
2014
FME® Transformer
Reference Guide
2014
Lizard Island
Transform
Bay
FME
2014

FME® Transformer Reference Guide

This guide contains a high-level summary of each transformer's functionality. For detailed information, select *FME Transformers* from FME Desktop Help, or visit **www.fmepedia.safe.com/knowledgedocumentation** to download documentation.

Contents

Symbol Reference

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

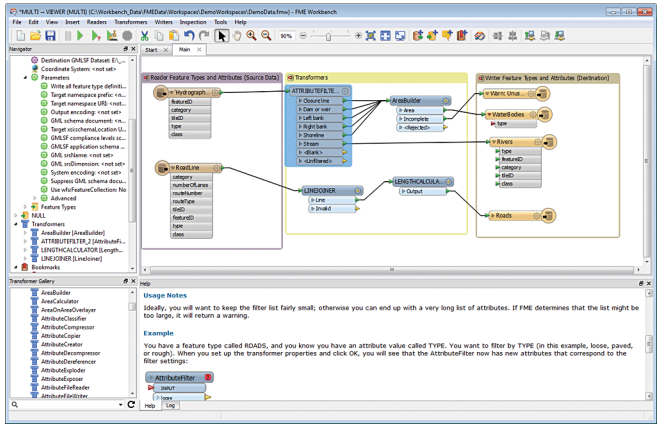
NEW Transformers with this symbol are new in this version of FME.

What is a Transformer?

A transformer is an FME Workbench object that carries out the restructuring of features from the source data to the destination data. FME contains over 400 different transformers that perform different types of restructuring.

FME Workbench workspaces contain source and destination data, as well as transformers. All of these elements are represented graphically on the Workbench canvas. By default, the 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 and may branch in different directions or even lead to a dead-end if required.

Example Workbench Workspace



In the Workbench interface, transformers are stored in the Transformer Gallery and grouped in categories applicable to their associated functionality. You can also search for transformers by keyword.

The Basics: Placing and Editing Transformers

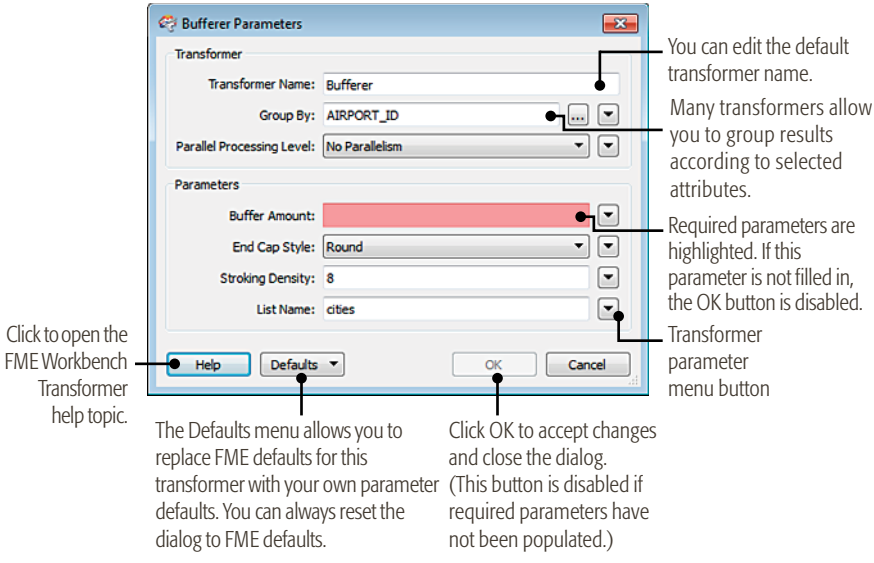
There are many ways to place a transformer on the Workbench canvas. To start, however, you can simply double-click the transformer name and it will appear in the workspace.

Every transformer has a Properties button on the right of the transformer.

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 may 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.

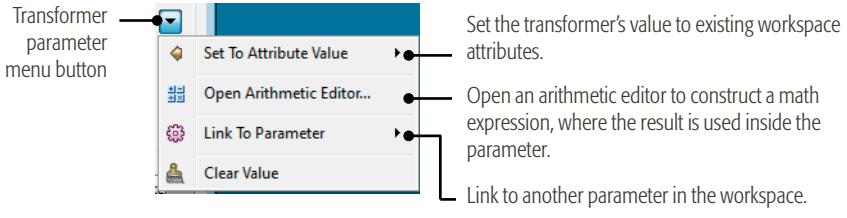


Working with Transformer Parameters

Most transformer parameters can be integrated with other pieces of a Workbench 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 still use a transformer with its displayed default values, but you can also just as easily access these more advanced parameters. A menu button displays available options for each parameter.

Example Transformer Parameter Menu

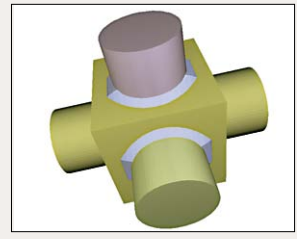
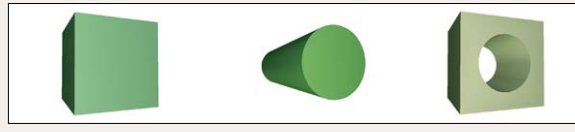


For detailed information on transformer parameters, please see the FME Workbench help or the FME Transformers help.

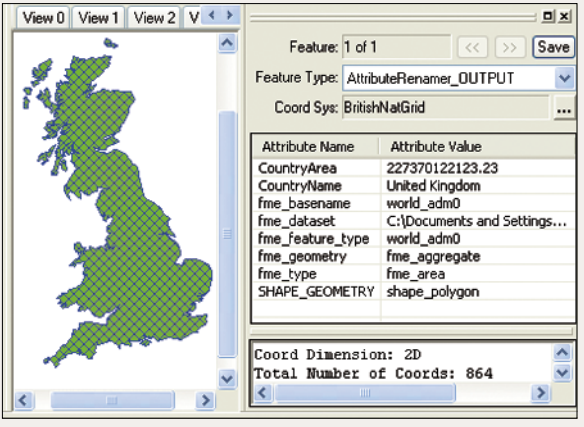
Workbench Keyboard Shortcuts

General Viewing	
Open	Ctrl+O
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+11
Maximize canvas to full screen	F11
Zoom-in	Ctrl+
Zoom-out	Ctrl-
Zoom100%	Ctrl+0
Zoomin and out	Ctrl+scroll wheel
Search: Workspace if the focus is in the workspace or the Navigator; Transformer if the focus is in the Transformer Gallery; Log if the focus is in the Log window	Ctrl+F F3
General Editing	
Cut	Ctrl+X
Copy	Ctrl+C
Paste	Ctrl+V
Redo	Ctrl+Shift+Z
Save	Ctrl+S
Select All	Ctrl+A
Undo	Ctrl+Z
Smart Delete (repair connections)	Delete key
Delete (without repair)	Shift+Delete

Transformer-Related Authoring	
Connect Inspector	Select the object(s), then Ctrl+Shift+I
Connect Logger	Select the object(s), then Ctrl+Shift+L
Create custom transformer from selected objects, or from bookmark	Ctrl+T
Duplicate transformer	Ctrl+D Using Quick Add: 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.
Other Workspace Authoring	
Generate workspace	Ctrl+G
Attach annotation	Select the object(s), then Ctrl+K
Attach summary annotation	Select the object(s), then Ctrl+Shift+K
Enable/disable objects (including links and feature types)	Ctrl+E
Running Translations	
Run translation	F5
Prompt and run translation	Ctrl+R
Run translation with Inspection	Shift+F5
Toggle inspection points	F9

3D – These transformers create and modify three-dimensional surface and solid geometries.	
CSGBuilder	Creates Constructive Solid Geometry (CSG) from pairs of solid geometry features. 
CSGEvaluator	Replaces the geometry of a feature that has CSG. 
Extruder	Creates line, surface or solid geometries with a fixed cross-sectional profile taken from the original geometry of the feature. 
FaceReplacer	Replaces the geometry of a feature from donut, raster or polygon to face.
MeshMerger	Merges mesh features (features with IFMEMesh geometries) into a single output mesh.
SurfaceReverser	Reverses surfaces and solids. On surfaces, it will reorder the coordinates of the surface such that the normal of the output surface is the opposite of the input surface. Vertex normals that exist on the surface will also be reversed. On solids, it will reverse the underlying surfaces, in effect causing the solid to be turned inside-out.

Calculators – These transformers calculate a value and supply it to a new attribute on a feature.	
AngularityCalculator	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.

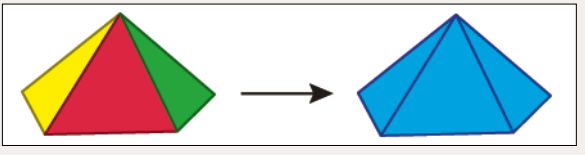
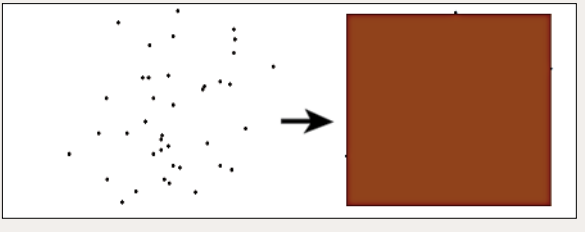
AreaCalculator	Calculates the area of a polygonal object and stores the value in an attribute. The area is calculated in square ground units (the units of the feature's coordinates). 
NEW **AttributePivoter**	Restructures and regroups incoming features based on specified "Group by attributes" and calculates summary statistics based on a designated "Attribute To Analyze" in order to form a Pivot table output.
AttributeRounder	Rounds off an attribute to the specified number of decimal places. `143.178435 ⟶ 143.18`

