Tolerance) or (Dangle Factor * value of Feature Tolerance Attribute). ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DDuplicateRemover</b> ☺	Deletes duplicated features. Features are considered to be duplicates if their geometries are within tolerance and only features with a smaller tolerance will remain after cleaning. ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DExtender</b> ☺	Extends arcs and lines that are within the specified tolerance to correct undershoots while maintaining line-work direction. ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DGeneralizer</b> ☺	Removes a number of vertices from lines. The number of vertices removed is controlled by a weeding tolerance. ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DIntersector</b> ☺	Computes intersections between all input features, breaking arcs and lines wherever an intersection occurs. ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DJoiner</b> ☺	Joins connected features to form longer ones. A pair of linear features become candidates for joining only when the two are connected at a given node or end point. ( <i>Data Quality, Integrations categories</i> )
<b>MRF2DShortGeometry Remover</b> ☺	Removes features that have lengths smaller than the specified tolerance, if Short Geometry Action is set to Remove. ( <i>Data Quality, Integrations categories</i> )
<b>MRF3DCleaner</b> ☺	Fixes geometric problems in input data such as line overshoots and undershoots within the user-specified tolerance. It is useful for multi-layer and multi-tolerance three-dimensional data cleaning. ( <i>3D, Data Quality, Integrations categories</i> )
<b>MultipleGeometryFilter</b>	Filters aggregate features based on the type of aggregate. ( <i>Filters and Joins category</i> )
<b>MultipleGeometrySetter</b>	Provides the ability to set up an aggregate where each part is independent from the others and is its own complete geometry. ( <i>Geometries category</i> )

**N**

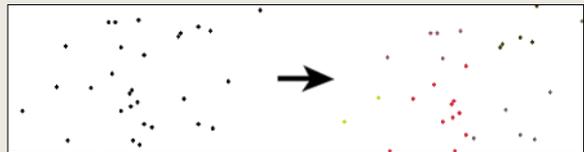
**NeighborFinder**

Finds the closest CANDIDATE feature within a specified maximum distance of each BASE feature. *(Spatial Analysis category)*



**NeighborhoodAggregator**

Creates aggregates of features based on their proximity to each other. *(Filters and Joins, Spatial Analysis categories)*



**NeighborPairFinder**

Finds the closest two CANDIDATE features within some maximum distance of each BASE feature and some minimum separation in heading between the CANDIDATES and the BASE. *(Spatial Analysis category)*

**NetworkCostCalculator**

Computes and assigns the cost of the shortest path from a source object to each connected object as the Z-values or measure values of the input features. *(Calculated Values, Spatial Analysis categories)*

**NetworkFlowOrientor**

Fixes the flow (direction) of each edge or linear feature in the network to fit the downstream direction to the destination node. *(Spatial Analysis category)*

**NetworkTopologyCalculator**

Finds the connected lines that belong to the same network graph. *(Calculated Values, Spatial Analysis categories)*

**NullAttributeMapper**

Maps specified attributes on a feature to specified values. This transformer is capable of mapping to and from null values, empty strings, and missing attributes. *(Attributes, Data Quality, Strings categories)*

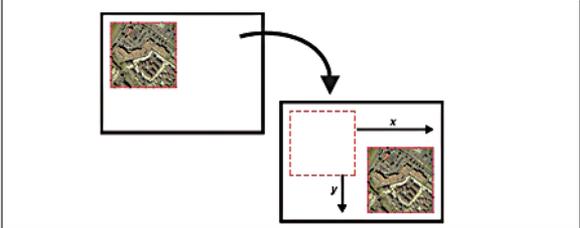
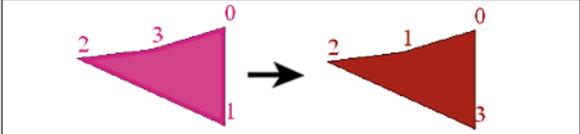
**NumericRasterizer**

Draws input point, line, and polygon features onto a numeric raster filled with the background value. The z coordinates of the input vector features are used to generate pixel values. *(Cartography and Reports, Rasters categories)*

**O**

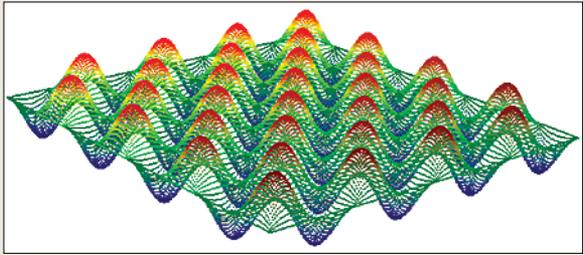
**OffsetCurveGenerator**

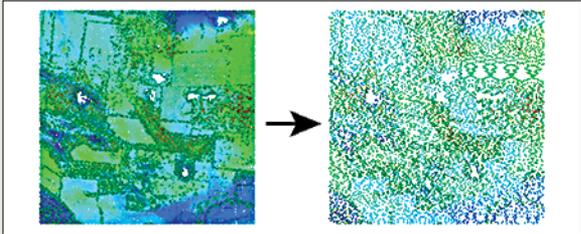
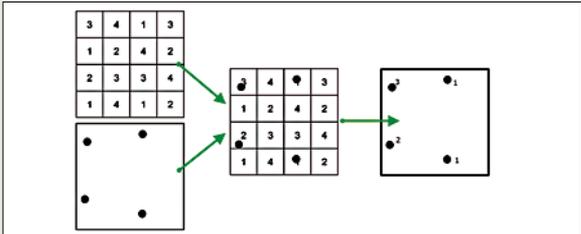
Offsets the segments of linear features, and if necessary, connects them using stroked arcs. *(Geometries category)*

<b>Offsetter</b>	<p>Adds offsets to the feature's coordinates so that the feature shifts by the specified amount. (<i>3D, Spatial Analysis categories</i>)</p>  <p>The diagram illustrates the Offsetter tool. On the left, a square frame contains a satellite image of a building. An arrow points to the right, where a larger square frame shows the same satellite image shifted. A dashed red rectangle outlines the original position, and a solid black rectangle shows the new position. An 'x' label with a right-pointing arrow indicates the horizontal offset, and a 'y' label with a downward-pointing arrow indicates the vertical offset.</p>
<b>NEW OneDriveConnector</b>	<p>Accesses the Microsoft OneDrive file storage service to upload, download, or delete files and folders or list the contents of a folder from a Microsoft OneDrive account. (<i>Integrations, Workflows categories</i>)</p>
<b>OrientationExtractor</b>	<p>Returns a feature's orientation. This will have different possible return value, based on the input geometry type. (<i>Calculated Values category</i>)</p>
<b>Orienter</b>	<p>Adjusts the orientation of a polygonal feature or the direction of a linear feature. (<i>Geometries category</i>)</p>  <p>The diagram illustrates the Orienter tool. On the left, a pink triangle has vertices labeled 0 (top), 1 (bottom), 2 (left), and 3 (right). An arrow points to the right, where a red triangle is shown. The vertices are now labeled 0 (top), 1 (left), 2 (right), and 3 (bottom), indicating the triangle has been rotated 90 degrees clockwise.</p>

