Data Scenarios 2020: Amazing Transformations

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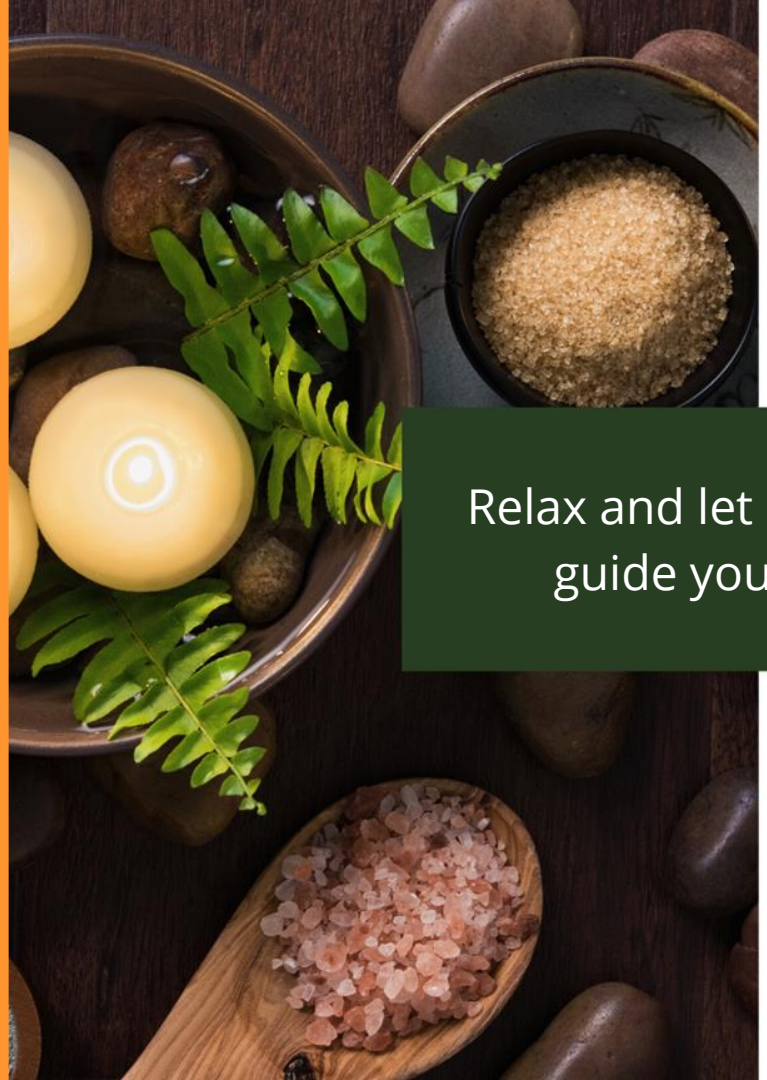
Safe Software

SAFE SOFTWARE

Today's Spiritual Experiences

1. See the world through new eyes.
2. Worry less over your bills.
3. Augmented Reality in a new light.



Relax and let FME guide you

Computer Vision

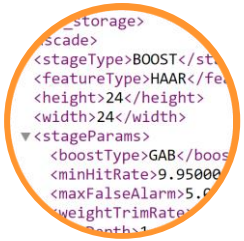
A field of Machine Learning with the goal of helping computers "see" and "understand" what's in an image.

How does CV work in FME?

Step One: Train the Algorithm

Input:
A lot of data samples

Use FME to connect to a CV tool and **train** it to recognize your object

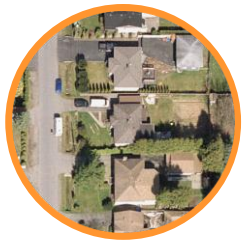


Output: XML file containing the knowledge

"Train" the algorithm once, then use the resulting XML file to perform computer vision.

How does CV work in FME?

Step Two: Perform CV on your Image(s)



Input: The image(s) you want to perform CV on

Use FME to pre-process, connect to a CV tool, and post-process

Output: Rectangles around found objects

"Train" the algorithm once, then use the resulting XML file to perform computer vision.

Results

Stop Sign Detector Service

Fire Hydrant Detector Service

CV on Cars

Car detection on aerial imagery using FME.

Workflow:

- Data collection and preprocessing.
- Connect to OpenCV using the RasterObjectDetector.
- Clipping, rotating, filtering, and other post-processing.

CV on Roofs

Roof detection on aerial imagery using FME in the same way.

E.g. a county needs to detect what's new whenever they get new imagery.

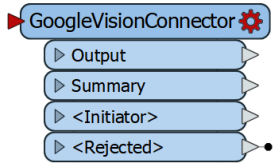
CV on Oblique Images

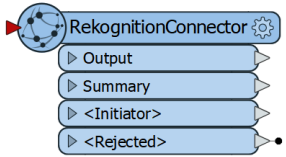
Car detection on oblique images

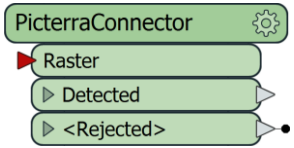
CV Tools in FME

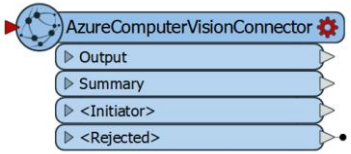
Many ways to connect to Computer Vision algorithms!

- OpenCV (via RasterObjectDetector transformers)
- Google Vision. **NEW!**
- Azure Computer Vision. **NEW!**
- Amazon Rekognition. **NEW!**
- PicterraConnector. **NEW and Geospatial!**









** Paid services. OpenCV is FOSS.*

Example: Face detection and augmented objects with Google Vision

Do you want to try the mask on?

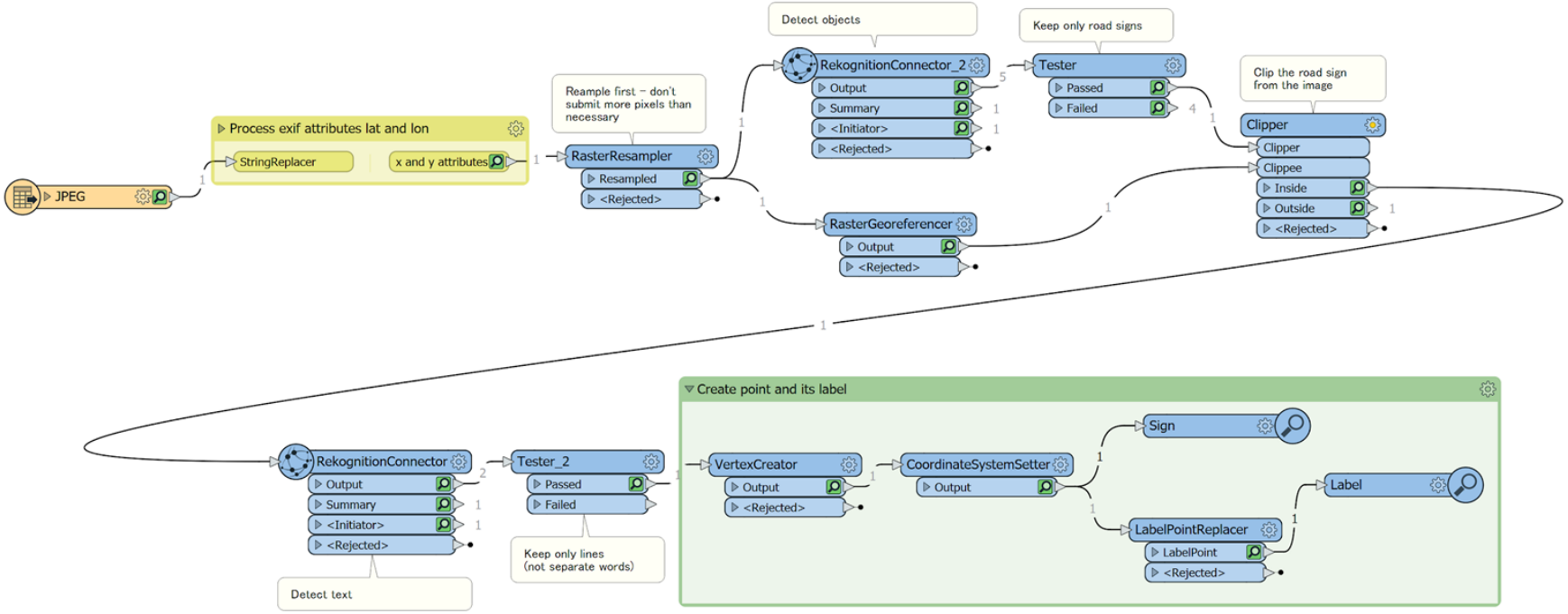
Do you want to make your own filter?