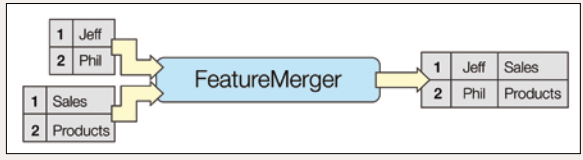
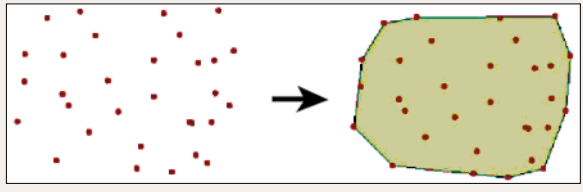
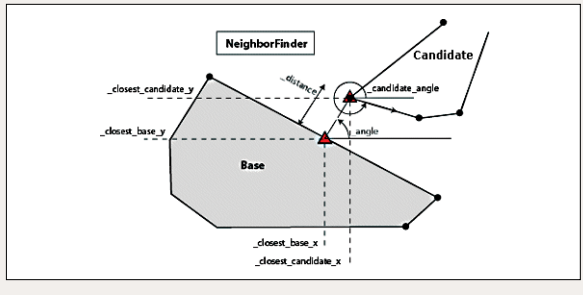
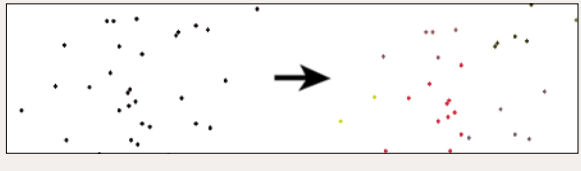
BaseConverter	Converts an attribute's value from one numeric system (base) to another, putting the resulting value in a new attribute.
	`Decimal Hex`
	`958713 ⟶ EA0F9`

BoundsExtractor	Extracts the minimum and maximum values of the feature's coordinates into new attributes.
CircularityCalculator	Calculates the circularity of an area feature, which indicates how elongated the feature is.
CoordinateConcatenator	Retrieves the value of all of the feature's coordinates into an attribute, separated by the delimiter characters.
CoordinateCounter	Stores the number of a feature's coordinates into an attribute.
CoordinateExtractor	Retrieves the value of the x, y, and z coordinates at the specified index into attributes.
Counter	Adds a numeric attribute to a feature and assigns a value.
CRCCalculator	Calculates a CRC (Cyclic Redundancy Check) value for a feature and places the calculated CRC value into the attribute specified.

DateFormatter	Reformats and replaces date or time strings into a new date format. The source string can be in almost any date and/or time format. Some valid examples include: • 20091206 15:05 • 20091206150500 • December 6, 2009 • 06 December 09, 15:05 • 3:05pm
DecimalDegreesCalculator	Calculates a decimal degree value from separate degrees, minutes, and seconds (DMS) values, stored in attributes.
DEMDistanceCalculator	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.
DensityCalculator	Determines the density of a group of CANDIDATE features based on the area of a corresponding AREA feature.
DimensionExtractor	Returns the dimension of the feature as a new attribute.
DMSCalculator	Calculates degrees, minutes, and seconds (DMS) from a decimal degrees value stored in an attribute.
ElevationExtractor	Extracts the elevation of the first coordinate and assigns it to the named attribute.
EnvironmentVariableFetcher	Fetches the specified environment variable and includes it in a new attribute.
ExpressionEvaluator	Evaluates an arbitrary Tcl 8.5.2 expression and returns the result in a new attribute.
HoleCounter	Adds a new attribute whose value is the number of holes in the feature.
InsidePointExtractor	Adds attributes holding the coordinates of a point guaranteed to be inside the area feature. The geometry of the feature is not changed by this transformer.
LeftRightSpatialCalculator	Computes relative position of the CANDIDATE input features relative to the BASE input features. The geometry of a CANDIDATE feature is restricted to point and area, whereas BASE features can only be lines.
LengthCalculator	Calculates the length of a feature and adds it as a new attribute.
ModuloCounter	Adds an attribute holding the next integer in a sequence, restarting the count at 0 whenever the sequence reaches the specified maximum value.
OrientationExtractor	Determines the feature's orientation and returns it in the specified Orientation Attribute.
RandomNumberGenerator	Generates a random number between the values in the Minimum Value and Maximum Value parameters. The random number is rounded to the number of digits specified in the Decimal Places parameter.
SpatialRelator	Determines topological (spatial) relationships between sets of features. It tags, but otherwise does not change features when they have certain relationships, such as touches, overlays, intersects, and so forth.
StatisticsCalculator	Calculates statistics based on a designated attribute of the incoming features.

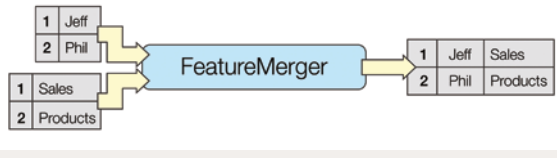
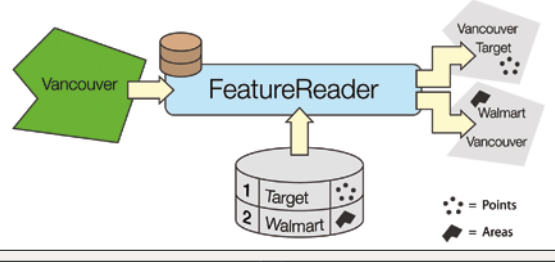
TextureCoordinateSetter	Assigns texture coordinates to surfaces.
VolumeCalculator	Calculates the volume of a solid object and stores the value in an attribute.

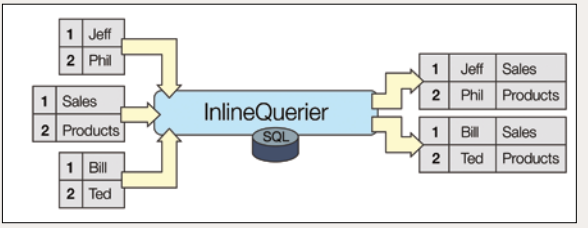
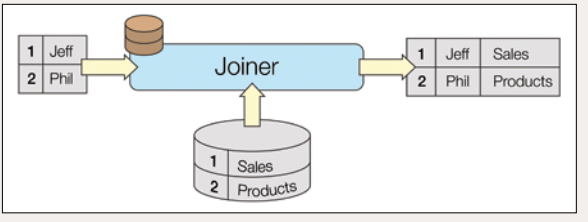
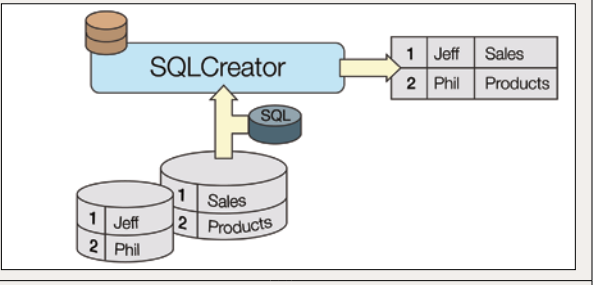
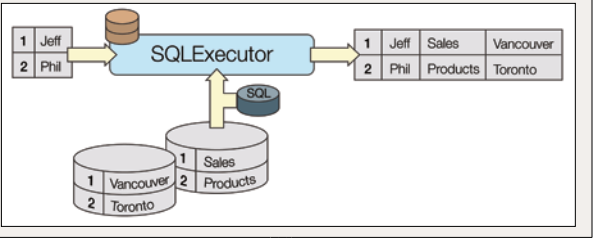
Collectors – These transformers operate on collections of features at the same time. The collection of features may be replaced by new features based upon them, have their attributes or geometries merged, or have their orders altered.	
2DGridAccumulator	Replaces the input features with a grid of two-dimensional 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.
Aggregator	Combines feature geometries into heterogeneous collections, homogeneous collections, or multiple geometries. Alternatively, combines feature attributes alone. 
Amalgamator	Generalizes polygonal input by connecting nearby geometries. It accepts polygonal geometries (including donuts) as input, and produces triangles that join input features into connected pieces, or amalgams.
BoundingBoxAccumulator	Takes a set of point, linear, polygonal, and/or aggregate features and creates a two-dimensional bounding box, which contains all features. 
CommonSegmentFinder	Tests to see which of the CANDIDATE features have even one line segment in common with any BASE feature.
Deaggregator	Decomposes an aggregate feature into its components. 
FeatureHolder	Stores incoming features until they have all arrived and then releases them in their original order.

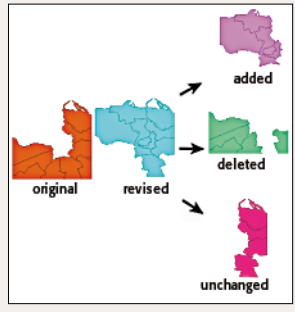
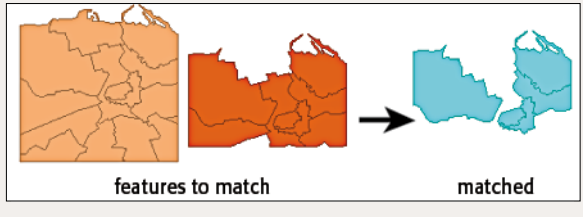
FeatureMerger	Moves the attributes and/or geometry from one feature to another feature. 
HullAccumulator	Creates convex or concave hulls for groups of features. One hull feature is output for each unique combination of values of the attributes specified in the Group By parameter. 
NEW **ListBasedFeatureMerger**	Moves the attributes and/or geometry from one feature to another feature.
NeighborFinder	Finds the closest CANDIDATE feature within a specified maximum distance of each BASE feature. 
NeighborhoodAggregator	Creates aggregates of features based on their proximity to each other. 
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.
Sorter	Sorts features by an attribute's value.