**P**

<b>ParameterFetcher</b>	<p>Adds an attribute to the feature and supplies it with the value of a previously published parameter. (<i>Web, Workflows categories</i>)</p>
<b>PartCounter</b>	<p>Returns the number of parts in the geometry. For multis and aggregates, this is the number of parts, and for paths, this is the number of segments. (<i>Calculated Values, Data Quality categories</i>)</p>
<b>PathBuilder</b>	<p>Connects input linear features (arcs and lines) in the order they enter, forming path features. (<i>Geometries category</i>)</p>
<b>PathSplitter</b>	<p>Decomposes a path feature into its component segments. Each output feature contains a copy of the source feature's attributes. (<i>Geometries category</i>)</p>
<b>PDFPageFormatter</b>	<p>Prepares features for output to PDF by providing a convenient interface to set the scale and location of features on a page. (<i>Cartography and Reports, Format Specific categories</i>)</p>
<b>PDFStyler</b>	<p>Sets the common Adobe® PDF style attributes for a group of features destined for the GeoSpatial PDF Writer. (<i>Cartography and Reports, Format Specific categories</i>)</p>
<b>PlanarityFilter</b>	<p>Filters features based on their planarity. To be planar, a geometry must have all of its points situated in the same plane. (<i>3D, Data Quality, Filters and Joins categories</i>)</p>
<b>Player</b>	<p>Retrieves features stored in an FME Feature Store file and outputs them into the workspace. (<i>Workflows category</i>)</p>

<b>PointCloudCoercer</b>	Coerces point cloud geometries into points or multipoints. This transformer can be used to write a point cloud to a format that does not support point clouds. <i>(Point Clouds category)</i>
<b>PointCloudCombiner</b>	Combines multiple geometries into a single point cloud. <i>(Point Clouds category)</i>
<b>PointCloudComponent Adder</b>	Adds new components with constant values to a point cloud. <i>(Point Clouds category)</i>
<b>PointCloudComponent Copier</b>	Copies an existing component to a new component with the specified name. The existing component remains and a new component is created that has a different name, but the same values. <i>(Point Clouds category)</i>
<b>PointCloudComponent Keeper</b>	Removes all components from a point cloud, except for the specified ones. <i>(Point Clouds category)</i>
<b>PointCloudComponent Remover</b>	Removes specified components from a point cloud. <i>(Point Clouds category)</i>
<b>PointCloudComponent Renamer</b>	Renames an existing component. <i>(Point Clouds category)</i>
<b>PointCloudComponent TypeCoercer</b>	Converts the type of point cloud components. <i>(Point Clouds category)</i>
<b>PointCloudConsumer</b>	Requests the point(s) from the point cloud geometry but no actual operations are performed on the point(s). <i>(Point Clouds category)</i>
<b>PointCloudCreator</b>	Creates a new point-cloud feature with the specified size and components and sends it into the workspace for processing. <i>(Point Clouds category)</i>
	
<b>PointCloudExpression Evaluator</b>	Evaluates expressions, such as algebraic operations or conditional statements, to set point cloud component values. <i>(Calculated Values, Point Clouds categories)</i>
<b>PointCloudExtractor</b>	Serializes the geometry of the feature into the Blob Attribute based on the selected writer format. <i>(Point Clouds category)</i>
<b>PointCloudFilter</b>	Filters a point-cloud feature into one or more parts based on evaluating expressions. <i>(Filters and Joins, Point Clouds categories)</i>
<b>PointCloudMerger</b>	Merges component values from one point cloud to another. <i>(Filters and Joins, Point Clouds categories)</i>
<b>PointCloudOnRaster ComponentSetter</b>	Sets point cloud component values by overlaying a point cloud on a raster. <i>(Point Clouds, Rasters categories)</i>
<b>PointCloudPropertyExtractor</b>	Extracts the properties of a point-cloud feature and exposes them as attributes. <i>(Calculated Values, Point Clouds categories)</i>
<b>PointCloudReplacer</b>	Replaces the geometry of the feature with the geometry held in the Blob Attribute. The blob is decoded according to the selected point cloud format. <i>(Point Clouds category)</i>

<b>NEW</b>	<b>PointCloudSimplifier</b>	Outputs point cloud features that have fewer points than the original input features while maintaining the original shape. <i>(Point Clouds category)</i>
	<b>PointCloudSorter</b>	Sorts a point cloud by the values of components. <i>(Point Clouds category)</i>
	<b>PointCloudSplitter</b>	Splits a single point cloud feature into multiple point cloud features, each having a homogeneous value for the point component that governs the split. <i>(Point Clouds category)</i>
	<b>PointCloudStatistics Calculator</b>	Calculates statistics on point cloud components and exposes them as attributes. <i>(Calculated Values, Point Clouds categories)</i>
<b>NEW</b>	<b>PointCloudSurfaceBuilder</b>	Takes an input point cloud and reconstructs it into an output mesh. <i>(3D, Geometries, Point Clouds categories)</i>
	<b>PointCloudThinner</b>	Outputs point-cloud features that have fewer points than the original input features. <i>(Point Clouds category)</i>  
	<b>PointCloudTransformation Applier</b>	Applies transformations on a point cloud. <i>(Point Clouds category)</i>
	<b>PointOnAreaOverlayer</b>	Performs an overlay of points on areas. <i>(Filters and Joins, Spatial Analysis categories)</i>
	<b>PointOnLineOverlayer</b>	Performs an overlay of points on lines. Each input line is split at its closest place to any point within the specified point tolerance. <i>(Filters and Joins, Spatial Analysis categories)</i>
	<b>PointOnPointOverlayer</b>	Performs an overlay of points on points. <i>(Filters and Joins, Spatial Analysis categories)</i>
	<b>PointOnRasterValueExtractor</b>	Extracts the band and palette values from a raster at the location of each input point and sets them as attributes on the feature. <i>(Spatial Analysis, Rasters categories)</i>  
	<b>PointPropertyExtractor</b>	Extracts point orientation to feature attributes. <i>(Calculated Values category)</i>
	<b>PointPropertySetter</b>	Adds or removes point orientation. <i>(Geometries category)</i>
	<b>PythonCaller</b>	Executes a Python script to manipulate the feature. A Python script can perform specialized and complex operations on a feature's geometry, attributes, and coordinate system. <i>(Workflows category)</i>