Example: I used text detection to destroy text detection

RekognitionConnector workflow example:

1. Use spatial filtering to submit only necessary photos or video frames (this is a paid service!)
2. Detect objects
3. Filter road signs
4. Clip road signs from photos
5. Detect texts on road sign clips
6. Stay in control over bills with FME

RekognitionConnector demo

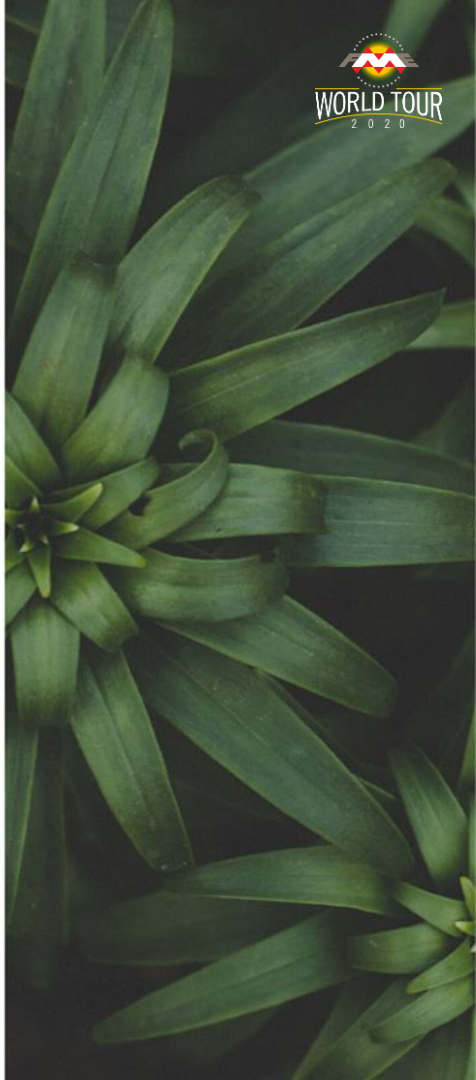


What is Picterra

Picterra - cloud-based computer vision platform for geospatial data

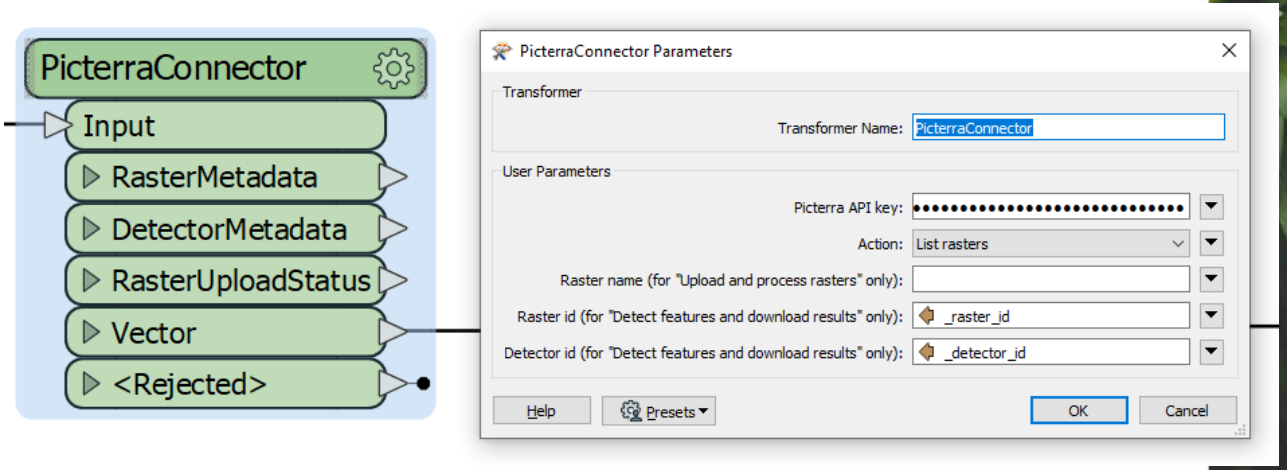
Examples:

- Ongoing building construction: results
- Road cracks: results
- Pinnipeds counting: blog, results
- Sheep counting and Cownter project
- Railway assets: results
- Weed (shattercane) detection: blog, results



PicterraConnector in FME

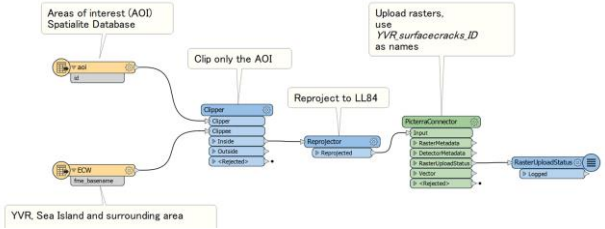
PicterraConnector - a custom transformer for utilizing Picterra capabilities via API