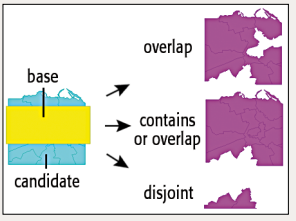
Coordinate Systems – These transformers relate to coordinate systems and reprojection.	
AttributeReprojector	Reprojects attributes from one coordinate system to another.
BMGReprojector	Reprojects feature coordinates from one coordinate system to another using the Blue Marble Geographic Calculator library.
CommonLocalReprojector	Reprojects a set of features to a local coordinate system with units of meters centered on the bounding box of the features.
CoordinateSystemDescription Converter	Converts coordinate systems between FME and Autodesk® WKT, EPSG, Esri® WKT, MapInfo®, OGC® WKT, Oracle® SRID, and PROJ.4 representations.
CoordinateSystemExtractor	Retrieves the feature's coordinate system into an attribute.
CoordinateSystemRemover	Removes the coordinate system from all input features. This transformer does not reproject features or otherwise modify their geometry.
CoordinateSystemSetter	Tags all features with the specified coordinate system. It does not reproject features or otherwise modify their geometry.
CsmapAttributeReprojector	Reprojects attributes from one coordinate system to another using the CS-MAP library.
CsmapReprojector	Reprojects feature coordinates from one coordinate system to another using the CS-MAP library.
EsriReprojector	Reprojects feature coordinates from one coordinate system to another using the Esri reprojection library.
GridInQuestReprojector	Reprojects feature coordinates from one coordinate system to another using the Grid InQuest reprojection library.
GtransAttributeReprojector	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.
GtransReprojector	Reprojects features to and from SWEREF99 using the Gtrans reprojection library (from the National Land Survey of Sweden) and the specified translation file.
LatLongToMGRSConverter	Calculates a Military Grid Reference System (MGRS) code based on the latitude and longitude values supplied in a feature's attributes.
LocalCoordinateSystemSetter	Tags all features with the local coordinate system defined by the specified parameters. It does not reproject features, or otherwise modify their geometry.
MGRSGeometryExtractor	Calculates a Military Grid Reference System (MGRS) code based on the feature's geometry.
MGRSGeometryReplacer	Converts MGRS code to longitude and latitude coordinates. The geometry of an input feature is replaced with a point at the longitude/latitude values obtained from the MGRS code.
MGRSToLatLongConverter	Converts MGRS code to longitude and latitude coordinates.
ReframeReprojector	Reprojects feature coordinates from one coordinate system to another using the REFRAME library.
ReprojectAngleCalculator	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.

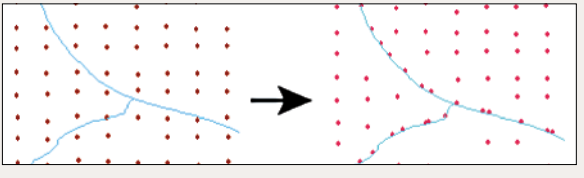
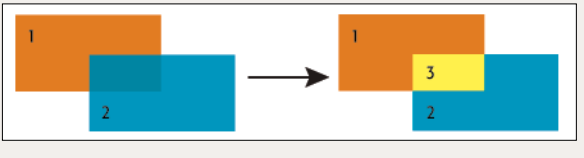
ReprojectLengthCalculator	Converts a given distance from one coordinate system to another. The transformer calculates the reprojected length of a line starting at the first coordinate in the feature, with the given length and angle.
Reprojector	Reprojects feature coordinates from one coordinate system to another. 

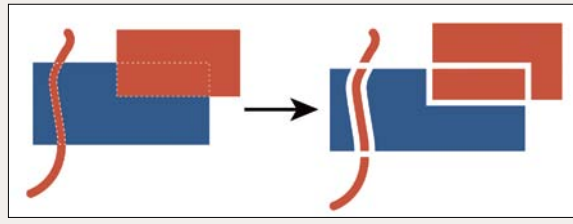
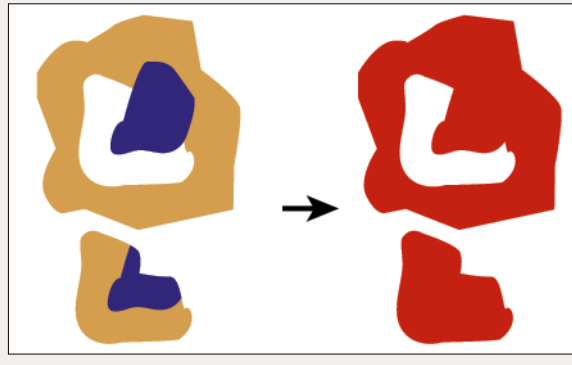
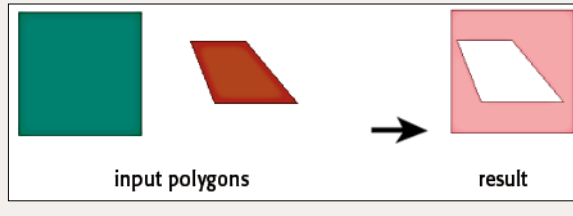
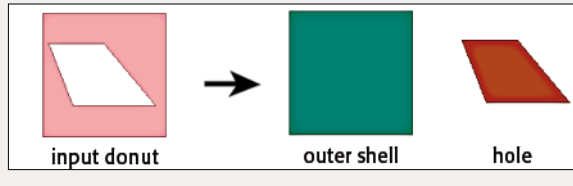
Database – These transformers allow interaction with external databases. Data can be extracted from databases and merged into the feature stream, or merged onto features. You can also execute arbitrary SQL statements.	
ArcSDEQuerier	Performs queries on an ArcSDE™ spatial database. The queries can have both a spatial and a nonspatial component.
NEW **DatabaseDeleter**	Delete rows in a database table based on the condition specified.
NEW **DatabaseUpdater**	Update fields in a database table based on the condition specified.
FeatureMerger	Moves the attributes and/or geometry from one feature to another feature. 
FeatureReader	Performs queries against any FME-supported format. The queries can have both a spatial and a nonspatial component. 

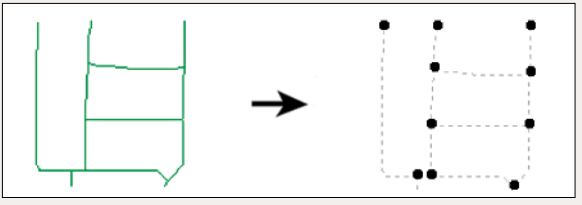
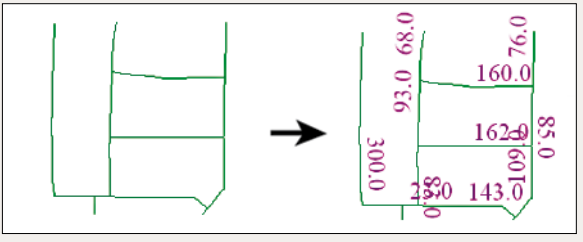
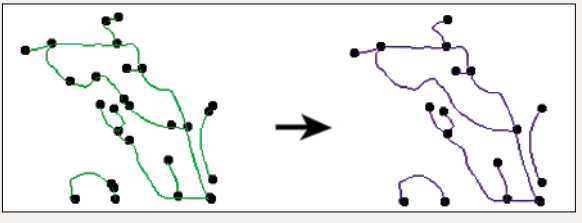
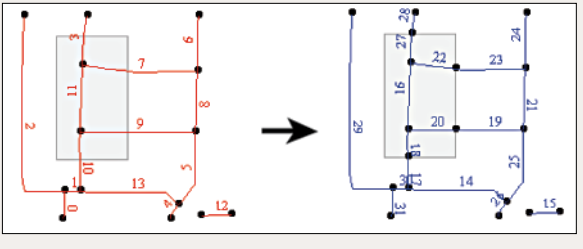
InlineQuerier	Executes SQL queries against a temporary database consisting of tables created from incoming features, returning the results as new features. 
Joiner	Joins attributes from an external database to other spatial or nonspatial features as they are processed through a translation. Most popular databases are supported. 
SchemaMapper	Maps the schema (attributes and feature types) of features based on a schema mapping table.
SQLCreator	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. 
SQLExecutor	Runs an arbitrary SQL statement against a database. 

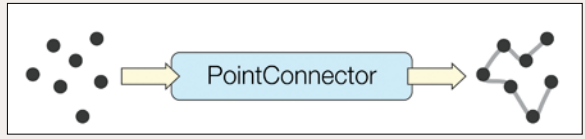
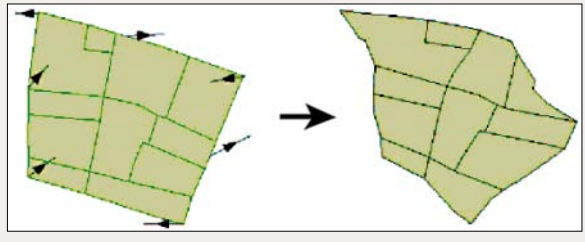
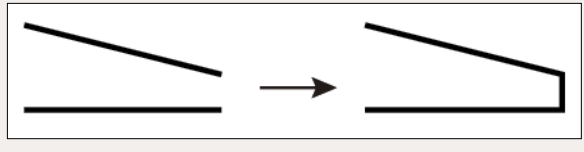
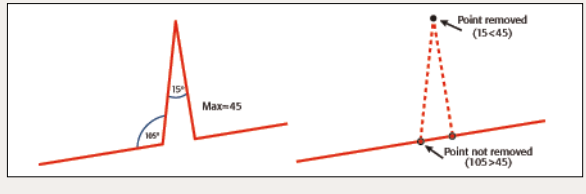
Filters – These transformers perform tests on feature geometry and/or attributes, and allow the feature to be routed to different destinations depending on the outcome of the test.	
AggregateFilter	Routes features differently depending on whether their geometry consists of an aggregate of several primitive geometries or a simple, single piece of geometry.
AttributeFilter	Routes features to different output ports depending on the value of an attribute.
AttributeRangeFilter	Performs a lookup on a range-based lookup table and routes the feature to the appropriate output port.
ChangeDetector	Detects changes between two sets of input features. 
ConvexityFilter	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.
DuplicateRemover	Detects duplicate features based on the value of a key attribute.
FeatureTypeFilter	Routes input features to different output ports based on their original feature type.
GeometryFilter	Routes a feature based on its geometry type.
LicenseChecker	Checks whether the license file is valid and the specified product name is licensed, based on a vendor key and vendor registration code.
Matcher	Detects features that are matches of each other. Features are declared to match when they have matching geometry, matching attribute values, or both. 
MultipleGeometryFilter	Filters aggregate features based on the type of aggregate.
PlanarityFilter	Filters features based on their planarity. To be planar, a geometry must have all of its points situated in the same plane.
Sampler	Preserves either a total number of features or a sampling of features, depending on the Sampling Type selection.