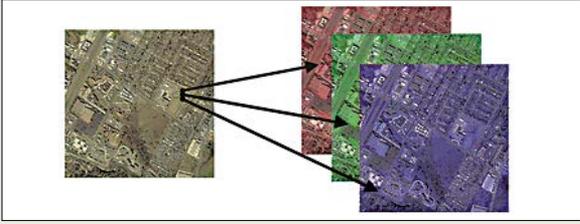
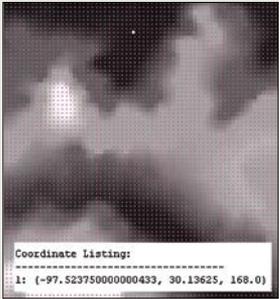
<b>PythonCreator</b>	Creates features using the Python script supplied, and sends them into the workspace for processing. ( <i>Workflows category</i> )
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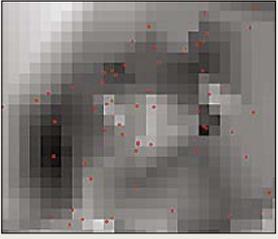
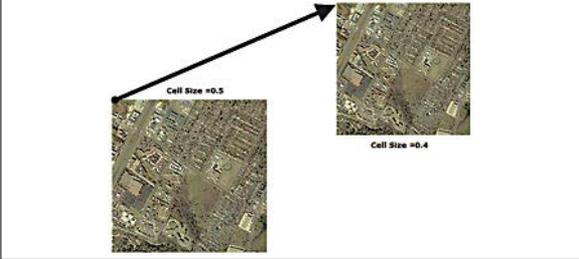
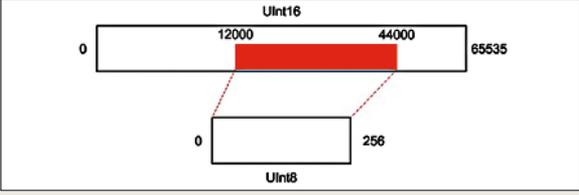
## R

<b>RandomNumberGenerator</b>	Generates a uniformly distributed random number. The random number is $x$ , where $\text{Minimum Value} \leq x \leq \text{Maximum Value}$ . ( <i>Calculated Values, Strings categories</i> )
<b>RasterAspectCalculator</b>	Calculates the aspect (direction of slope) for each cell of a raster. Aspect is measured in degrees from 0 to 360, starting clockwise from the north. ( <i>Calculated Values, Rasters categories</i> )
<b>RasterBandAdder</b>	Adds a new band to a raster. The added band will have the same value in all cells, and the same raster-level properties as other bands in the raster (that is, number of rows/columns, cell spacing, cell origin, etc.). ( <i>Rasters category</i> )
<b>RasterBandCombiner</b>	Merges multiple overlapping raster features into a single raster feature. ( <i>Rasters category</i> )
<b>RasterBandInterpretation Coercer</b>	Alters the underlying interpretation of the selected bands of the raster geometry on the input features, using the specified conversion options. ( <i>Rasters category</i> )
<b>RasterBandKeeper</b>	Removes all bands of a raster, except for those that are selected. The RasterSelector can be used to modify the selection. ( <i>Rasters category</i> )
<b>RasterBandMinMaxExtractor</b>	Extracts the band minimum and maximum values, palette minimum and maximum keys, and palette minimum and maximum values of a raster feature, and exposes them as attributes. ( <i>Calculated Values, Rasters category</i> )
<b>RasterBandNameSetter</b>	Sets the name of selected bands on a raster. ( <i>Rasters category</i> )
<b>RasterBandNodataRemover</b>	Removes the existing nodata identifier from the selected bands of a raster feature. That is, any values that were previously equal to the nodata value will now be considered valid data. ( <i>Rasters category</i> )
<b>RasterBandNodataSetter</b>	Identifies a value to act as a nodata identifier on a raster feature at the band level. That is, values equal to the specified value will now be considered invalid, and will not be affected by many operations (e.g. offsetting or scaling). ( <i>Rasters category</i> )
<b>RasterBandOrderer</b>	Specifies the order of bands in a raster. Bands are reordered according to the input band indices. ( <i>Rasters category</i> )
<b>RasterBandPropertyExtractor</b>	Extracts the band and palette properties of a raster feature and exposes them as attributes. ( <i>Calculated Values, Rasters category</i> )
<b>RasterBandRemover</b>	Removes the selected band(s) of a raster. ( <i>Rasters category</i> )

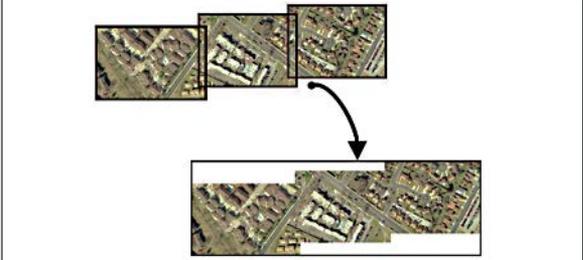
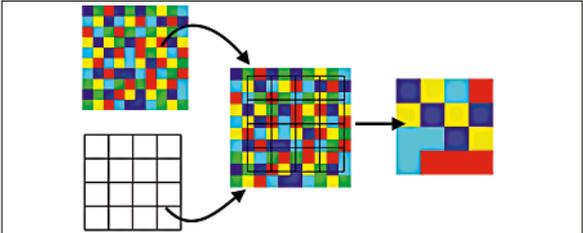
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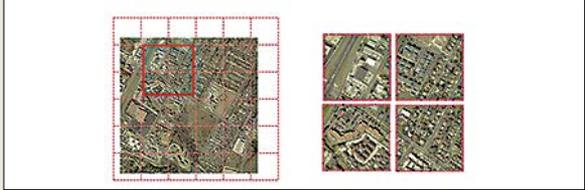
## R

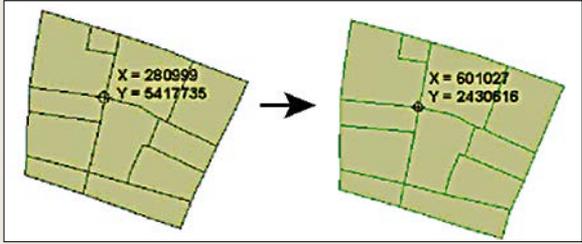
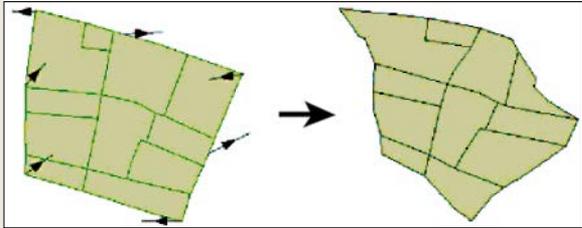
<p><b>RasterBandSeparator</b></p>	<p>Separates the bands and palettes from each input raster feature into one or more output raster features based on the number of input bands and palettes. (<i>Rasters category</i>)</p> 																																																																																					
<p><b>RasterCellCoercer</b></p>	<p>Decomposes all input numeric raster features into individual points or polygons. One vector feature is output for each cell in the band. (<i>Rasters category</i>)</p>  <pre> Coordinate Listing: ----- 1: [-97.523750000000433, 30.13625, 168.0] </pre>																																																																																					
<p><b>RasterCellOriginSetter</b></p>	<p>Sets the raster's cell origin. (<i>Rasters category</i>)</p>																																																																																					
<p><b>RasterCellValueCalculator</b></p>	<p>Performs an arithmetical operation on a pair of rasters. The first selected band of raster A is combined with the first selected band of raster B, the second selected band of raster A is combined with the second selected band of raster B, and so on. (<i>Calculated Values, Rasters categories</i>)</p> <table border="1" data-bbox="396 889 976 1060"> <tr> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> <td>+</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> <td>=</td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> <tr> <td>0</td><td>0</td><td>7</td><td>7</td><td>0</td> <td></td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> <td></td> <td>0</td><td>0</td><td>7</td><td>7</td><td>0</td> </tr> <tr> <td>0</td><td>0</td><td>7</td><td>7</td><td>0</td> <td></td> <td>3</td><td>3</td><td>3</td><td>0</td><td>0</td> <td></td> <td>3</td><td>3</td><td>10</td><td>0</td><td>0</td> </tr> <tr> <td>0</td><td>0</td><td>7</td><td>0</td><td>0</td> <td></td> <td>3</td><td>3</td><td>3</td><td>0</td><td>0</td> <td></td> <td>3</td><td>3</td><td>10</td><td>0</td><td>0</td> </tr> <tr> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> <td></td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> <td></td> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td> </tr> </table>	0	0	0	0	0	+	0	0	0	0	0	=	0	0	0	0	0	0	0	7	7	0		0	0	0	0	0		0	0	7	7	0	0	0	7	7	0		3	3	3	0	0		3	3	10	0	0	0	0	7	0	0		3	3	3	0	0		3	3	10	0	0	0	0	0	0	0		0	0	0	0	0		0	0	0	0	0
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<p><b>RasterCellValueReplacer</b></p>	<p>Replaces a range of values in the source raster with a new single value. (<i>Rasters category</i>)</p>																																																																																					
<p><b>RasterCellValueRounder</b></p>	<p>Rounds off raster cell values. (<i>Rasters category</i>)</p>																																																																																					
<p><b>RasterCheckpointer</b></p>	<p>Sets a checkpoint in the raster processing which forces previous processing to occur immediately. Once complete, it saves the current state to disk. (<i>Rasters, Workflows categories</i>)</p>																																																																																					
<p><b>RasterConsumer</b></p>	<p>Requests the tile(s) from the raster geometry but no actual operations are performed on the tile(s). (<i>Rasters category</i>)</p>																																																																																					