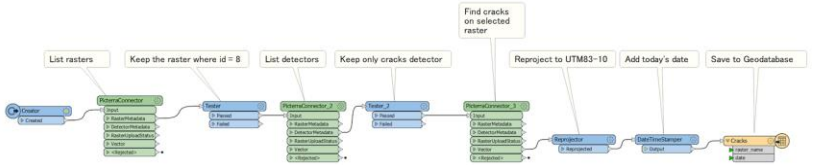
Demo: PicterraConnector

Sample project: Pavement cracks

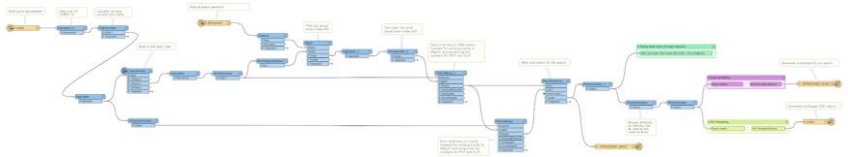
Upload

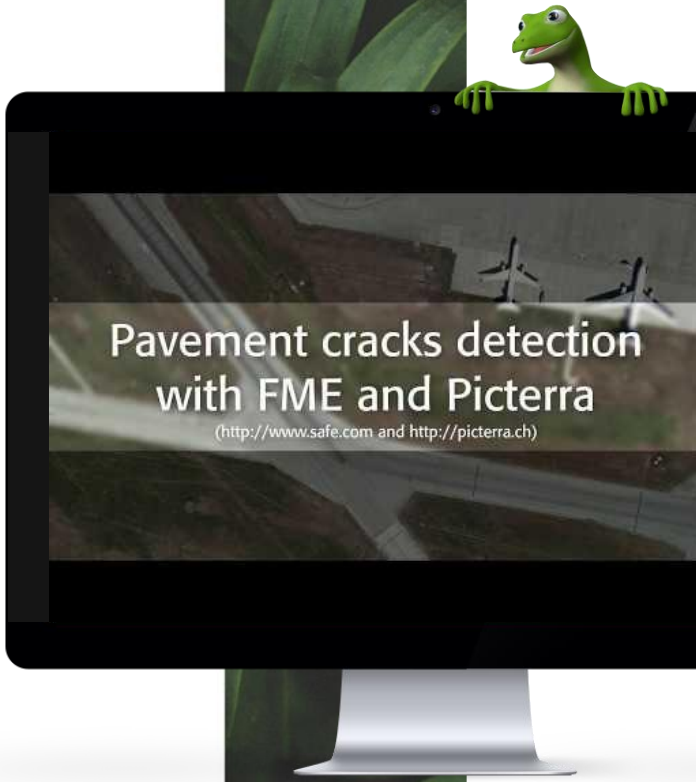


Detect



Report





Results

Which detection project was most interesting?

What would you like to detect on your imagery?

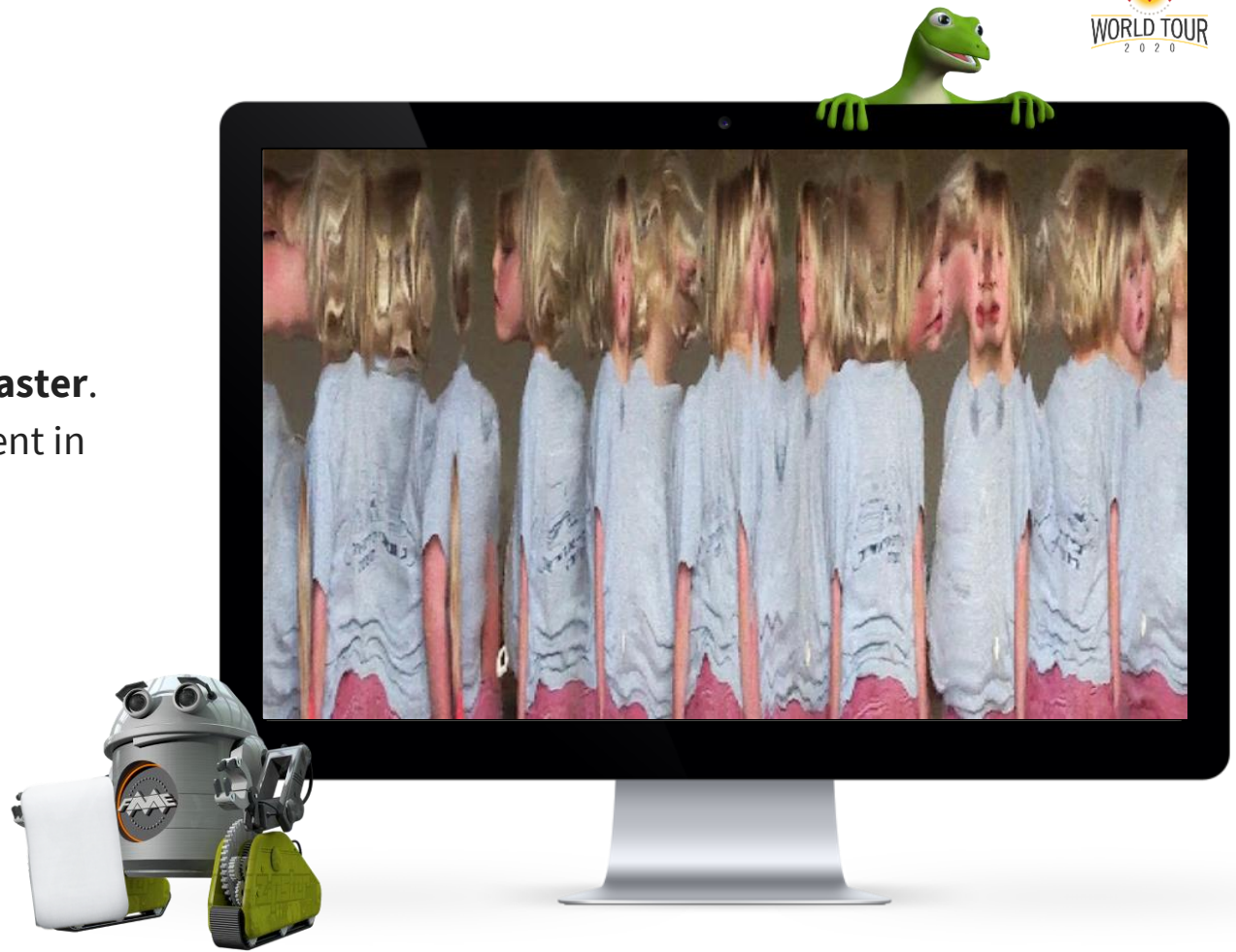
Talk to us via Q&A or send us an email!

A Simple Alternative to CV techniques

Sometimes, a very simple method can be as effective as advanced **AI/CV/DL**

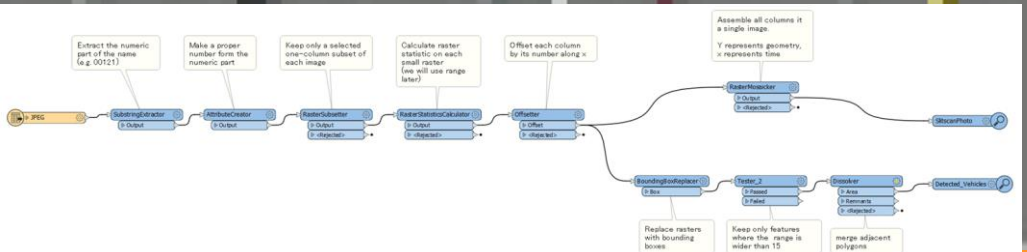
Slit-Scan Photography

You're looking at **a space-time raster**. Every column of pixels is a moment in time – like a static animation.



Counting Cars

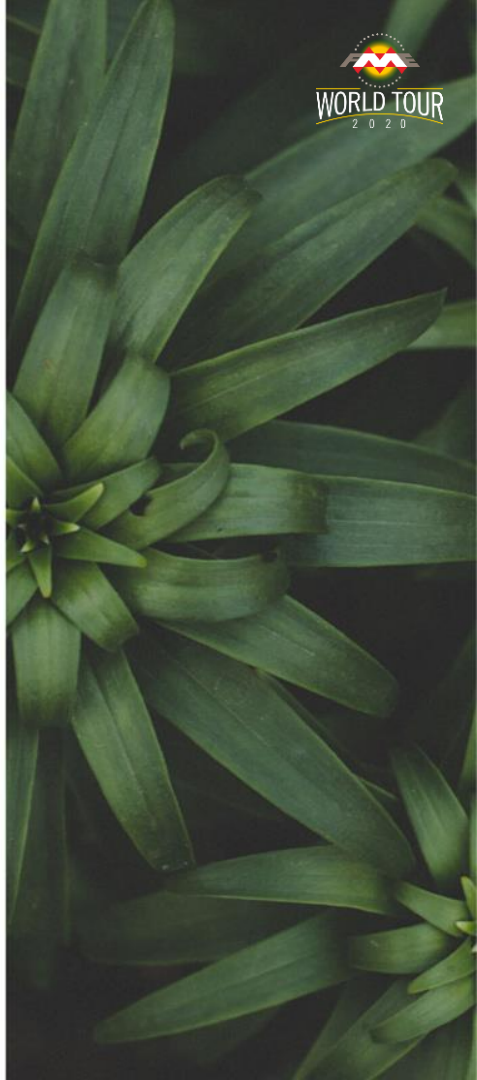
This is a slit-scan image of 30 seconds of traffic.