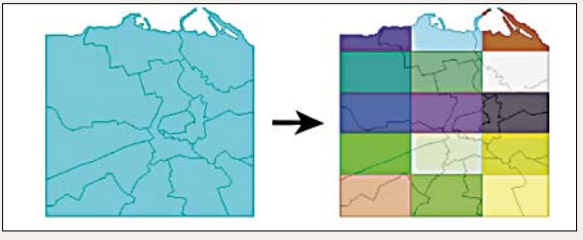
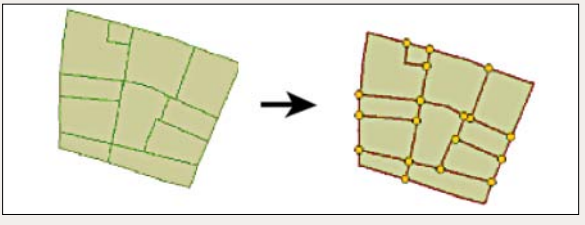
SpatialFilter	Filters features based on spatial relationships. Each input CANDIDATE feature is compared against all BASE features, based on the selected tests to perform. 
Tester	Evaluates one or more tests on a feature and routes the feature according to the outcome of the tests. The tests can consist of any FME-allowed operands.
TestFilter	Filters features by test conditions to one or more output ports.

Geometric Operators – These transformers operate on the geometry of individual features, or groups of features. A wide variety of operations are available, including overlays, snapping, line labeling, clipping, and intersection.	
AffineWarper	Performs warping operations on the spatial coordinates of features. It is used to adjust a set of observed features so they more closely match some set of reference features.
AnchoredSnapper	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. 
AreaBuilder	Takes a set of topologically connected linework and creates topologically correct polygon features where the linework forms closed shapes.
AreaOnAreaOverlayer	Performs an area-on-area overlay. All input areas are intersected against each other, and resulting area features are created and output. The resulting areas have all of the attributes from all the original features in which they are contained. 

Clipper	Performs a geometric clipping operation. 
Dissolver	Dissolves area features by removing common boundaries to create larger areas. Input attributes may be accumulated. 
DonutBridgeBuilder	Builds connections between donut holes with the outer boundary of a donut, resulting in a polygon-equivalent representation of the input donut.
DonutBuilder	Cuts holes in polygonal features by making polygons completely enclosed in other polygons into holes of the containing polygon. 
DonutHoleExtractor	Splits an area feature that has holes into its component rings. 
GeometryValidator	Detects selected issues in input features, and optionally repairs detected issues. Each input feature is processed individually.

Intersector	Computes intersections between all input features, and breaks lines and polygons wherever an intersection occurs. 
Labeller	Interpolates labels along a linear or polygonal feature. 
LineJoiner	Takes non-intersecting lines and connects them into longer lines whenever doing so does not remove a significant node. 
LineOnAreaOverlayer	Performs a line-on-area overlay. Each input line is split at any area boundaries it intersects. 
LineOnLineOverlayer	Performs a line-on-line overlay. During the overlay, all input lines are intersected against each other, and resulting line features are created and output.
NetworkTopologyCalculator	Finds the connected lines that belong to the same network graph.
PathBuilder	Connects input linear features (arcs and lines) in the order they enter, forming path features.

PointConnector	Connects input point features in the order they enter, forming linear or polygonal features. 
PointOnAreaOverlayer	Performs an overlay of points on areas.
PointOnLineOverlayer	Performs an overlay of points on lines. Each input line is split at its closest place to any point within the specified point tolerance.
PointOnPointOverlayer	Performs an overlay of points on points.
RubberSheeter	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. 
SliverRemover	Cleans up feature geometries by forming a 2D planar partition with no gaps or overlaps between polygons.
Snapper	A Snapper snaps 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. 
SolidBuilder	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.
SpikeRemover	Cleans up feature geometries by removing spikes in two dimensions. 

SurfaceBuilder	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.
SurfaceOnSurfaceOverlayer	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.
Tiler	Chops the input features into a series of tiles. This transformer works with both raster and vector data. 
TopologyBuilder	Computes topology on input point, line, and/or area features. 
Triangulator	Breaks an input geometry into triangular units or a mesh.

Infrastructure – These transformers provide interaction with the underlying FME translation engine facilities. These include functionality to log features, set feature colors, create individual features and grids of features from nothing, and invoke the FME Viewer on features flowing by.	
2DGridCreator	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.
AttributeCompressor	Compresses and (optionally) encrypts the values of the specified attributes.
AttributeCopier	Copies existing attributes to new attributes with the specified names. The existing attribute remains and a new attribute is created. The new attribute has a different name, but the same value.
AttributeCreator	Adds a number of attributes to the feature, supplying them with constants, attribute values, and expressions. Any feature that enters the transformer emerges with a new set of attributes as defined in the transformer's parameters dialog.
AttributeDecompressor	Decompresses and decrypts the values of the specified attributes that were compressed and encrypted by the AttributeCompressor.

AttributeDereferencer	Copies the value of the attribute whose name is held in the source attribute to a newly created attribute.
AttributeExposer	Exposes hidden attributes so that they can be used by other transformers.
AttributeFileReader	Reads the contents of a file and stores them as the value for the specified attribute.
AttributeFileWriter	Writes the contents of the specified attribute to a file.
AttributeRenamer	Renames, deletes, or creates the specified attributes.
AttributeValueMapper	Looks up and assigns attribute values based on other attributes, and stores the looked-up value in a new attribute. 
Cloner	Makes the specified number of copies of the input features and outputs all copies through its single output port.
Creator	Creates features using the parameters supplied and sends them into the workspace for processing.
FeatureColorSetter	Assigns colors to incoming features.
FeatureTypeExtractor	Adds an attribute containing the original feature type of a feature.
FMEFunctionCaller	Calls the specified FME function, optionally putting the resulting value in the Result Attribute.
Inspector	Sends features to the FME Universal Viewer or the FME Data Inspector.
Logger	Logs each feature to the translation log. All attributes and geometry of the feature will be output.
MultipleGeometrySetter	Provides the ability to set up an aggregate where each part is independent from the others and is its own complete geometry.
NEW **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.
ParameterFetcher	Adds an attribute to the feature and supplies it with the value of a previously published parameter.
Player	Retrieves features stored in an FME Feature Store file and outputs them into the workspace.
PythonCaller	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.
PythonCreator	Creates features using the Python script supplied, and sends them into the workspace for processing.
Recorder	Saves a copy of all features that enter to a disk file.
SummaryReporter	Writes a summary report of incoming features to a disk file. Features are sorted before they are summarized.
SystemCaller	Runs a program and waits for it to exit before continuing the translation.
TclCaller	Runs a Tool Command Language (Tcl) command and assigns its return value to an attribute.

TCPIPReceiver	Receives raw data over TCP/IP. Produces a feature each time a specified number of bytes is received or a particular sequence is detected.
TCPIPSender	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.
Terminator	Causes the translation to end and prints the specified message in the translation log as the reason for the termination.
TransporterReceiver	Receives features from another FME workspace. The workspaces can be on the same machine or on different machines. Used in conjunction with the TransporterSender.
TransporterSender	Sends features to another FME workspace. The workspaces can be on the same machine or on different machines. Used in conjunction with the TransporterReceiver.
VariableRetriever	Reads the specified variable and puts its value into the specified attribute. This variable must have been previously set using the VariableSetter transformer.
VariableSetter	Creates and sets the specified variable to the specified value. The variable can later be read back into an attribute using the VariableRetriever transformer.

JSON – JSON (JavaScript Object Notation) is a simple, structured text format designed to be easily integrated into JavaScript applications.	
JSONFragmenter	Extracts portions of JSON formatted text into new FME features.
JSONExtractor	Extracts portions of JSON formatted text into feature attributes.
JSONFlattener	Flattens JSON objects, extracting the object keys and values into FME feature attributes.
JSONFormatter	Provides options for formatting JSON text.
JSONTemplater	Populates a JSON document with FME feature attribute values.
NEW **JSONUpdater**	This transformer creates, modifies, replaces or deletes object and array values in a JSON document.
JSONValidator	Validates the syntax of JSON text.

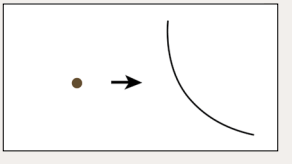
KML – These transformers manipulate feature geometry and/or attributes for output using the Google™ Earth™ KML Writer.	
KMLPropertySetter	Sets common properties for groups of vector and raster features that are destined for the Google Earth KML Writer.
KMLRegionSetter	Sets the region-related KML attributes for a group of features that are destined for the Google Earth KML Writer.
KMLStyler	Creates a common style for a group of features destined for the OGCKML writer.

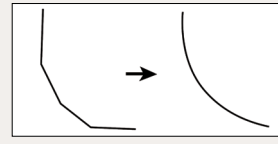
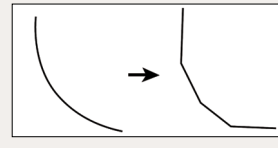
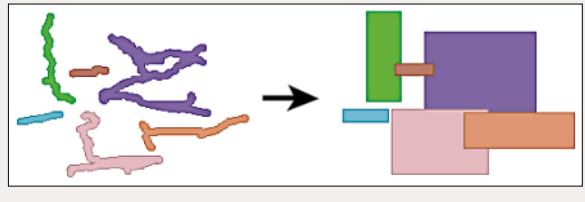
KMLTimeSetter	Sets the time-related KML attributes for a group of features that are destined for the Google Earth KML Writer.
KMLTourBuilder	Generates a KML Tour from the input features. The tour consists of tour stops that correspond to each input feature.
KMLViewSetter	Sets the view-related KML attributes for a group of features that are destined for the OGCKML Writer. Creation of LookAt or Camera views are supported.