<b>RasterDEMGenerator</b>	<p>Constructs a Delaunay triangulation based on input points and breaklines. That triangulation is then uniformly sampled to produce a raster digital elevation model (DEM raster). <i>(3D, Rasters categories)</i></p>	
<b>RasterExpressionEvaluator</b>	<p>Evaluates expressions on each cell in a raster, such as algebraic operations or conditional statements. <i>(Calculated Values, Rasters categories)</i></p>	
<b>RasterExtentsCoercer</b>	<p>Replaces the geometry of input raster features with a polygon that covers the extents of the raster. <i>(Rasters category)</i></p>	
<b>RasterExtractor</b>	<p>Serializes the geometry of the feature into the Raster Blob Attribute based on the selected writer format. <i>(Rasters category)</i></p>	
<b>RasterGCPExtractor</b>	<p>Extracts the coordinate system and the Ground Control Points (GCPs) from the raster feature and exposes them as attributes. <i>(Coordinates, Rasters categories)</i></p>	
<b>RasterGCPSetter</b>	<p>Sets the GCP on a raster with the specified Column (pixel), Row (line), X Coordinate, Y Coordinate and Z Coordinate. <i>(Coordinates, Rasters categories)</i></p>	
<b>RasterGeoreferencer</b>	<p>Georeferences a raster with the specified parameters. <i>(Coordinates, Rasters categories)</i></p>	
<b>RasterHillshader</b>	<p>Generates a shaded relief effect, useful for visualizing terrain. <i>(3D, Cartography and Reports, Rasters categories)</i></p>	
<b>RasterInterpretationCoercer</b>	<p>Alters the underlying interpretation of the bands of the raster geometry on the input features, using the specified conversion options. <i>(Rasters category)</i></p>	

R

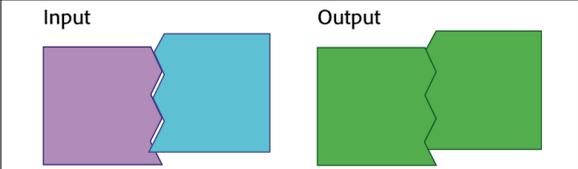
<b>RasterMosaicker</b>	<p>Mosaics multiple raster features into a single raster feature. (<i>Filters and Joins, Rasters categories</i>)</p> 
<b>RasterNumericCreator</b>	<p>Creates a feature with a raster of the specified size with a numeric value and sends it into the workspace for processing. This transformer is useful for creating a very large image with a user-specified width and height. (<i>Rasters category</i>)</p>
<b>RasterPaletteAdder</b>	<p>Creates a palette from an attribute and adds this palette to all selected bands on a raster. (<i>Rasters category</i>)</p>
<b>RasterPaletteExtractor</b>	<p>Creates a string representation of an existing palette and saves it to an attribute. (<i>Rasters category</i>)</p>
<b>RasterPaletteGenerator</b>	<p>Generates a palette out of the selected band(s) of a raster. (<i>Rasters category</i>)</p>
<b>RasterPaletteInterpretation Coercer</b>	<p>Alters the underlying interpretation of the palettes of the raster geometry on the input features, using the specified conversion options. (<i>Rasters category</i>)</p>
<b>RasterPaletteNodataSetter</b>	<p>Identifies the nodata value on a raster feature at the palette level. (<i>Rasters category</i>)</p>
<b>RasterPaletteRemover</b>	<p>Removes the selected palette(s) of a raster. (<i>Rasters category</i>)</p>
<b>RasterPaletteResolver</b>	<p>Resolves the palettes of the selected bands of the input raster features by using the band cell values to look up the corresponding palette values, which then replace the original band cell values in the raster. (<i>Rasters category</i>)</p>
<b>RasterPropertyExtractor</b>	<p>Extracts the geometry properties of a raster feature and exposes them as attributes. (<i>Calculated Values, Rasters categories</i>)</p>
<b>RasterPyramider</b>	<p>Creates a series of pyramid levels for each input raster feature by specifying either the smallest pyramid level size or the number of pyramid levels to generate. (<i>Rasters, Web categories</i>)</p>
<b>RasterReplacer</b>	<p>Replaces the feature's geometry with the geometry held in the Raster Blob Attribute. The blob is decoded according to the selected raster format. (<i>Rasters category</i>)</p>
<b>RasterResampler</b>	<p>Resamples an input raster using the desired dimensions, the desired cell size in ground units, or a percentage of the size. (<i>Rasters category</i>)</p> 