Further Reading

- Blog: FME Does Computer Vision (only talks about the OpenCV method – the RasterObjectDetector transformer family)

- Computer Vision Webinar - “How to Improve Computer Vision with Geospatial Tools”

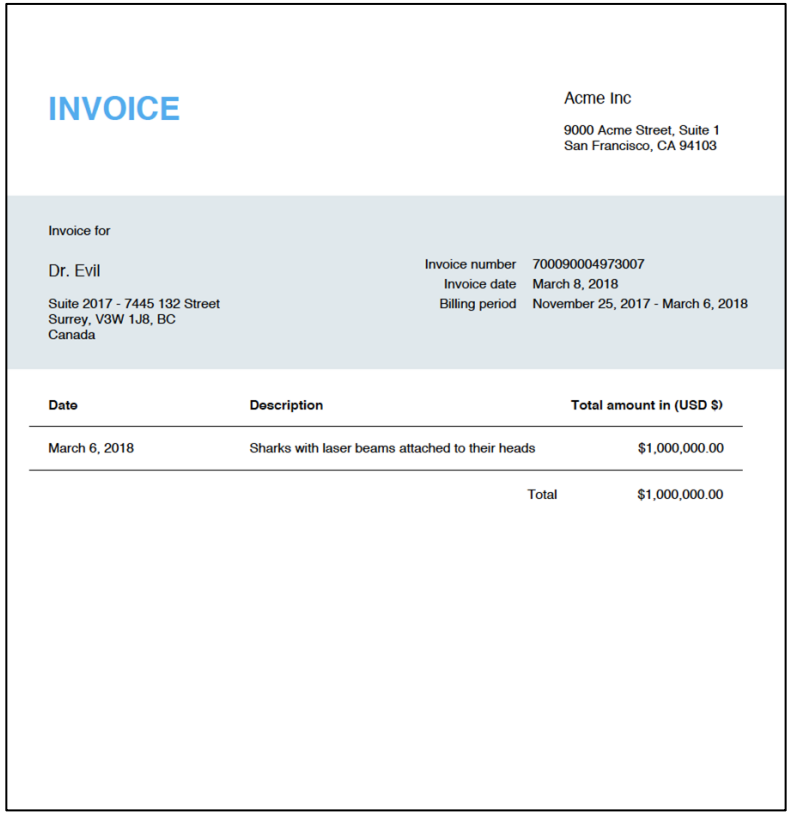


Managing Bills Automatically

Using FME to automatically process your PDF bills.

Automate Everything

Process invoices, bills, statements, and other accounting documents with FME Server



INVOICE

Acme Inc

9000 Acme Street, Suite 1
San Francisco, CA 94103

Invoice for

Dr. Evil

Suite 2017 - 7445 132 Street
Surrey, V3W 1J8, BC
Canada

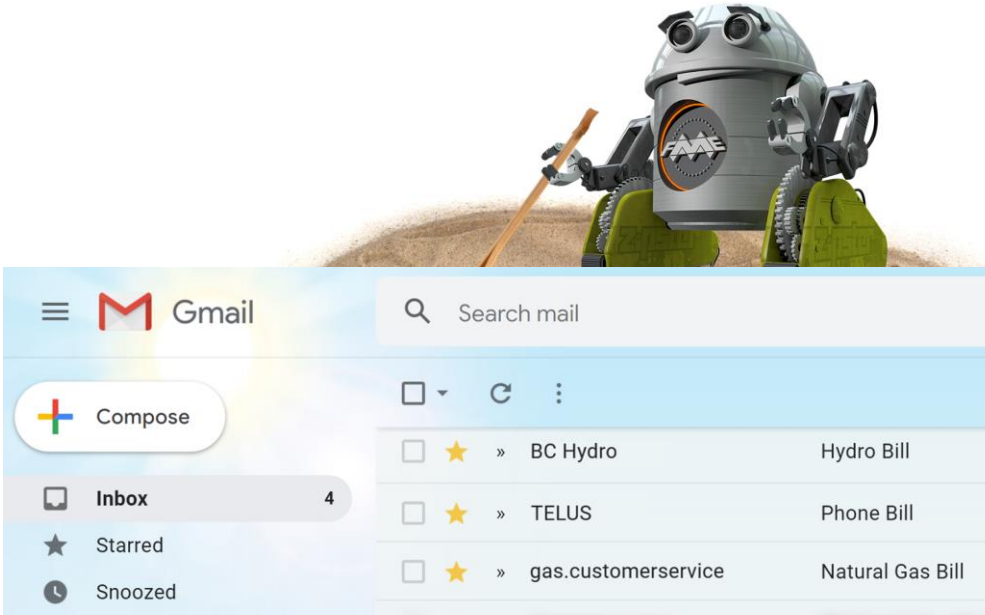
Invoice number 700090004973007
Invoice date March 8, 2018
Billing period November 25, 2017 - March 6, 2018

Date	Description	Total amount in (USD $)
March 6, 2018	Sharks with laser beams attached to their heads	$1,000,000.00
	Total	$1,000,000.00

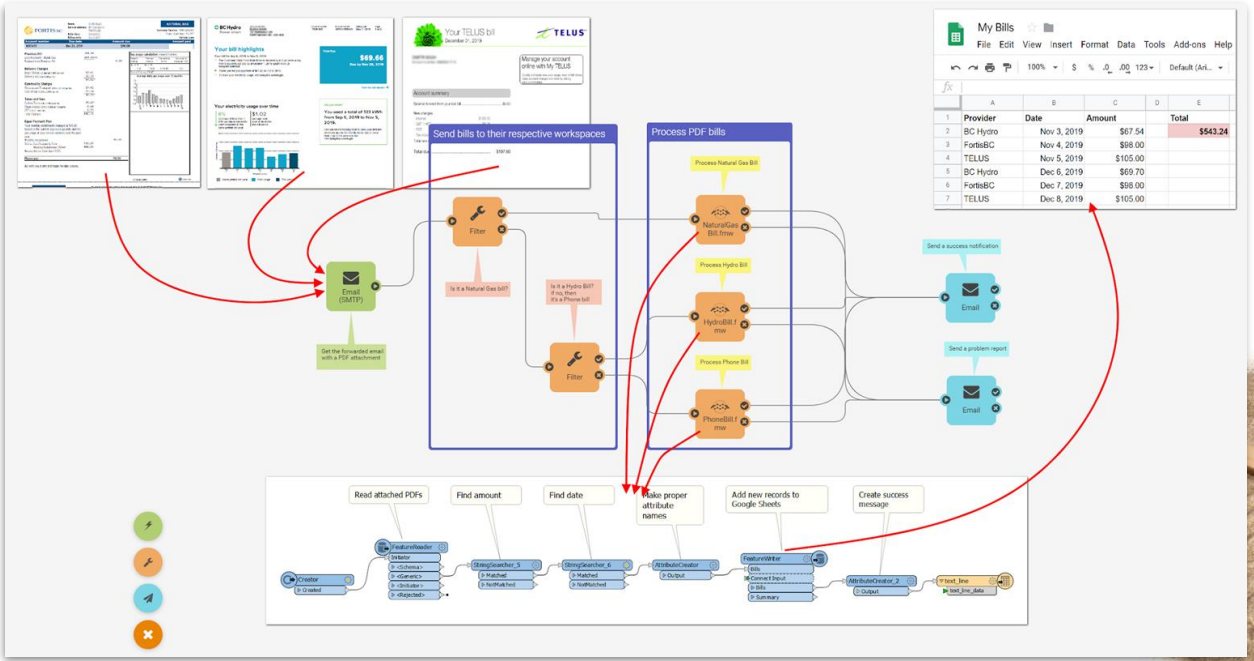
How to Process Your PDF Bills

- In your email inbox, set up a rule to forward your bill emails to FME Server.