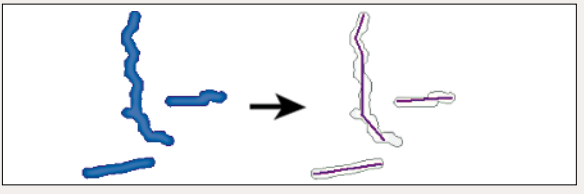
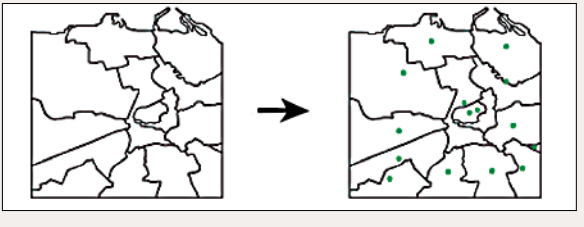
Linear Referencing – These transformers work with linear referencing data structures on FME features. Transformers are provided for creating and applying measure-related information held in attributes onto the geometry of FME features.	
LengthToPointCalculator	Calculates the length of a feature from 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.
MeasureExtractor	Extracts the measures of geometries that match the given type, and places them in attributes or list attributes.
MeasureGenerator	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.
MeasureRemover	Removes measures from a feature's geometry.
MeasureSetter	Sets measures on a point, line, arc, area geometry, or a vertex of a linear geometry to attribute values of given attributes or list attributes.
Snipper	Shortens the geometry of a line feature by snipping off specified distances, indices, or measure values from the ends. It operates on features with simple line geometry and polygons without holes.

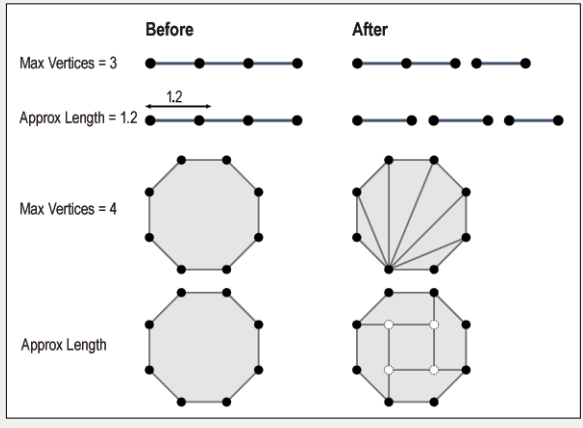
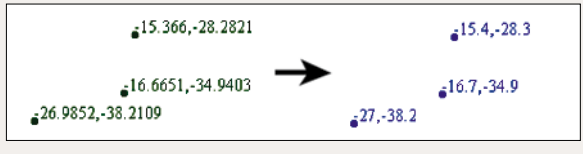
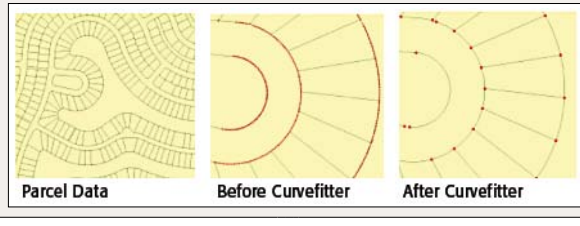
Lists – These transformers operate on FME attribute lists. Transformers are provided for creating, exploding, searching, and extracting from FME attribute lists.	
AttributeExploder	Creates a new pair of attributes (attribute name/attribute value) from each attribute on the input feature and either outputs 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.
NEW **ListBasedFeatureMerger**	Moves the attributes and/or geometry from one feature to another feature.
ListBuilder	Combines attributes of the input features into a single list structure.
ListConcatenator	Concatenates all values of a list into a single attribute.
ListCopier	Copies a complete attribute list, including all nested attributes, from one list name to another.
ListDuplicateRemover	Removes all duplicate values from a list attribute. In the resulting list, only distinct values for the list attribute will be present.
ListElementCounter	Stores the number of member elements found in the specified list into an attribute.
ListExploder	Explodes each list member on each input feature out into its own feature.

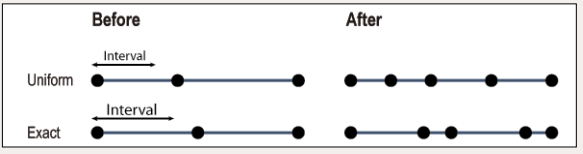
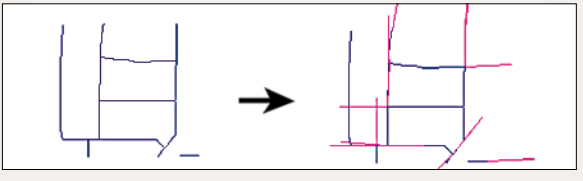
ListExpressionPopulator	Populates a new list from a series of attributes, specified using a regular expression.
ListHistogrammer	Computes a histogram of the values found in a list and returns these in a new list attribute on the feature.
ListIndexer	Demotes the attributes of the list element specified by the index to become main attributes of the feature.
ListPopulator	Takes a series of user attributes attached to a feature and creates a list attribute from them. Example: *myattrib0* *myattrib1* *myattrib2* becomes a list ***myattrib{}*** containing entries ***myattrib{0}, myattrib{1}, myattrib{2}***
ListRangeExtractor	Extracts the minimum and maximum values found in a list.
ListRenamer	Renames the components of a list or the list name.
ListSearcher	Searches a list to find a value and returns the index of the value in the list.
ListSorter	Sorts the elements of the given list into a new list.
ListSummer	Computes the sum of all elements of a list.

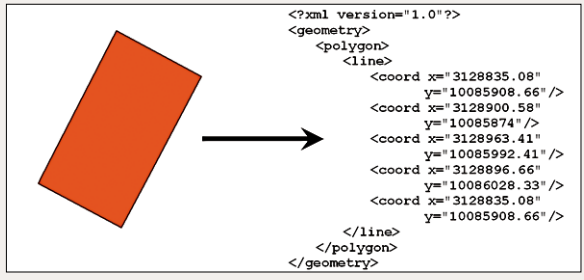
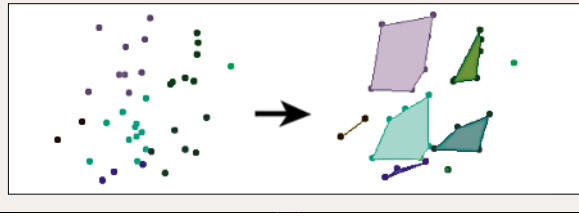
Manipulators – These transformers modify (manipulate) the geometry or attributes of individual features in isolation from other features.	
2DArcReplacer	Replaces the geometry of the feature with a two-dimensional arc whose shape is set by the parameters, which can be either constant floating point values or the values of existing attributes. 
2DBoxReplacer	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.
2DEllipseReplacer	Replaces the feature's geometry with a two-dimensional ellipse whose shape is set by the parameters, values, or the values of existing attributes.
2DForcer	Removes any elevation z coordinates that may or may not have been present on the original feature.
3DAffiner	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.
3DArcReplacer	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.
3DForcer	Turns two-dimensional data into three-dimensional data by adding a z-value to every coordinate.

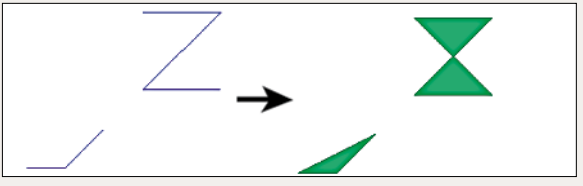
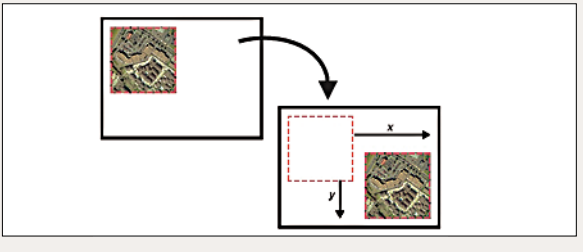
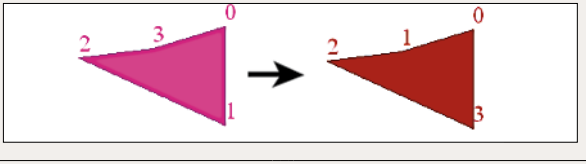
3DInterpolator	Interpolates elevation values along a non-aggregated linear feature from a starting value to an ending value. The resulting feature's elevation monotonically increases (or decreases) from the starting value to the ending value. If the feature was two-dimensional, it becomes three-dimensional. If the feature was three-dimensional, its previous elevations are removed and replaced.
3DRotator	Rotates features according to the right-hand rule, and in a counter-clockwise direction about the specified axis of rotation.
Affiner	Performs an affine transformation on the feature's coordinates.
AngleConverter	Converts angles of a feature's geometry and/or attributes from one representation to another.
ArcEstimator	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. 
ArcPropertyExtractor	Sets the given attributes to the properties of an arc geometry and works on a single feature at a time.
ArcPropertySetter	Modifies the properties of an arc geometry.
ArcSDEGridSnapper	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.
ArcStroker	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. 
AttributeKeeper	Removes all attributes and list attributes from the feature, except the ones that are selected from the attribute list.
AttributeRangeMapper	Performs a lookup on a range-based lookup table and stores the resulting value, or writes the value to, a new output attribute.
AttributeRemover	Removes the selected attributes and list attributes from the feature.
BoundingBoxReplacer	Replaces the geometry of the feature with either its two-dimensional bounding box or its two-dimensional minimum oriented bounding box. 
Bufferer	Replaces the geometry of a feature with one that represents the original, padded by a specified width. Each point in the output geometry is the specified distance away from the original geometry.

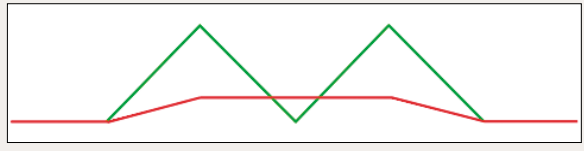
BulkAttributeRemover	Removes all attributes on incoming features that match a given regular expression. It can also be used to remove large numbers of attributes that have common naming.
BulkAttributeRenamer	Renames attributes by adding or removing prefixes or suffixes, or replacing text in regular expressions or character strings.
CenterLineReplacer	Replaces an area feature with its medial axis, straight skeleton, or a centerline. This transformer works best with long, narrow areas. 
CenterOfGravityReplacer	Replaces the feature's geometry with a point that is the center of mass distribution of the feature. The resulting point may be far outside of the original feature, depending on the feature's shape. 
CenterPointReplacer	Replaces the feature's geometry with a point that is in the center of the feature's bounding box. 