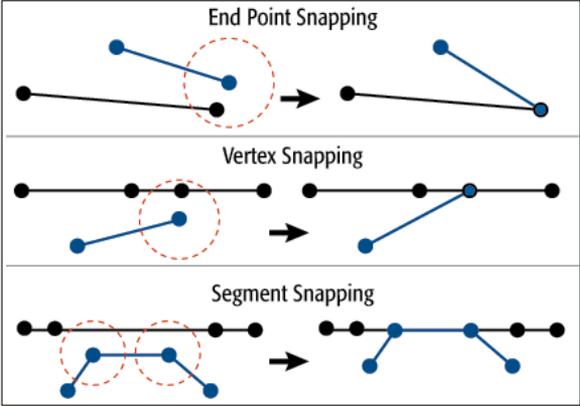
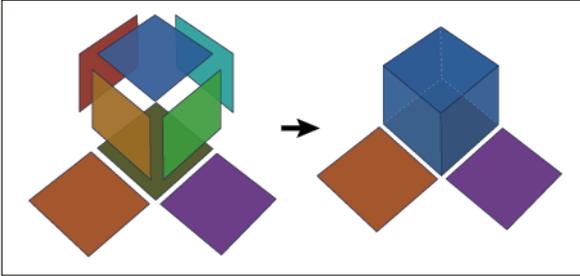
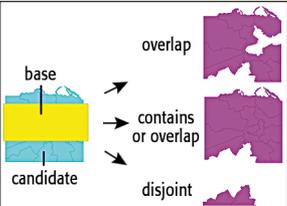
<b>RasterRGBCreator</b>	Creates a feature with a raster of the specified size with an RGB value and sends it into the workspace for processing. ( <i>Rasters category</i> )
<b>RasterRotationApplier</b>	Applies the raster rotation angle on the input raster properties to the rest of the raster properties and data values. ( <i>Rasters category</i> )
<b>RasterSelector</b>	Selects specific bands and palettes of a raster for subsequent transformer operations. ( <i>Rasters category</i> )
<b>RasterSingularCellValue Calculator</b>	Performs an arithmetic operation on two operands: the cell values of a raster and a numeric value. ( <i>Calculated Values, Rasters categories</i> )
<b>RasterSlopeCalculator</b>	Calculates the slope (maximum rate of change in z) for each cell of a raster. ( <i>3D, Rasters categories</i> )
<b>RasterSubsetter</b>	Reduces a raster to a subset of its original size. This is essentially a clipping operation using pixel bounds instead of ground coordinates. ( <i>Rasters category</i> )
<b>RasterTiler</b>	<p>Splits each input raster into a series of tiles by specifying either a tile size or a number of tiles. (<i>Rasters category</i>)</p> 
<b>RasterToPolygonCoercer</b>	Creates polygons from input raster features. One polygon is output for each contiguous area of pixels with the same value in the input raster. ( <i>Rasters category</i> )
<b>RCaller</b>	Executes an R script that has the ability to access feature data from a temporary R data frame. Input data is set up in the form of tables that will become R data frames. R data frames are tables similar to those of a relational database that support columns of varying types. ( <i>Format Specific, Integrations, Rasters categories</i> )
<b>Recorder</b>	Saves a copy of all features that enter to a disk file. ( <i>Workflows category</i> )
<b>ReframeReprojector</b>	Reprojects feature coordinates from one coordinate system to another using the REFRAME library. ( <i>Coordinates, Integrations categories</i> )
<b>ReprojectAngleCalculator</b>	Converts a given angle from one coordinate system to another. The transformer calculates the reprojected angle of a line starting at the first coordinate in the feature, with the given length and angle. ( <i>Calculated Values, Coordinates categories</i> )
<b>ReprojectLengthCalculator</b>	Converts a given distance from one coordinate system to another. The transformer calculates the reprojected length of a line starting at the first coordinate in the feature, with the given length and angle. ( <i>Calculated Values, Coordinates category</i> )

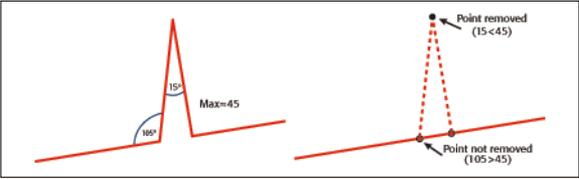
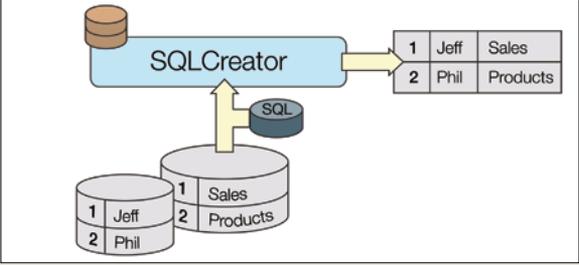
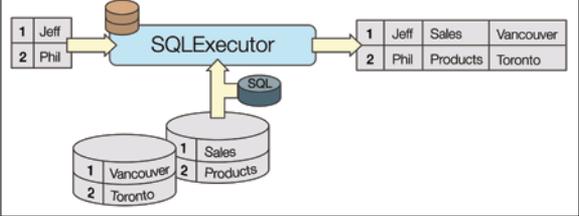
<b>Reprojector</b>	Reprojects feature coordinates from one coordinate system to another. ( <i>Coordinates category</i> ) 
<b>Rotator</b>	Rotates features in a counterclockwise direction about the specified point by the rotation angle (measured in degrees). ( <i>Geometries category</i> )
<b>RubberSheeter</b>	Performs warping operations on the spatial coordinates of features. It is used to adjust a set of observed features so they more closely match a set of reference features. ( <i>Coordinates, Geometries categories</i> ) 

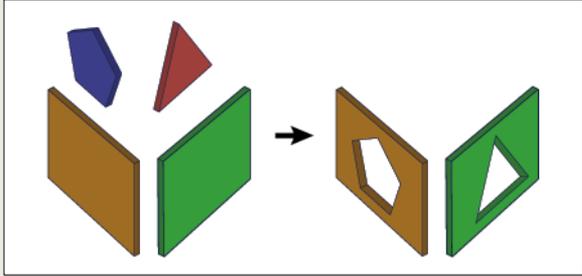
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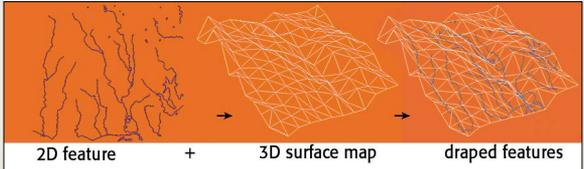
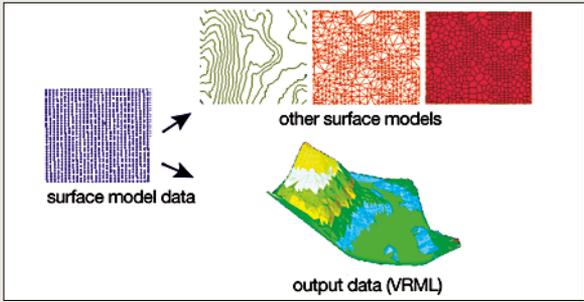
<b>S3Deleter</b>	Using the Amazon Simple Storage Service (S3), deletes a file or a folder from a bucket. ( <i>Integrations, Web categories</i> )
<b>S3Downloader</b>	Using the Amazon Simple Storage Service (S3), downloads data from an object in an S3 bucket. ( <i>Integrations, Web categories</i> )
<b>S3ObjectLister</b>	Using the Amazon Simple Storage Service (S3), list the keys of all objects contained in a folder or a bucket. ( <i>Integrations, Web categories</i> )
<b>S3Uploader</b>	Using the Amazon Simple Storage Service (S3), uploads data to an Amazon S3 bucket. ( <i>Integrations, Web categories</i> )
<b>Sampler</b>	Preserves either a total number of features or a sampling of features, depending on the Sampling Type selection. ( <i>Data Quality, Filters and Joins, Workflows categories</i> )
<b>Scaler</b>	The Scaler scales objects to make them bigger or smaller. ( <i>3D, Coordinates, Geometries categories</i> )
<b>SchemaMapper</b>	Converts the existing schema (data model) of features to a new structure, based on mappings defined in an external lookup table. ( <i>Workflows category</i> )
<b>SecondOrderConformer</b>	Performs a second-order conformal transformation on the feature's geometry. Depending on the input geometry, a 2D or 3D transformation is performed. ( <i>3D, Coordinates categories</i> )
<b>SectorGenerator</b>	Outputs circular sectors of influence for point features that have directions defined by azimuths (degrees clockwise from North). ( <i>Spatial Analysis category</i> )