- In FME Server, build an Automation to:
  - Trigger when an email is received.
  - Extract the PDF attachment.
  - Run a workspace that uses the PDF Reader to get the **amount** from the PDF.
  - Save the **amount** to a database.
  - Send back a notification report.



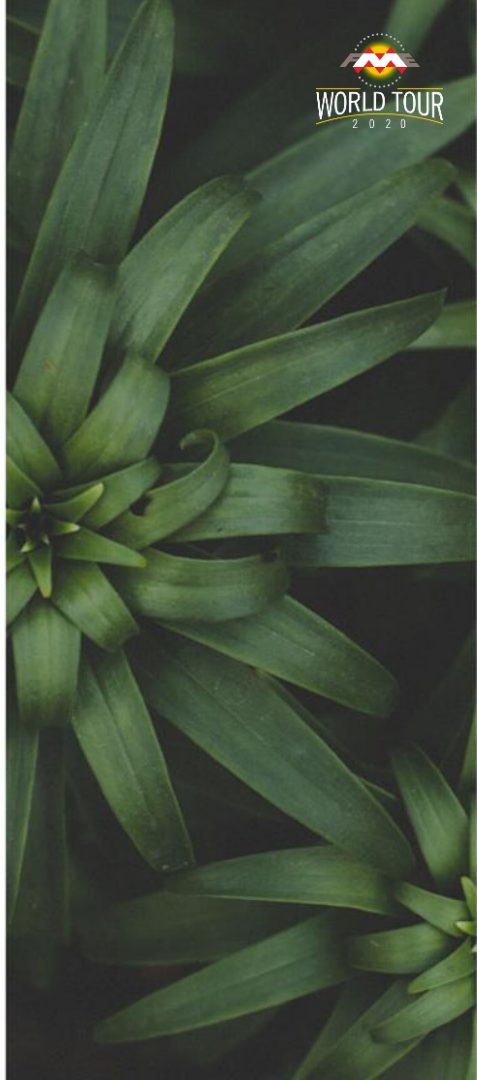
How to Process Your PDF Bills



[YouTube video]

Further Reading

- PDF processing:
  - [Blog] Extracting Geospatial Data from PDFs
  - [Webinar + Demos] Reading PDFs with FME
    - Includes demos for reading spatial data & maps
  - [Tutorial] Getting Started with PDF Reading
- [Blog] Synchronizing Accounting Data using FME



Augmented Reality

AR has all been fun and games … but what about practical use cases?

What is FME AR?

Data needs to be prepared for AR

FME can be used to transform your data into AR format no matter what format it comes from.

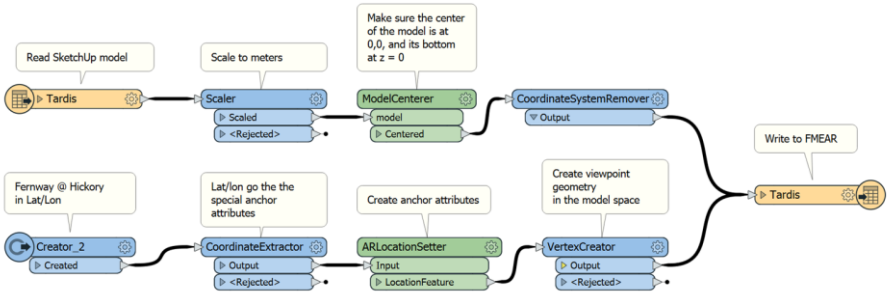
- Bring your data into workbench
- Transform it to 3D if necessary, set styles
- Save it to FME AR

Spatially-aware AR

It is simple with an FME workspace to place an object at any location on the planet.

[Watch video]

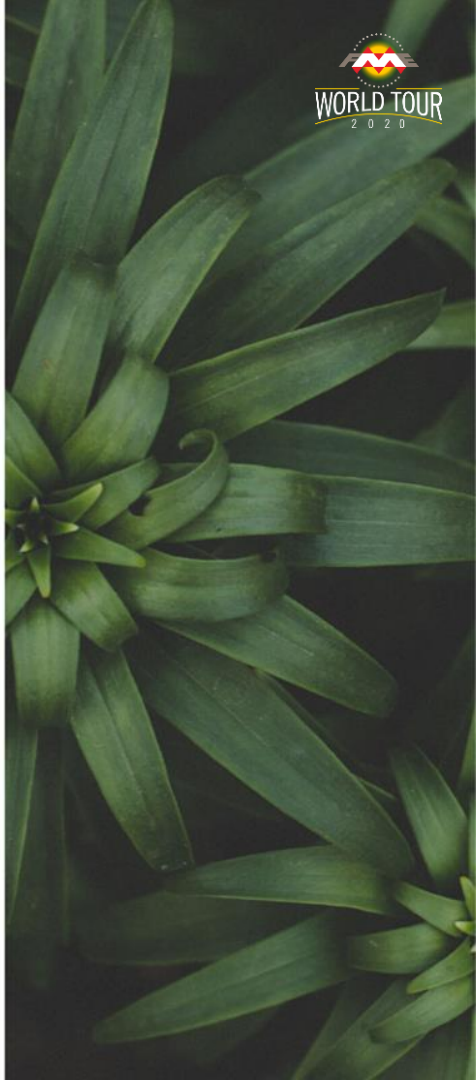
[Try it yourself]



Location-based AR on demand

What if we need AR data that is:

- Up-to-date
- Relevant to a particular location
- Available in the field
- Created and and delivered on-demand



Prepare AR models on demand

Set Up

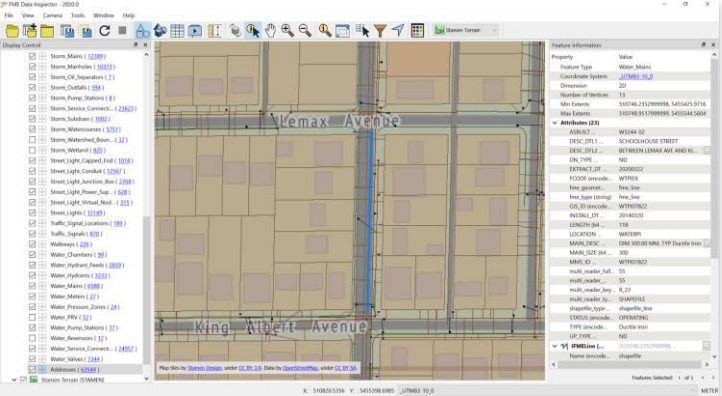
- Prepare the workspace that includes:
  - Reading **data** in any format(s) around submitted location
  - Transforming (2D to 3D, setting styles, scaling);
  - Saving as an AR model.
    NO CONVERSION AT THIS POINT
- Upload the **workspace** to **FME Cloud.**

Workflow

- Create the model in **FME Cloud** for the location sent by mobile device through **FME Data Express**
- Stream the model to **FME AR** app (or just open pre-created models).