Chopper	Breaks input features into points, lines, or areas. Chopped features contain the same set of vertices as input features. 
CoordinateRemover	Removes one or more coordinates from the geometry of the feature.
CoordinateRounder	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. 
CoordinateSwapper	Swaps coordinate axes of the input features.
Curvefitter	Smoothes 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. 

Densifier	Adds vertices to each feature by interpolating new coordinates at fixed intervals. 
Displacer	Solves proximity conflicts between features using a variant of the Nickerson displacement algorithm.
EllipsePropertyExtractor	Sets the given attributes to the properties of an ellipse geometry.
EllipsePropertySetter	Sets the properties of an ellipse geometry as specified.
Extender	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. 
FilenamePartExtractor	Extracts specified parts of a filename path and returns the results as string attributes.
Generalizer	There are four algorithm types: • Generalizing algorithms reduce the density of coordinates by removing vertices. • Smoothing algorithms determine a new location for each vertex. • Measuring algorithms calculate the location of points and return a list of these points (for example, to measure the sinuosity of a feature). • 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).
NEW **GeographicBufferer**	Expands or shrinks the boundary segments in the input geometry by a specified amount, and if necessary, connects them using stroked arcs.
GeometryCoercer	Resets the geometry type of the feature.

GeometryExtractor	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. 
GeometryPartExtractor	Extracts or removes selected geometry parts based on a Geometry XQuery.
GeometryProperty Extractor	Extracts selected geometry names or traits to feature attributes.
GeometryProperty Remover	Removes selected geometry names or traits.
GeometryPropertyRenamer	Renames geometry names or traits.
GeometryPropertySetter	Sets selected geometry names or traits from feature attributes or constants.
GeometryRefiner	Performs the following refinements on the feature's geometry: • Any homogeneous IFMEAggregate becomes a multi (IFMEMultiCurve, IFMEMultiArea, IFMEMultiPoint, or IFMEMultiText). • Any IFMEAggregate or multi with only one member is replaced by its single part. • Any IFMEDonut with no holes becomes an IFMEPolygon or IFMEEllipse. • Any IFMEPath with only one segment is replaced by that segment. • Consecutive IFMELine segments within an IFMEPath are combined.
GeometryRemover	Completely removes the feature's geometry; for example, when you want to turn spatial data into nonspatial data.
GeometryReplacer	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.
GMLFeatureExtractor	Constructs GML2 documents from the input features and stores them in the specified attribute for the features that are output by the GML2 port.
GMLFeatureReplacer	Constructs features out of GML documents that are stored in an attribute of the input features.
HullReplacer	Replaces the geometry of the feature with a polygon representing its hull. 

InsidePointReplacer	Replaces the geometry of the area feature with a point that is guaranteed to be inside the area.
LabelPointReplacer	Replaces the feature's geometry with a label point. For polygons, the text is guaranteed to be inside the original object. For lines or points, the text is guaranteed to be on the original object. 
LineCloser	Turns input linear features into areas by adding their start point as the end point. 
MinimumAreaForcer	Ensures that features with polygon geometry have an area that is equal to, or in excess of, the specified minimum area.
MinimumSpanningCircle Replacer	Replaces feature's geometry 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.
OffsetCurveGenerator	Offsets the segments of linear features, and if necessary, connects them using stroked arcs.
Offsetter	Adds offsets to the feature's coordinates so that the feature shifts by the specified amount. 
Orientor	Adjusts the orientation of a polygonal feature or the direction of a linear feature. 
PartCounter	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.
PathSplitter	Decomposes a path feature into its component segments. Each output feature contains a copy of the source feature's attributes.

Rotator	Rotates features in a counterclockwise direction about the specified point by the rotation angle (measured in degrees).
Scaler	The Scaler scales objects to make them bigger or smaller.
SecondOrderConformer	Performs a second-order conformal transformation on the feature's geometry. Depending on the input geometry, a 2D or 3D transformation is performed.
SherbendGeneralizer	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: 
TextAdder	Sets the feature's geometry to text using the previous geometry as the text location.
TextLocationExtractor	Sets a text feature's geometry to the location of the text.
TextPropertyExtractor	Sets the given attributes to a text geometry's properties.
TextPropertySetter	Sets the properties of a text geometry to the specified properties.
TextStroker	Takes as input a font name, text padding and width multiplier, and outputs aggregates that describe the outline of the text. 
NEW **VertexCreator**	Appends coordinates to point and line geometry, or replaces existing geometry with point geometry.

MapText – These transformers are used to create text labels for features. They are built using technology developed by MapText, Inc.	
MapTextLabeller	Creates text labels for features using the MapText Label Manager.
MapTextStyler	Prepares features for labelling by the MapTextLabeller by specifying no-label zones around features.

MRF – These transformers repair geometry, particularly during data migration from CAD to GIS. They are built upon the MRFCleanFactory, which is an integration of MRF Geosystems Corporation's cleaning technology into FME. All of the transformers in this category are available as an extra-cost package from Safe Software.	
MRF2DCleaner	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.

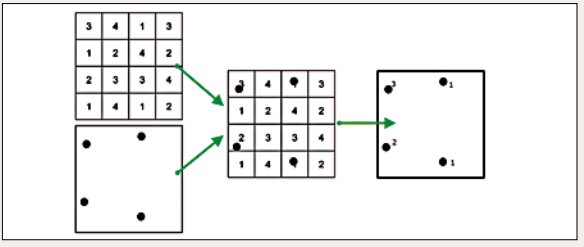
MRF2DConflator	Changes a feature's geometry to match that of another when both have approximately the same shape and location, and have matching endpoints.
MRF2DDangleRemover	Removes features that have at least one free endpoint and have lengths smaller than the specified amount.
MRF2DDuplicateRemover	Deletes duplicated features. Features are considered to be duplicates if their geometries are within tolerance. Only features with a smaller tolerance remain after cleaning.
MRF2DExtender	Extends arcs and lines that are within the specified tolerance to correct undershoots while maintaining line-work direction.
MRF2DGeneralizer	Removes a number of vertices from lines. The number of vertices removed is controlled by a weeding tolerance.
MRF2DIntersector	Computes intersections between all input features, breaking arcs and lines wherever an intersection occurs.
MRF2DJoiner	Joins connected features to form longer ones. A pair of linear features becomes a candidate for joining only when the two are connected at a given node or end point.
MRF2DShortGeometry Remover	Removes features that have lengths smaller than the specified tolerance.
MRF3DCleaner	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.

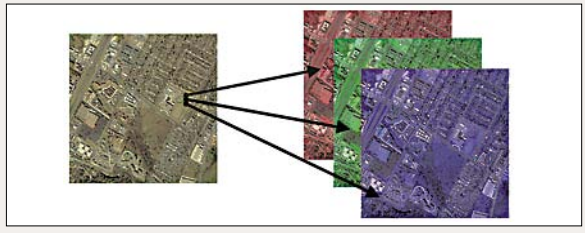
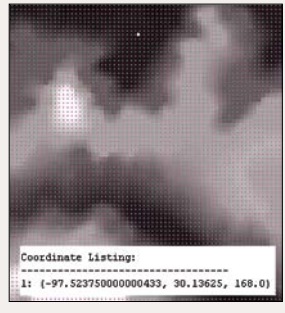
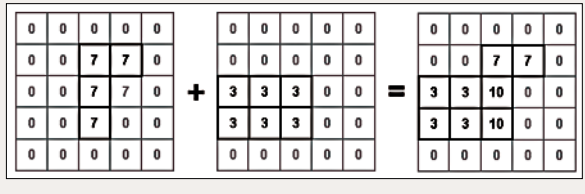
Network – These transformers operate on linear features that are connected in a network, performing operations such as priority calculation and orientation correction.	
NetworkCostCalculator	Computes and assigns the cost of the shortest path from a source object to each connected object as the Z-values or measure values of the input features.
NetworkFlowOrientor	Fixes the flow (direction) of each edge or linear feature in the network to fit the downstream direction to the destination node.
NetworkTopologyCalculator	Finds the connected lines that belong to the same network graph.
ShortestPathFinder	Computes the shortest path of a line or lines in a network based on the length of the input or the weight of the edges.
StreamOrderCalculator	Computes the order (Strahler or Horton) of streams in a river network.
StreamPriorityCalculator	Calculates the primary and secondary streams of multiple stream networks.

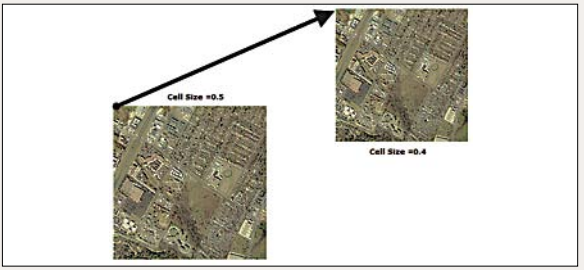
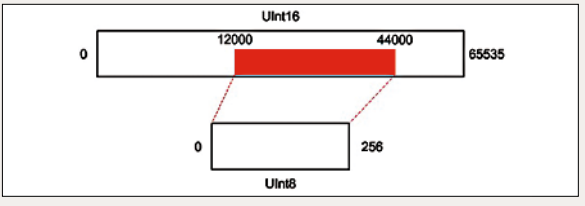
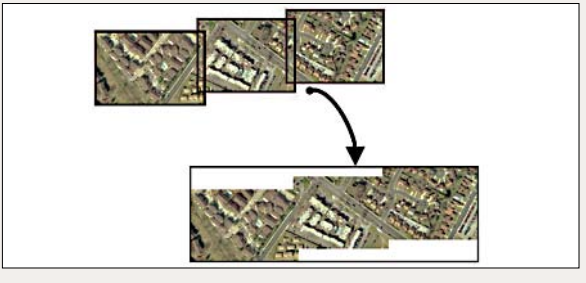
Point Cloud – These transformers create, use, and output point cloud features. They operate only on data consisting of point clouds.	
PointCloudCoercer	Coerces point cloud geometries into points or multipoints; can be used to write a point cloud to a format that does not support point clouds.
PointCloudColorScaler	Scales the color component of a point cloud from UInt8 to UInt16, or UInt16 to UInt8.
PointCloudCombiner	Combines multiple point clouds into a single point cloud.