<b>SharedItemAdder</b>	Adds or replaces Appearances, Textures, Rasters, or Geometry Definitions in the internal FMELibrary. (3D category)
<b>SharedItemIDExtractor</b>	Extracts Shared Item IDs from the front and/or back side of geometries and adds them as traits or a list attribute. (3D category)
<b>SharedItemIDSetter</b>	Sets Shared Object IDs onto the front and/or back sides of geometries. (3D category)
<b>SharedItemRetriever</b>	Retrieves Appearances, Textures, Rasters, or Geometry Definitions from the internal FMELibrary. (3D category)
<b>SherbendGeneralizer</b>	<p>Uses the Sherbend algorithm to simplify lines by reducing unnecessary details based on the analysis of the line's bends. The generalization process may eliminate, reduce, or combine bends, while resolving conflicts. In this example, three bends are combined into one: (Cartography and Reports, Geometries categories)</p> 
<b>ShortestPathFinder</b>	Computes the shortest path of a line or lines containing a source and destination node in a network based on the length of the input or the cost (specified in an attribute) of each of the edges. (Spatial Analysis category)
<b>SlackConnector</b>	Posts a message or uploads a file to the Slack group chat service. (Integrations, Web categories)
<b>SliverRemover</b>	<p>Cleans up feature geometries by forming a 2D planar partition with no gaps or overlaps between polygons. (Data Quality, Geometries categories)</p> 

<p><b>Snapper</b></p>	<p>Brings lines, segments, end points or vertex points of features together if they are within a certain distance of each other and (optionally) if they have one or more attributes in common.  <i>(Data Quality, Geometries, Spatial Analysis categories)</i></p>  <p>The diagram shows three snapping operations:</p> <ul style="list-style-type: none"> <li><b>End Point Snapping:</b> A blue line segment's endpoint is moved to meet the endpoint of a black line segment.</li> <li><b>Vertex Snapping:</b> A blue line segment's vertex is moved to meet a vertex on a black line segment.</li> <li><b>Segment Snapping:</b> A blue line segment is moved to align with and connect to a segment of a black line.</li> </ul>
<p><b>Snipper</b></p>	<p>Shortens the geometry of a line feature from the ends by snipping specified distances, indices, or measure values. It operates on features with simple line geometry and polygons without holes.  <i>(Data Quality, Geometries categories)</i></p>
<p><b>SNSSender</b></p>	<p>Using the Amazon Simple Notification Service (SNS), sends messages to an Amazon SNS topic. <i>(Integrations, Web categories)</i></p>
<p><b>SolidBuilder</b></p>	<p>Constructs solids from surfaces and cuts hollow regions, or voids, in solid features with other solid features. A solid that is cut by another solid must contain that second solid. <i>(3D, Geometries categories)</i></p>  <p>The diagram shows a 3D solid composed of several colored faces (red, blue, green, brown, purple) being cut by a blue solid. The result is a blue solid and two separate colored solids (brown and purple).</p>
<p><b>Sorter</b></p>	<p>Sorts features by an attribute's value. <i>(Workflows category)</i></p>
<p><b>SpatialFilter</b></p>	<p>Filters point, line, area, and text features based on spatial relationships. Each input CANDIDATE feature is compared against all FILTER features, based on the given spatial tests to meet  <i>(Data Quality, Filters and Joins, Spatial Analysis categories)</i></p>  <p>The diagram shows a yellow 'base' feature and a blue 'candidate' feature. Three spatial relationships are illustrated:</p> <ul style="list-style-type: none"> <li><b>overlap:</b> The candidate overlaps the base.</li> <li><b>contains or overlap:</b> The candidate contains the base or overlaps it.</li> <li><b>disjoint:</b> The candidate and base do not overlap.</li> </ul>

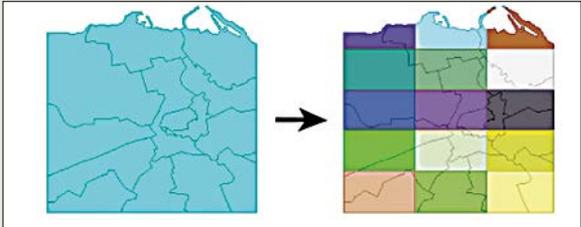
<b>SpatialRelator</b>	Determines topological (spatial) relationships between sets of features. It tags – but does not otherwise change – features when they have certain relationships, such as touches, overlays, intersects, and so forth. <i>(Data Quality, Filters and Joins, Spatial Analysis categories)</i>
<b>SpikeRemover</b>	Cleans up feature geometries by removing spikes in 2D. <i>(Data Quality, Geometries categories)</i> 
<b>SQLCreator</b>	Generates FME features from the results of a SQL query against a database. One FME feature is created for each row of the results of the SQL Query. <i>(Workflows category)</i> 
<b>SQLExecutor</b>	Performs SQL queries against a database. <i>(Workflows category)</i> 
<b>SQSDeleter</b>	Using the Amazon Simple Queue Service (SQS), deletes messages from an Amazon SQS queue. <i>(Integrations, Web categories)</i>
<b>SQSMessageCounter</b>	Using the Amazon Simple Queue Service (SQS), counts the number of messages in an Amazon SQS queue. <i>(Integrations, Web categories)</i>
<b>SQSReceiver</b>	Using the Amazon Simple Queue Service (SQS), receives messages from an Amazon SQS queue. <i>(Integrations, Web categories)</i>
<b>SQSSender</b>	Using the Amazon Simple Queue Service (SQS), sends messages to an Amazon SQS queue. <i>(Integrations, Web categories)</i>
<b>StatisticsCalculator</b>	Calculates statistics based on a designated attribute or set of attributes of the incoming features. <i>(Calculated Values category)</i>
<b>StreamOrderCalculator</b>	Computes the Strahler order and/or Horton order of streams in a river network. <i>(Calculated Values category)</i>