DEMO.
Source Materials

- City Infrastructure in shapefile, geodatabase, DWG, geopackage… you name it.
- Style information in MS Excel
- 3D models in SketchUp, Collada, KML, OBJ etc.



CoquitlamStyles.xlsx - Excel

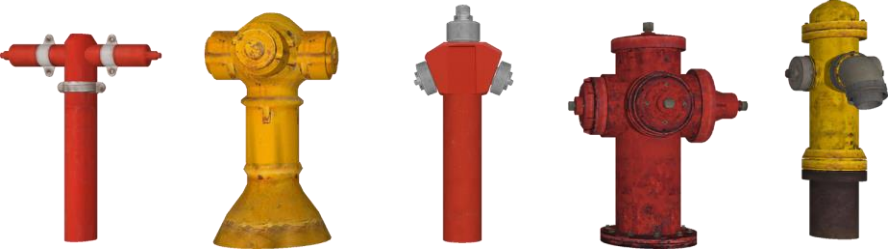
File Home Insert Page Layout Formulas Data Review View Team Tell Sign in Share

H7

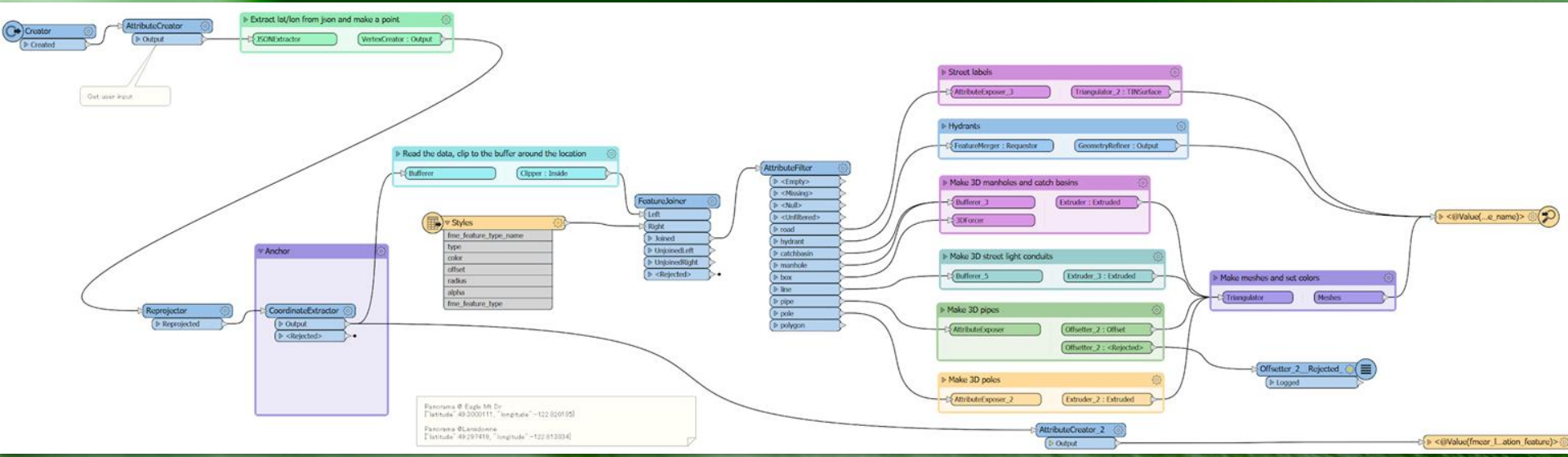
	A	B	C	D	E	F
1	fme_feature_type_name	type	color	offset	radius	alpha
2	Addresses					1
3	City_Boundary					1
4	Parcels	polygon	#ff0000			1
5	Road_ROW_Lines					1
6	Storm_Capped_Ends		#0000ff			1
7	Storm_Catchbasins	catchbasin	#0000ff	-1	0.35	1
8	Storm_Catchments		#0000ff			1
9	Storm_CB_Leads		#0000ff			1
10	Storm_Channels		#0000ff			1
11	Storm_Cleanouts		#0000ff			1