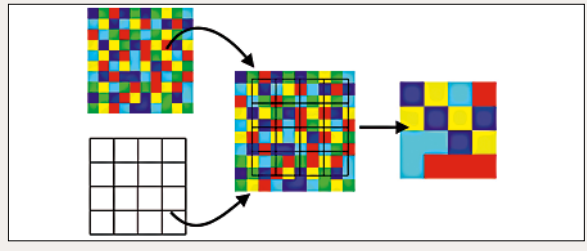
NEW **PointCloudComponent Adder**	Adds new components with constant values to a point cloud.
NEW **PointCloudComponent Copier**	Copies an existing component to a new component with the specified name. The existing component remains and a new component is created that has a different name, but the same values.
NEW **PointCloudComponent Keeper**	Removes all components from a point cloud, except for the specified ones.
NEW **PointCloudComponent Remover**	Removes specified components from a point cloud.
NEW **PointCloudComponent Renamer**	Renames an existing component.
NEW **PointCloudComponent TypeCoercer**	Converts the type of point cloud components.
PointCloudConsumer	Requests the point(s) from the point cloud geometry but no actual operations are performed on the point(s).
PointCloudCreator	Creates a new point-cloud feature with the specified size and components and sends it into the workspace for processing.
PointCloudExpression Evaluator	Evaluates expressions, such as algebraic operations or conditional statements, to set point cloud component values.
NEW **PointCloudExtractor**	Serializes the geometry of the feature into the Blob Attribute based on the selected writer format.
PointCloudFilter	Filters a point-cloud feature into one or more parts based on evaluating expressions.
PointCloudOnRaster ComponentSetter	Sets point cloud component values by overlaying a point cloud on a raster.
PointCloudPropertyExtractor	Extracts the properties of a point-cloud feature and exposes them as attributes.
NEW **PointCloudReplacer**	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.
PointCloudSplitter	Splits a single point-cloud feature into multiple point-cloud features.
PointCloudThinner	Outputs point-cloud features that have fewer points than the original input features.
NEW **PointCloudTransformation Applier**	Applies transformations on a point cloud.

Rasters – These transformers create, use, and output rasters. They operate on data consisting of a regularly spaced grid of values.	
ImageRasterizer	Draws input point, line, and polygon features onto a color raster filled with the background color.
NEW **MapnikRasterizer**	Draws input point, line, polygon, and raster features onto a raster using the Mapnik toolkit.

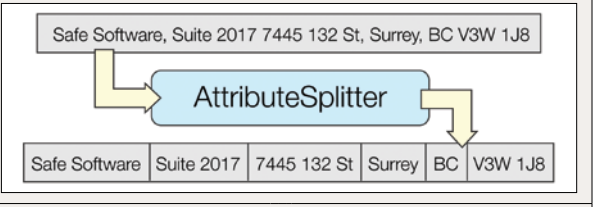
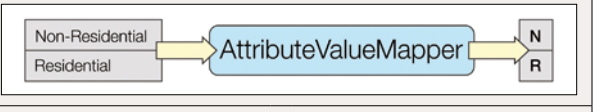
NumericRasterizer	Draws input point, line, and polygon features onto a numeric raster filled with the background value. The z coordinates of the input vector features are used to generate pixel values.
PointOnRasterValueExtractor	Extracts the band and palette values from a raster at the location of each input point and sets them as attributes on the feature. 
NEW **RasterAspectCalculator**	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.
RasterBandAdder	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.
RasterBandCombiner	Merges multiple overlapping raster features into a single raster feature.
RasterBandInterpretation Coercer	Alters the underlying interpretation of the selected bands of the raster geometry on the input features, using the specified conversion options.
RasterBandKeeper	Removes all bands of a raster, except for those that are selected. The RasterSelector can be used to modify the selection.
RasterBandMinMaxExtractor	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.
RasterBandNameSetter	Sets the name of selected bands on a raster.
RasterBandNodataRemover	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.
RasterBandNodataSetter	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).
RasterBandOrderer	Specifies the order of bands in a raster. Bands are reordered according to the input band indices.
RasterBandProperties Extractor	Extracts the band and palette properties of a raster feature and exposes them as attributes.
RasterBandRemover	Removes the selected bands of a raster.

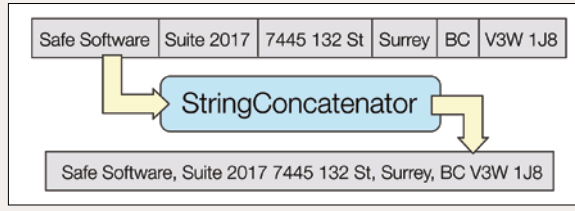
RasterBandSeparator	Separates the bands and palettes from each input raster feature into one or more output raster features based on the number of input bands and palettes. 
RasterCellCoercer	Decomposes all input numeric raster features into individual points or polygons. One vector feature is output for each cell in the band. 
RasterCellOriginSetter	Sets the raster's cell origin.
RasterCellValueCalculator	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. 
RasterCellValueReplacer	Replaces a range of values in the source raster with a new single value.
RasterCellValueRounder	Rounds off raster cell values.
RasterCheckpointer	Sets a checkpoint in the raster processing, which forces previous processing to occur immediately and saves the current state to disk when complete.
RasterConsumer	Requests all the tiles from the raster geometry.
RasterExpressionEvaluator	Evaluates expressions on each cell in a raster, such as algebraic operations or conditional statements.
RasterExtentsCoercer	Replaces the geometry of input raster features with a polygon that covers the extents of the raster.
RasterExtractor	Serializes the geometry of the feature into the Raster Blob Attribute based on the selected writer format.
RasterGCPExtractor	Extracts the coordinate system and the Ground Control Points (GCPs) from the raster feature and exposes them as attributes.

RasterGCPSetter	Sets the GCP on a raster with the specified Column (pixel), Row (line), x Coordinate, y Coordinate and z Coordinate.
RasterGeoreferencer	Georeferences a raster with the specified parameters. 
RasterHillshader	Generates a shaded relief effect, useful for visualizing terrain.
RasterInterpretationCoercer	Alters the underlying interpretation of the bands of the raster geometry on the input features, using the specified conversion options. 
RasterMosaicker	Mosaics multiple raster features into a single raster feature. 
RasterNumericCreator	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.
RasterPaletteAdder	Creates a palette from an attribute and adds this palette to all selected bands on a raster.
RasterPaletteExtractor	Creates a string representation of an existing palette and saves it to an attribute.
RasterPaletteGenerator	Generates a palette out of the selected bands of a raster.
RasterPaletteInterpretation Coercer	Alters the underlying interpretation of the palettes of the raster geometry on the input features, using the specified conversion options.
RasterPaletteNodataSetter	Identifies the nodata value on a raster feature at the palette level.
RasterPaletteRemover	Removes the selected palettes of a raster.

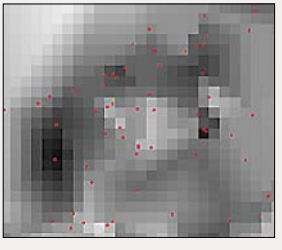
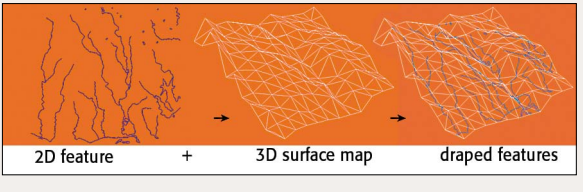
RasterPaletteResolver	Resolves the palettes of the selected bands of the input raster features by using the band cell values to look up the corresponding palette values, which then replace the original band cell values in the raster.
RasterPropertiesExtractor	Extracts the geometry properties of a raster feature and exposes them as attributes.
RasterPyramider	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.
RasterReader	Reads and outputs raster features from the specified format and dataset.
RasterReplacer	Replaces the feature's geometry with the geometry held in the Raster Blob Attribute. The blob is decoded according to the selected raster format.
RasterResampler	Resamples an input raster using the desired dimensions, the desired cell size in ground units, or a percentage of the size. 
RasterRGBCreator	Creates a feature with a raster of the specified size with an RGB value and sends it into the workspace for processing.
RasterRotationApplier	Applies the raster rotation angle on the input raster properties to the rest of the raster properties and data values.
RasterSelector	Selects specific bands and palettes of a raster for subsequent transformer operations.
RasterSingularCellValue Calculator	Performs an arithmetic operation on two operands: the cell values of a raster and a numeric value.
NEW **RasterSlopeCalculator**	Calculates the slope (maximum rate of change in z) for each cell of a raster.
RasterSubsetter	Reduces a raster to a subset of its original size. This is essentially a clipping operation using pixel bounds instead of ground coordinates.
RasterTiler	Splits each input raster into a series of tiles by specifying either a tile size or a number of tiles. 
RasterToPolygonCoercer	Creates polygons from input raster features. One polygon is output for each contiguous area of pixels with the same value in the input raster.

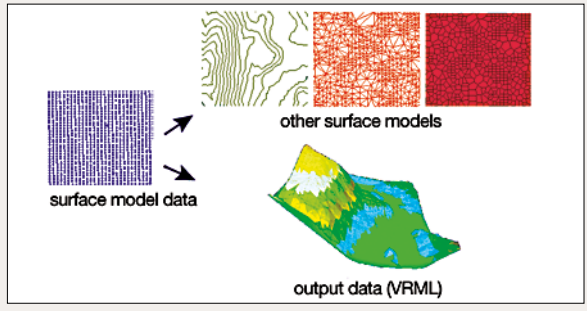
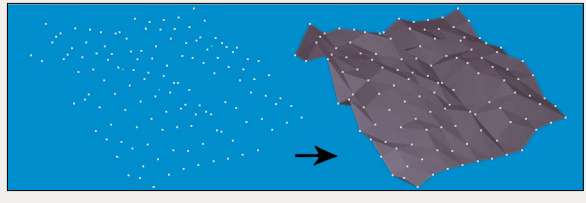
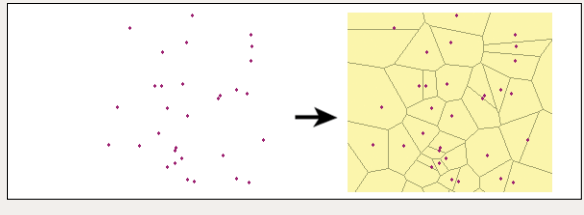
VectorOnRasterOverlayer	Overlays vector features onto a single raster feature by drawing them onto the resulting output raster. The properties of the output raster are identical to that of the input raster.
WebMapTiler	Creates a series of image tiles that can be utilized by web mapping applications such as Bing™ Maps, Google Maps™, or Web Map Tile Service.