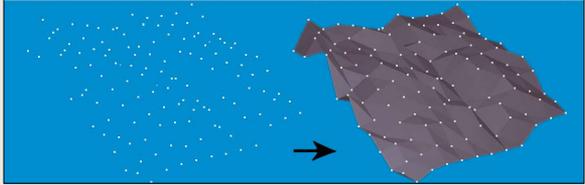
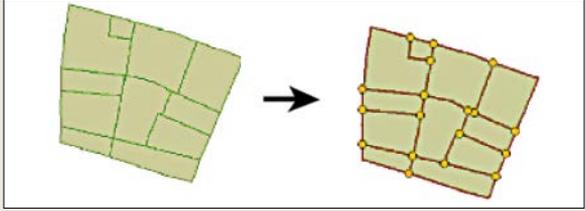
<b>StreamPriorityCalculator</b>	Calculates the primary and secondary streams of multiple stream networks. ( <i>Calculated Values category</i> )
<b>StringCaseChanger</b>	Changes the case of text attributes to UPPERCASE, lowercase, Title case, or Full Title Case. ( <i>Strings category</i> )
<b>StringConcatenator</b>	Concatenates the values of any number of attributes, user parameters and/or constants, and stores the result in a new attribute. ( <i>Strings category</i> )  <p>The diagram shows a workflow for the StringConcatenator tool. At the top, there are six input boxes containing the text: 'Safe Software', 'Suite 2017', '7445 132 St', 'Surrey', 'BC', and 'V3W 1J8'. Yellow arrows from each of these boxes point to a central blue rounded rectangle labeled 'StringConcatenator'. A yellow arrow then points from the bottom of this rectangle to a single output box at the bottom containing the concatenated string: 'Safe Software, Suite 2017 7445 132 St, Surrey, BC V3W 1J8'.</p>
<b>StringFormatter</b>	Reformats the data held in each specified attribute according to the Tcl <i>format</i> command, which is similar to the C <i>printf</i> function. Attribute values can be formatted into strings, characters, or numbers. ( <i>Strings category</i> )
<b>StringLengthCalculator</b>	Calculates the length of strings and the number of bytes in a blob. ( <i>Calculated Values, Strings categories</i> )
<b>StringPadder</b>	Pads the selected attributes with a specified character, either on the right or left side. ( <i>Strings category</i> )
<b>StringPairReplacer</b>	Replaces characters in the value contained in the source attribute based on the replacement key-value pairs. ( <i>Strings category</i> )
<b>StringReplacer</b>	Replaces substrings matching a string or regular expression in the string contained in the source attribute. ( <i>Strings category</i> )
<b>StringSearcher</b>	Performs a regular expression match on the specified expression. ( <i>Strings category</i> )
<b>SubstringExtractor</b>	Extracts a substring from the source attribute. ( <i>Calculated Values, Strings categories</i> )
<b>SummaryReporter</b>	Writes a summary report of incoming features to a disk file. Features are sorted before they are summarized. ( <i>Data Quality, Workflows categories</i> )
<b>SurfaceBuilder</b>	Cuts holes in surface features with other surface features. A surface that is cut by another surface must be co-planar with that second surface, have compatible orientation, and contain that second surface. ( <i>3D, Spatial Analysis categories</i> )  <p>The diagram illustrates the SurfaceBuilder tool. On the left, there are two flat rectangular surfaces, one brown and one green, and two triangular shapes, one blue and one red. An arrow points to the right, where the brown and green surfaces are shown with irregular holes cut out of them. The shapes of these holes correspond to the blue and red triangles, demonstrating how the tool uses other surfaces to create voids in a primary surface.</p>

<b>SurfaceDraper</b>	<p>Constructs a Delaunay triangulation based on input points and breaklines. Input drape features will be overlaid onto the surface model, and output as draped features. <i>(3D, Point Clouds, Spatial Analysis categories)</i></p>  <p style="text-align: center;">2D feature    +    3D surface map    →    draped features</p>
<b>SurfaceFootprintReplacer</b>	<p>Replaces the geometry of a feature with a two-dimensional representation of the feature's shadow. <i>(3D, Geometries categories)</i></p>
<b>SurfaceModeller</b>	<p>Constructs a Delaunay triangulation based on input points and breaklines. It is useful when you need multiple representations of the same model. <i>(3D, Point Clouds categories)</i></p>  <p style="text-align: center;">surface model data    →    other surface models    →    output data (VRML)</p>
<b>SurfaceOnSurfaceOverlayer</b>	<p>Performs a surface-on-surface overlay so that all input surfaces are intersected against each other and resultant surface features are created and output. The output surfaces can retain all the attributes of the input features in which they are contained. <i>(3D, Spatial Analysis categories)</i></p>
<b>SurfaceSplitter</b>	<p>Splits a double-sided input surface geometry into two single-sided surfaces – one equal to the front side of the input surface and one equal to the back side of the input surface. <i>(3D, Geometries categories)</i></p>
<b>SystemCaller</b>	<p>Runs a program or operating system command, and waits for it to exit before continuing the translation. <i>(Workflows category)</i></p>

**S T**

<b>TclCaller</b>	<p>Runs a Tool Command Language (Tcl) command and assigns its return value to an attribute. <i>(Workflows category)</i></p>
<b>TCPIPReceiver</b>	<p>Receives raw data over TCP/IP. Produces a feature each time a specified number of bytes is received or a particular sequence is detected. <i>(Integrations, Web, Workflows categories)</i></p>
<b>TCPIPSender</b>	<p>Sends raw data to the specified host, which may be another FME workspace running in a different process (located on the same machine or on a different machine), or any client application that communicates over TCP/IP. <i>(Integrations, Web, Workflows categories)</i></p>

<b>TempPathnameCreator</b>	Reserves and returns a temporary file or directory path that will be deleted upon translation completion. An optional basename and extension can be supplied to further refine the filename portion of the resulting pathname. <i>(Calculated Values, Workflows categories)</i>
<b>Terminator</b>	Stops a translation when it detects detect non-valid situations or input data conditions that should not exist. <i>(Workflows category)</i>
<b>Tester</b>	Evaluates one or more tests on a feature, and routes the feature according to the outcome of the test(s). The tests can consist of any FME-allowed operands. <i>(Data Quality, Filters and Joins categories)</i>
<b>TextFilter</b>	Filters features by test conditions to one or more output ports. <i>(Data Quality, Filters and Joins categories)</i>
<b>TextAdder</b>	Sets the feature's geometry to text using the previous geometry as the text location. <i>(Cartography and Reports, Geometries categories)</i>
<b>TextDecoder</b>	Decodes a string from a number of different text encodings into plain text. <i>(Strings category)</i>
<b>TextEncoder</b>	Encodes a text string using URL, XML, HTML, Base64, or HEX methods. <i>(Strings category)</i>
<b>TextLocationExtractor</b>	Sets a text feature's geometry to the location of the text. <i>(Calculated Values category)</i>
<b>TextPropertyExtractor</b>	Extracts the values of text attributes from input text geometry features. <i>(Calculated Values category)</i>
<b>TextPropertySetter</b>	Sets the properties of a text geometry to the specified properties. <i>(Cartography and Reports category)</i>
<b>TextStroker</b>	Takes as input a font name, text padding and width multiplier, and outputs aggregates that describe the outline of the text. <i>(Cartography and Reports, Rasters category)</i>
	
<b>TextureCoordinateSetter</b>	Assigns texture coordinates to surfaces. <i>(Calculated Values, Coordinates categories)</i>
<b>Tiler</b>	Chops the input features into a series of tiles. This transformer works with raster, vector and point cloud data. <i>(Geometries category)</i>
	
<b>TimeStamper</b>	Adds a time stamp to a feature as a new attribute. The format of the time stamp is set as a parameter of the transformer. <i>(Calculated Values category)</i>