Styles

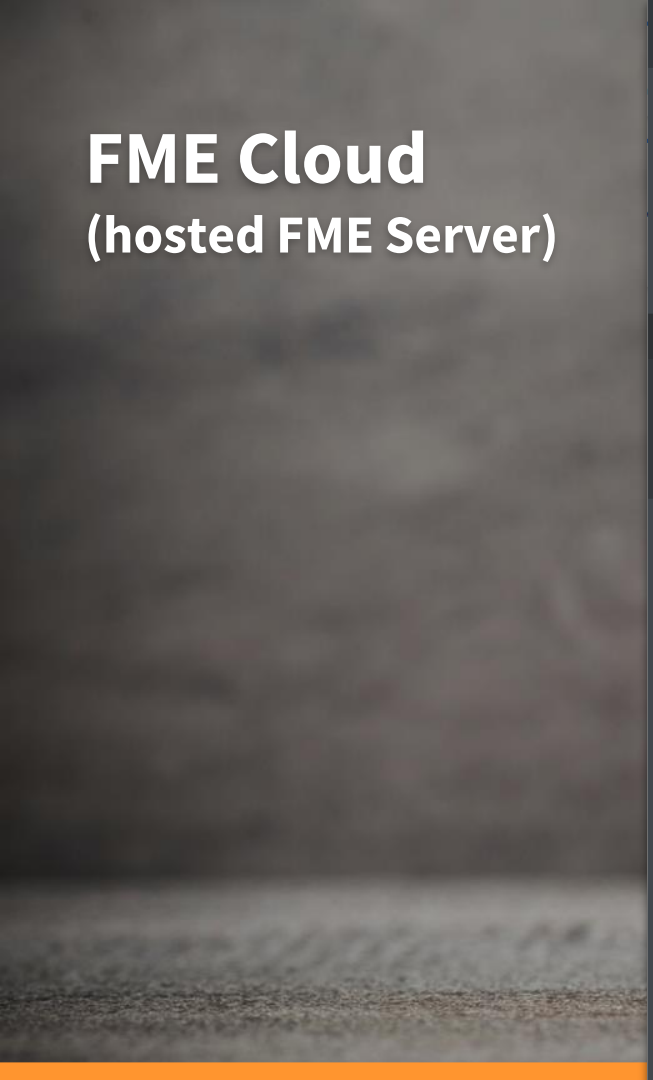
Ready 100%



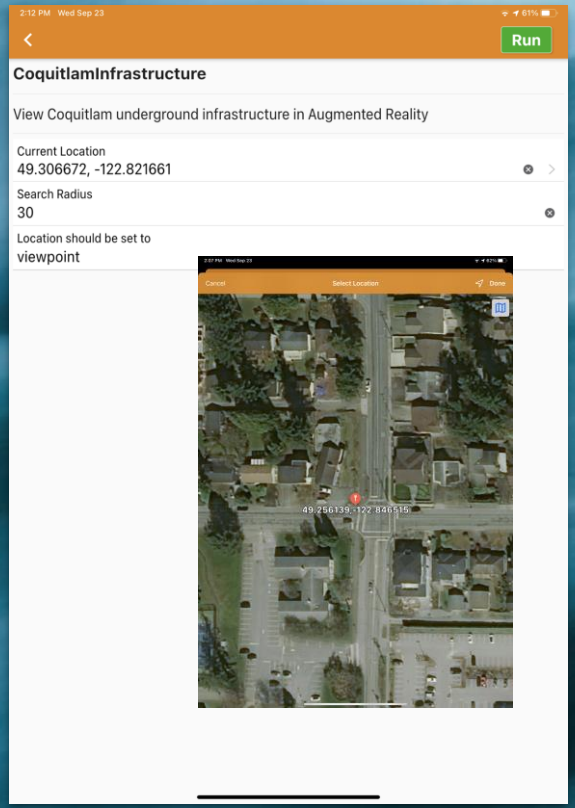
Workspace

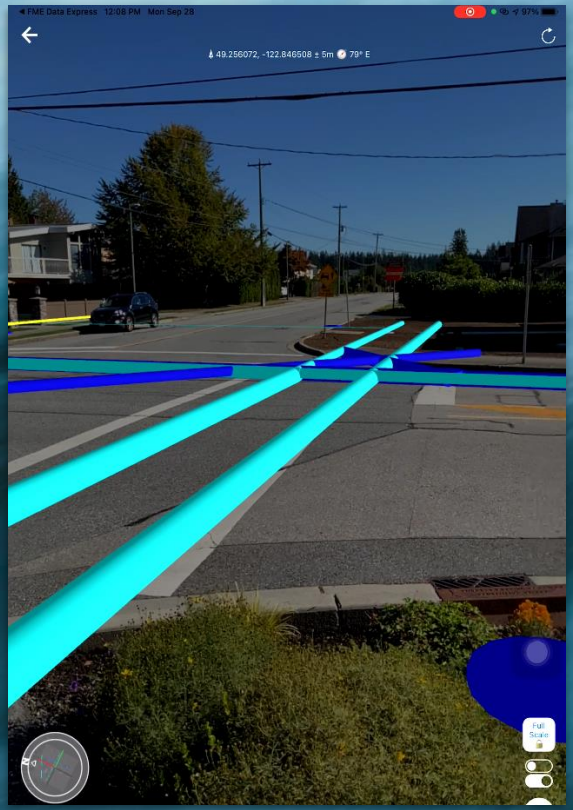

Creator
Created
AttributeCreator
Output
Get user input
Extract lat/lon from json and make a point
JSONExtractor
VertexCreator : Output
Read the data, clip to the buffer around the location
Bufferer
Clipper : Inside
Styles
fme_feature_type_name
type
color
offset
radius
alpha
fme_feature_type
FeatureJoiner
Left
Right
Joined
UnjoinedLeft
UnjoinedRight
<Rejected>
AttributeFilter
<Empty>
<Missing>
<Null>
<Unfiltered>
road
hydrant
catchbasin
manhole
box
line
pipe
pole
polygon
Anchor
Reprojector
Reprojected
CoordinateExtractor
Output
<Rejected>
Street labels
AttributeExposer_3
Triangulator_2 : TINSurface
Hydrants
FeatureMerger : Requestor
GeometryRefiner : Output
Make 3D manholes and catch basins
Bufferer_3
Extruder : Extruded
3DForcer
Make 3D street light conduits
Bufferer_5
Extruder_3 : Extruded
Make 3D pipes
AttributeExposer
Offsetter_2 : Offset
Offsetter_2 : <Rejected>
Make 3D poles
AttributeExposer_2
Extruder_2 : Extruded
Make meshes and set colors
Triangulator
Meshes
Offsetter_2__Rejected
Logged
<@Value(...e_name)>
AttributeCreator_2
Output
<@Value(fmear_l...ation_feature)>

FME Cloud
(hosted FME Server)



How it works

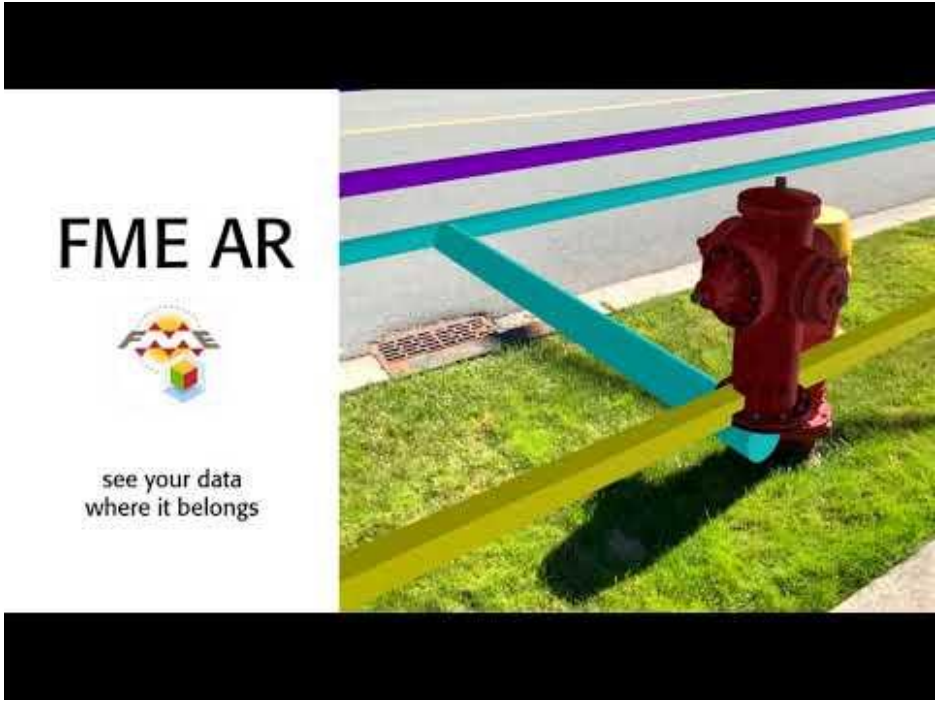

Run
CoquitlamInfrastructure
View Coquitlam underground infrastructure in Augmented Reality
Current Location
49.306672, -122.821661
Search Radius
30
Location should be set to
viewpoint



Results

The model is relevant to the current location and was generated from the most recent version of the original dataset