Strings – These transformers operate on character strings held in FME attributes. Transformers are provided for searching, replacing, changing case, and extracting character encodings from strings held in FME attributes.	
AttributeClassifier	Tests whether the contents of the source attribute are entirely of a particular character classification, and routes the feature accordingly.
AttributeSplitter	Splits a selected attribute into a list attribute. Each item in the list contains a single token split from the list. For example, you can use this transformer to separate an attribute that has a comma-separated value list into its component pieces. 
AttributeTrimmer	Removes leading and trailing trim characters from the selected attributes.
AttributeValueMapper	Looks up and assigns attribute values based on other attributes, and stores the looked-up value in a new attribute. 
BinaryDecoder	Converts ASCII text to binary data using Base64 or HEX decoding methods.
BinaryEncoder	Converts binary data to ASCII strings using Base64 or HEX encoding methods.
CharacterCodeExtractor	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.
CharacterCodeReplacer	Sets the result attribute to the character whose numeric code was contained in the source code attribute (or the entered integer).
GOIDGenerator	Calculates a Geographic Object IDentifier (GOID) 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.
NEW **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.
StringCaseChanger	Changes the case of text attributes to UPPERCASE, lowercase, Title case, or Full Title Case.

StringConcatenator	Concatenates the values of any number of attributes, user parameters and/or constants, and stores the result in a new attribute. 
StringFormatter	Reformats the data held in each specified attribute according to the Tcl ***format*** command, which is similar to the C ***printf*** function. Attribute values can be formatted into strings, characters, or numbers.
StringLengthCalculator	Calculates the length of the string in Source Attribute.
StringPadder	Pads the given attributes with spaces, either on the right or left side.
StringPairReplacer	Replaces characters in the value contained in the source attribute based on the replacement key-value pairs.
StringReplacer	Replaces substrings matching a string or regular expression in the string contained in the source attribute.
StringSearcher	Performs a regular expression match on the specified expression.
SubstringExtractor	Extracts a substring from the source attribute.
TextDecoder	Decodes a string from URL, XML, HTML, Base64, or HEX encodings into plain text.
TextEncoder	Encodes a text string using URL, XML, HTML, Base64, or HEX methods.
TimeStamper	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.
UUIDGenerator	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

Stylers – These transformers are used to prepare features for output to particular formats by providing a convenient interface for setting color and other display characteristics.	
DGNStyler	Prepares features for output to Bentley® Microstation® Design V7/V8 by providing a convenient interface to set a variety of format-specific attributes.
DWGStyler	Prepares features for output to AutoCAD® DWG™/DXF™ by providing a convenient interface to set a variety of format-specific attributes.
KMLStyler	Creates a common style for a group of features destined for the OGCKML writer.
MapInfoStyler	Prepares features for output to Mapinfo® MIF/MID or MapInfo TAB by providing a convenient interface to set a variety of format-specific attributes.
MapTextStyler	Prepares features for labelling by the MapTextLabeller (see the MapText category on page 23) by specifying no-label zones around features.
PDFStyler	Sets the common Adobe® PDF style attributes for a group of features destined for the GeoSpatial PDF Writer.

Surfaces – These transformers create, use, and output surfaces. They operate on data that defines a surface through the z coordinate, and then either outputs this surface in a variety of ways or applies the surface to other data.	
AppearanceExtractor	Extracts appearance style(s) from the front and/or back side of the geometries.
AppearanceJoiner	Sets the front and/or back appearance style(s) of specified geometries to be identical to that which is on a specific source geometry.
AppearanceRemover	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.
AppearanceSetter	Sets appearance style(s) onto the front and/or back sides of geometries.
AppearanceStyler	Creates an appearance style that can later be applied to a surface (in conjunction with the AppearanceSetter, for example).
ContourGenerator	Constructs a Delaunay triangulation based on input points and breaklines. Contour lines are then generated from the triangulation.
DEMGenerator	Constructs a Delaunay triangulation based on input points and breaklines. That triangulation is then uniformly sampled to produce a digital elevation model (DEM points).
GeometryColorSetter	Sets colors, via appearances, on geometries (such as surfaces) that support appearances, and match a Geometry XQuery.
RasterDEMGenerator	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). 
SectorGenerator	Outputs circular sectors of influence for point features that have directions defined by azimuths.
SurfaceDraper	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. 

SurfaceModeller	The SurfaceModeller combines the functionality of several other surface-related transformers. It is useful when you need multiple representations of the same model. 
SurfaceSplitter	The SurfaceSplitter divides a double-sided surface geometry into two parts; front and back. It would be particularly useful for 3D buildings when a combined inside and outside need to be split apart.
TINGenerator	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. 
VoronoiCellGenerator	Outputs circular sectors of influence for point features that have directions defined by azimuths.
VoronoiDiagrammer	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. 

Web Services – These transformers access web services using the HTTP protocol.	
Decelerator	Slows down the flow of features through the workspace.
DirectTweeter	Sends a direct Twitter™ message from Workbench.
GeoRSSFeatureExtractor	Constructs GeoRSS documents from the input features and stores them in the specified attribute for the features that are output by the GeoRSS port.

GeoRSSFeatureReplacer	Constructs features out of GeoRSS documents and URLs that are stored in a specified attribute of the input features. The features from the GeoRSS document and URL can be output with the attributes from the original feature and merged.
HTTPDeleter	Accesses a URL by performing an HTTP DELETE operation. The results of the request are stored in the specified target attribute.
HTTPFetcher	Accesses a URL by performing an HTTP GET operation. The results of the request will be stored in the specified target attribute.
HTTPFileUploader	Uploads the contents of a file to a URL using an HTTP PUT or POST operation. The result of the upload will be stored in the specified target attribute.
HTTPMultipartUploader	Creates a multipart upload request using the specified files and parameters using either an HTTP PUT or POST operation.
HTTPUploader	Uploads data to a URL using an HTTP PUT or POST operation. The result of the upload will be stored in the specified target attribute.
ImageFetcher	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.
ProxixGeocoder	Geocodes addresses using a Proxix Geospatial Enterprise Real-Time (GSERT) server.
NEW **S3Downloader**	Using the Amazon Simple Storage Service (S3), downloads data from an object in an S3 bucket.
NEW **S3Uploader**	Using the Amazon Simple Storage Service (S3), uploads data to an Amazon S3 bucket.
Tweeter	Sends a Twitter status update from Workbench.
TweetSearcher	Runs a search for Twitter entries that contain the given query.
TwitterStatusFetcher	Retrieves the Twitter status updates for a particular user.
WebCharter	Creates a URL that can be used to obtain a chart of the specified data as a PNG image from the Google Chart API. One URL is created for each feature that enters the transformer. Use of the Google Chart API is subject to the Terms of Service for the API.
NEW **WebSocketReceiver**	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.
NEW **WebSocketSender**	Sends WebSocket messages to the specified WebSocket server.
WhiteStarLeaseBuilder	Posts a query to a WhiteStar Legal2Map™ WebServices (W3) server to obtain points or polygons that match a list of legal land descriptions.

Workflow – These transformers run workspaces either locally or on an FME Server. To use these transformers, you may need access to an FME Server.	
FMEServerJobSubmitter	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.

FMEServerJobWaiter	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.
FMEServerLogFileRetriever	Accesses the translation log for a specified FME Server-run translation. The translation log to access is identified by the job ID input parameter.
FMEServerNotifier	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.
FMEServerWorkspaceRunner	Submits FME Spatial ETL jobs to be run on an FME Server, and downloads the resulting data to a specified location. You can optionally upload files used for the job, and download results locally when the FME Server job is complete.
NEW **JMSReceiver**	Using the Java Message System (JMS), receives messages from a message broker.
NEW **JMSSender**	Using the Java Message System (JMS), sends messages to a message broker.
NEW **SNSSender**	Using the Amazon Simple Notification Service (SNS), sends messages to an Amazon SNS topic.
NEW **SQSReceiver**	Using the Amazon Simple Queue Service (SQS), receives messages from an Amazon SQS queue.
NEW **SQSSender**	Using the Amazon Simple Queue Service (SQS), sends messages to an Amazon SQS queue.
WorkspaceRunner	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.

XML – These transformers work with XML data by mapping XML elements into FME features, using stylesheets to convert XML documents, and querying collections of XML data.	
NEW **XMLAppender**	Assembles several XML documents into one.
HTMLToXHTMLConverter	Converts HTML document into valid XHTML document.
XMLFeatureMapper	Constructs features from XML documents via xfMaps.
XMLFlattener	Flattens content of XML element(s) into feature attributes.
XMLFormatter	Provides various options for formatting and cleaning up XML documents.
XMLFragmenter	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.
XMLNamespaceDeclarer	Declares missing namespaces in XML documents by matching prefixes from another sample XML file whose namespaces are fully declared.
XMLSampleGenerator	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.

XMLTemplater	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.
XMLUpdater	This transformer creates, modifies, replaces, or deletes XML elements and attributes in an XML document.
XMLValidator	Validates the syntax or schema of an XML file or text.
XQueryExploder	Extracts portions of XML text using XQuery expressions into new FME features.
XQueryExtractor	Uses XQuery expressions to extract portions of XML text into feature attributes.
XQueryUpdater	Provides updates to an XML document using XQuery Update expressions.
XSLTProcessor	Uses an eXtensible Stylesheet Language (XSL) stylesheet to convert an XML document. Common output formats include text, RSS, SVG, and CSV.

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