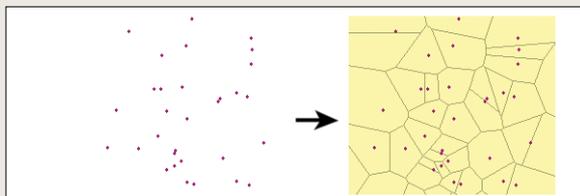
<b>TINGenerator</b>	<p>Constructs a Delaunay triangulation based on input points and breaklines. The surface model may be output in a number of representations: a triangulated irregular network (TIN), TIN vertices, TIN edges, and triangles. <i>(3D, Geometries categories)</i></p> 
<b>TopologyBuilder</b>	<p>Computes topology on input point, line, and/or area features. <i>(Spatial Analysis category)</i></p> 
<b>TraitMerger</b>	<p>Moves the traits from one geometry onto another geometry. It can also move the attributes from a feature onto a geometry as traits, or the traits from a geometry onto a feature as attributes. <i>(Filters and Joins category)</i></p>
<b>TransporterReceiver</b>	<p>Receives features from another FME workspace running in a different process, which may be located on the same or a different machine. Used in conjunction with the TransporterSender. <i>(Integrations, Workflows categories)</i></p>
<b>TransporterSender</b>	<p>Sends features to another FME workspace running in a different process, which may be located on the same machine or on a different machine. Used in conjunction with the TransporterReceiver. <i>(Integrations, Workflows categories)</i></p>
<b>Triangulator</b>	<p>Breaks an input geometry into triangular units or a mesh. <i>(Geometries category)</i></p>
<b>Tweeter</b>	<p>Sends a Twitter™ status update from Workbench. <i>(Integrations, Web categories)</i></p>
<b>TweetSearcher</b>	<p>Runs a search for Twitter™ entries that contain the given query. <i>(Integrations, Web categories)</i></p>
<b>TweetStreamer</b>	<p>Connects to a Twitter™ stream and outputs a new feature for each tweet. <i>(Integrations, Web categories)</i></p>
<b>TwitterStatusFetcher</b>	<p>Retrieves the timeline for a particular Twitter™ user or list. <i>(Integrations, Web categories)</i></p>

**U**

<b>UUIDGenerator</b>	<p>Calculates a Universally Unique Identifier (UUID) for each incoming feature, and adds it as a new attribute. An example UUID looks like: 7672aac8-fa0b-464c-b0b8-3efa9ae9cd86 <i>(Calculated Values category)</i></p>
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## V

<b>VariableRetriever</b>	Reads the specified variable and puts its value into the specified attribute. This variable must have been previously set using the VariableSetter transformer. <i>(Workflows category)</i>
<b>VariableSetter</b>	Creates and sets the specified variable to the specified value. The variable can later be read back into an attribute using the VariableRetriever transformer. <i>(Workflows category)</i>
<b>VectorOnRasterOverlayer</b>	Overlays vector features onto a single raster feature by drawing them onto the resulting output raster. The properties of the output raster are identical to that of the input raster. <i>(Rasters, Spatial Analysis categories)</i>
<b>VertexCreator</b>	Appends coordinates to null, point, text, line, and arc geometry, or replaces existing geometry with point geometry. <i>(Geometries category)</i>
<b>VolumeCalculator</b>	Calculates the volume of a solid object and stores the value in an attribute. <i>(3D, Calculated Values categories)</i>
<b>VoronoiCellGenerator</b>	Outputs circular sectors of influence for point features that have directions defined by azimuths (degrees clockwise from North). <i>(Spatial Analysis category)</i>
<b>VoronoiDiagrammer</b>	Generates a Voronoi diagram or Thiessen polygon. Each polygon in the diagram defines the area of space that is closest to a particular input point. <i>(Spatial Analysis category)</i>



## W

<b>WebMapTiler</b>	Creates a series of image tiles that can be utilized by web mapping applications such as Bing™ Maps, Google Maps™, or Web Map Tile Service. <i>(Cartography and Reports, Format Specific, Rasters, Web categories)</i>
<b>WebSocketReceiver</b>	Receives WebSocket messages from the specified WebSocket server. Produces a feature each time a message is received, and places the contents of the message into the specified attribute. <i>(Web, Workflows categories)</i>
<b>WebSocketSender</b>	Sends WebSocket messages to the specified WebSocket server. <i>(Web, Workflows categories)</i>
<b>WhiteStarLeaseBuilder</b>	Posts a query to a WhiteStar Legal2Map™ WebServices (W3) server to obtain points or polygons that match a list of legal land descriptions. <i>(Integrations category)</i>
<b>WorkspaceRunner</b>	Runs another FME Workbench workspace on the local computer by spawning a new FME process. This transformer is useful for batch processing, especially in conjunction with the Directory and File Reader. <i>(Workflows category)</i>

V

W

**X**

<b>XMLAppender</b>	Assembles several XML documents into one. <i>(Format Specific, Web categories)</i>
<b>XMLFeatureMapper</b>	Constructs features from XML documents via xMaps. <i>(Format Specific, Web categories)</i>
<b>XMLFlattener</b>	Flattens content of XML element(s) into feature attributes. <i>(Format Specific, Web categories)</i>
<b>XMLFormatter</b>	Provides various options for formatting and cleaning up XML documents. <i>(Format Specific, Web categories)</i>
<b>XMLFragmenter</b>	Maps elements from an XML document into XML fragments. Can decompose large XML documents into parts, where these parts may be further operated on via downstream XML, XQuery, XSLT or generic text processing transformers. <i>(Format Specific, Web categories)</i>
<b>XMLNamespaceDeclarer</b>	Declares missing namespaces in XML documents by matching prefixes from another sample XML file whose namespaces are fully declared. <i>(Format Specific, Web categories)</i>
<b>XMLSampleGenerator</b>	This transformer generates an XML document based on an XML Schema (XSD) file. While the sample document may not pass a schema validation, it will provide a generate outline of what a valid XML document looks like. The XML generated by this transformer can be used as a base for an XML template used in the XMLTemplater transformer. <i>(Format Specific, Web categories)</i>
<b>XMLTemplater</b>	Populates an XML document with FME feature attribute values. The document is provided as a template, and the transformer will use XQuery to insert attribute values and geometry information into the template. <i>(Format Specific, Web categories)</i>
<b>XMLUpdater</b>	This transformer creates, modifies, replaces, or deletes XML elements and attributes in an XML document. <i>(Format Specific, Web categories)</i>
<b>XMLValidator</b>	Validates the syntax or schema of an XML file or text. <i>(Format Specific, Web categories)</i>
<b>XMLXQueryExploder</b>	Uses XQuery expression to extract portions of XML text into new FME features. <i>(Format Specific, Web categories)</i>
<b>XMLXQueryExtractor</b>	Uses XQuery expressions to extract portions of XML text into feature attributes. <i>(Format Specific, Web categories)</i>
<b>XMLXQueryUpdater</b>	Provides updates to an XML document using XQuery Update expressions. <i>(Format Specific, Web categories)</i>
<b>XSLTProcessor</b>	The XSLTProcessor uses an XSL (eXtensible Stylesheet Language) stylesheet to convert an XML document. Common output formats include text, RSS, SVG, and CSV. <i>(Format Specific, Web, Workflows categories)</i>



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