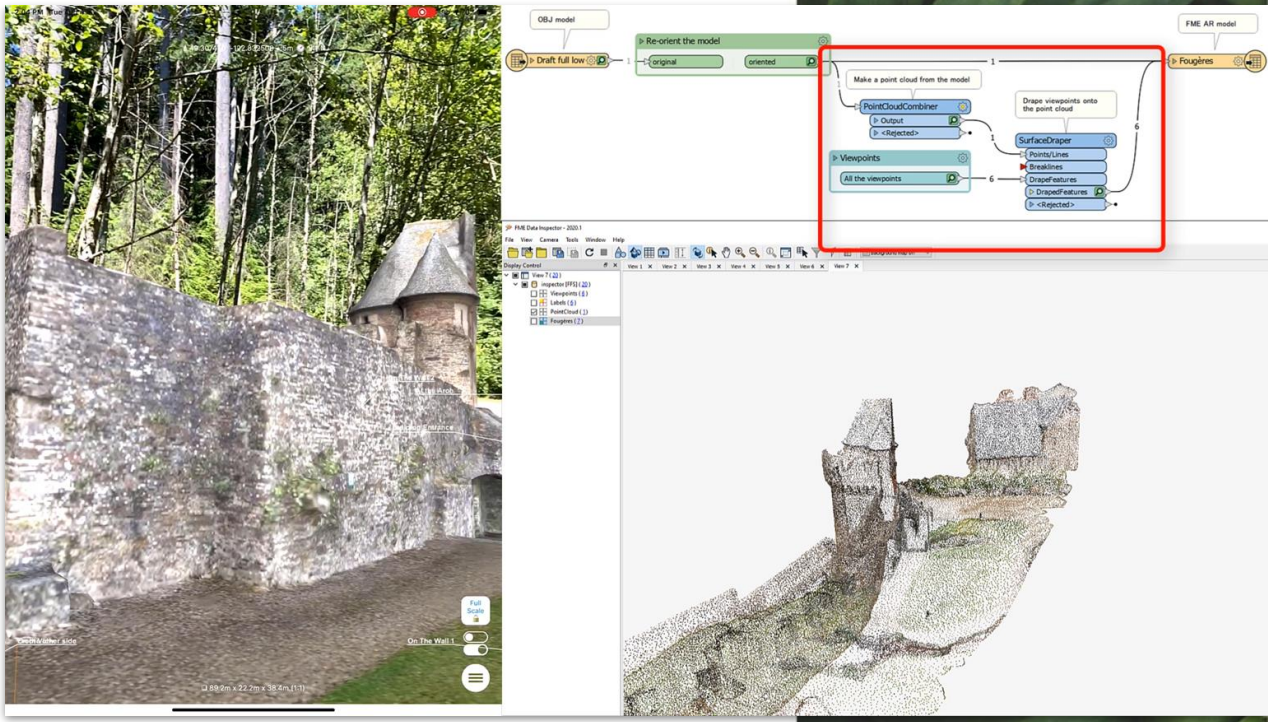
Watch video



Model viewing. The power of FME

- Explore safely
- Scale 1:1
- Viewpoints - geospatial bookmarks
- Draping viewpoints

Watch video

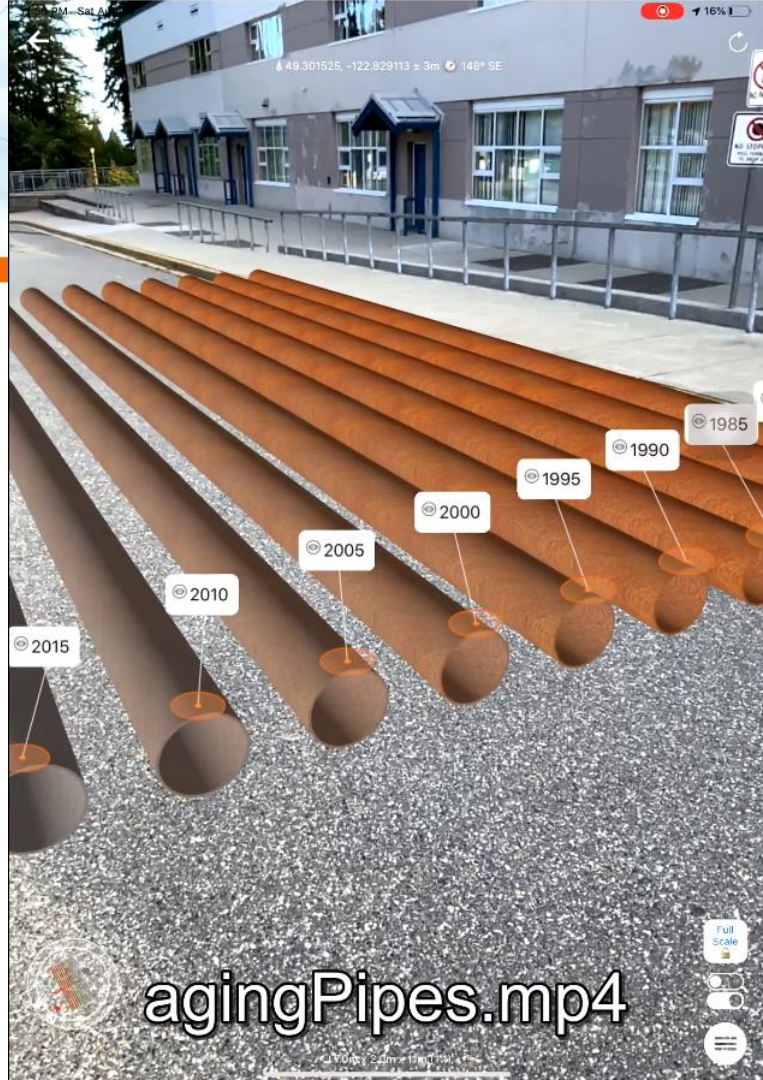


Advanced visualizations

Combine the tools and power of cartography and 3D visualization.

Merge thematic mapping and realism of the 3D models.

Watch video



More Scenarios

[View air quality]

[Walk through the models of the future]

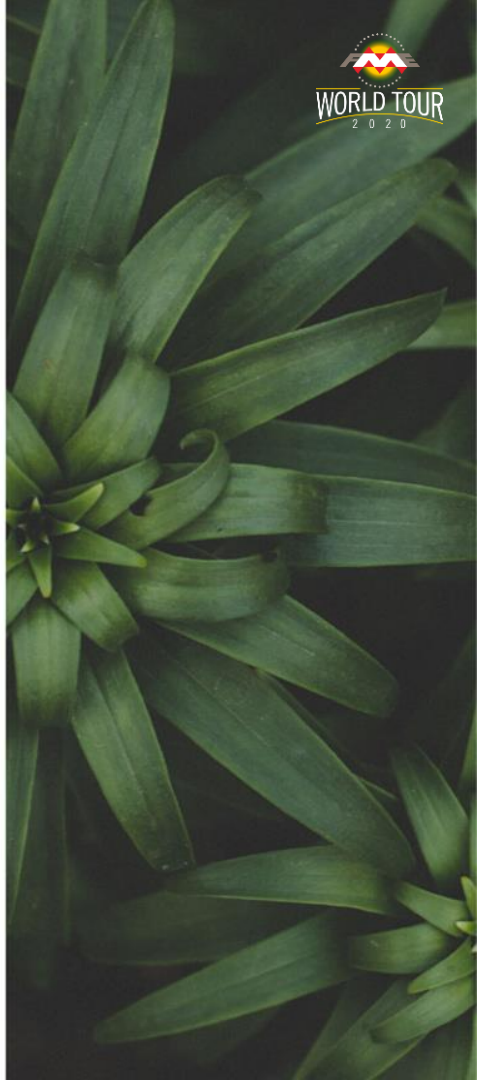
[Find your way indoors]

[Annotate city assets]

[Build a photo gallery]

Resources

- Get the FMEAR app for iOS and Android
- **Blogs:**
  - Visualizing Data with Location-based Augmented Reality
  - Preserving the History of Amache Using AR & Virtual Worlds
  - 5 Ways to View Your Data in Augmented Reality
- [Tutorial] Getting Started with Augmented Reality. Learn how to use the FME AR app and create .fmear datasets.



What do you think about AR?

Is it still a toy or do you think it can be used for serious things?

Do you want to try it?

Tell us more in Q&A or email us later!

All workspaces shown in this presentation can be found here:

http://fme.ly/hxk

FME WORLD TOUR 2020

SAFE SOFTWARE

Questions?

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