



# INSPIRE Helsinki Workshop

Building web and mobile friendly applications on top of  
INSPIRE data services combined with real time data streams



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# Hello!



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Spatial ETL Team Leader



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Consultant & Developer

# Agenda: 9:00 – 10:30

## FME & INSPIRE Overview

- Schema, Geometry Transformation & Validation
- Writing INSPIRE GML
- Consuming INSPIRE data

## Con terra ISP for FME

## What's New for INSPIRE – FME 2019+

- Alternative encodings, Open API: GeoJSON, WFS3
- Updated support for GML3.x, CityGML3
- FME Server Automations

## Workshop Intro and Setup

- Exercise 1: Data extraction and loading - basemap, impact layers
  - Exercise 2: Live data feed to geopackage - dynamic data
- 

# Agenda: 11:00 – 12:30

## Implementing INSPIRE: Challenges

- Finding data – locating and accessing
- Schema simplification
- Geometry simplification

## Troubleshooting

## Hands-on Part II

- Exercise 2: Live data feed to geopackage - dynamic data - continued
- Exercise 3: Data Processing, Publication and App Deploy

## Wrap-up

- Demos (Safe and volunteers)
- Lessons learned
- QnA

# **Setup – Getting Started**

**Wifi p/w: DigitallyDriven**

**Exercises:**

<https://knowledge.safe.com/articles/100678/inspire-flood-warning-assistant-tutorial.html>

<https://knowledge.safe.com/index.html> KB Search: ‘inspire flood warning assistant’

**FME Virtual Machines:**

(ask for url)

Use you email address

VM User: Administrator, password: \_\_\_\_

C:\ FMEData2019\ Resources\ Inspire\ exercise1

**Alternative - Local Install:** FME Installers, licenses, exercises .zip

# Where is INSPIRE?

Implementation deadline 2021:

- Spatial data infrastructures (SDIs)
- Open data portals
- OGC Services

Ongoing Implementation Challenges:

- Management awareness?
- Developer friendly?
- Public accessibility?



<sup>1</sup> <https://inspire.ec.europa.eu/about-inspire/563>

# What is FME?

- Data Integration Made Easy
  - Spatial ETL
  - Rapid prototyping
  - Automation





## Connect Your Applications

Integrate and convert information across 400+ applications.



## Transform Your Data

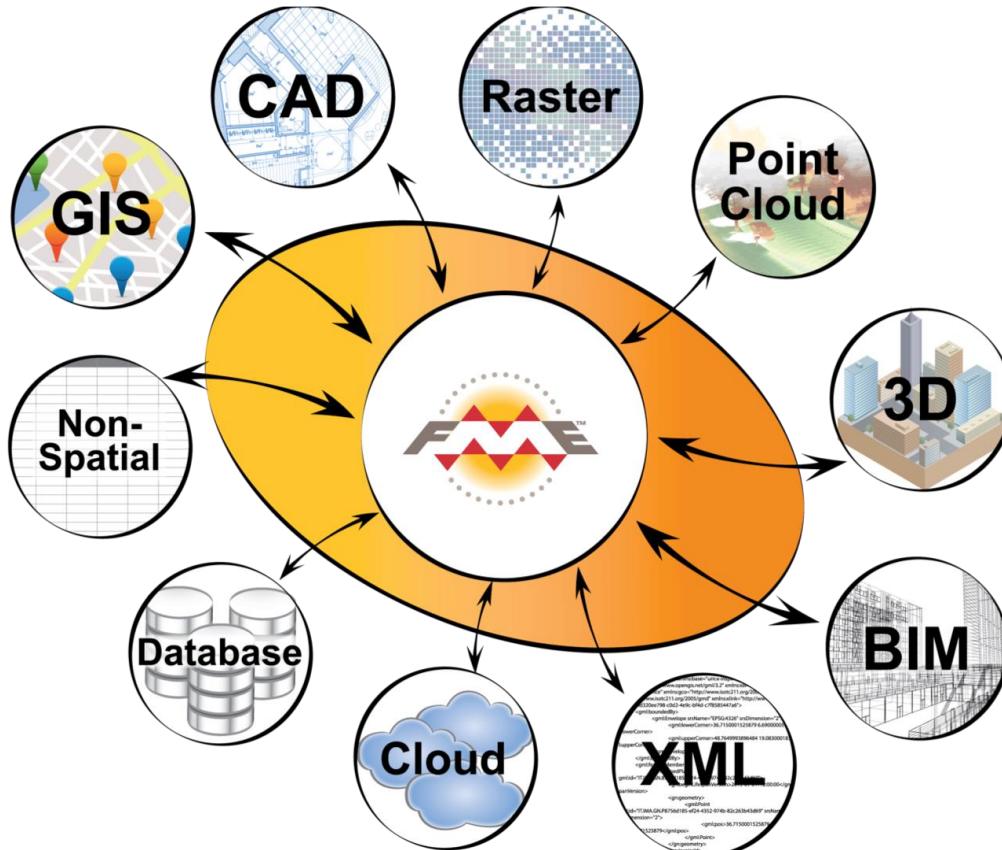
Library of transformers  
[safe.com/transformers](https://safe.com/transformers) | [hub.safe.com](https://hub.safe.com)



## Automate Your Workflows

Build event-based workflows in a visual interface.

# Connections



# FME Bridges the Gap

Proprietary



Open Source



Open Standards



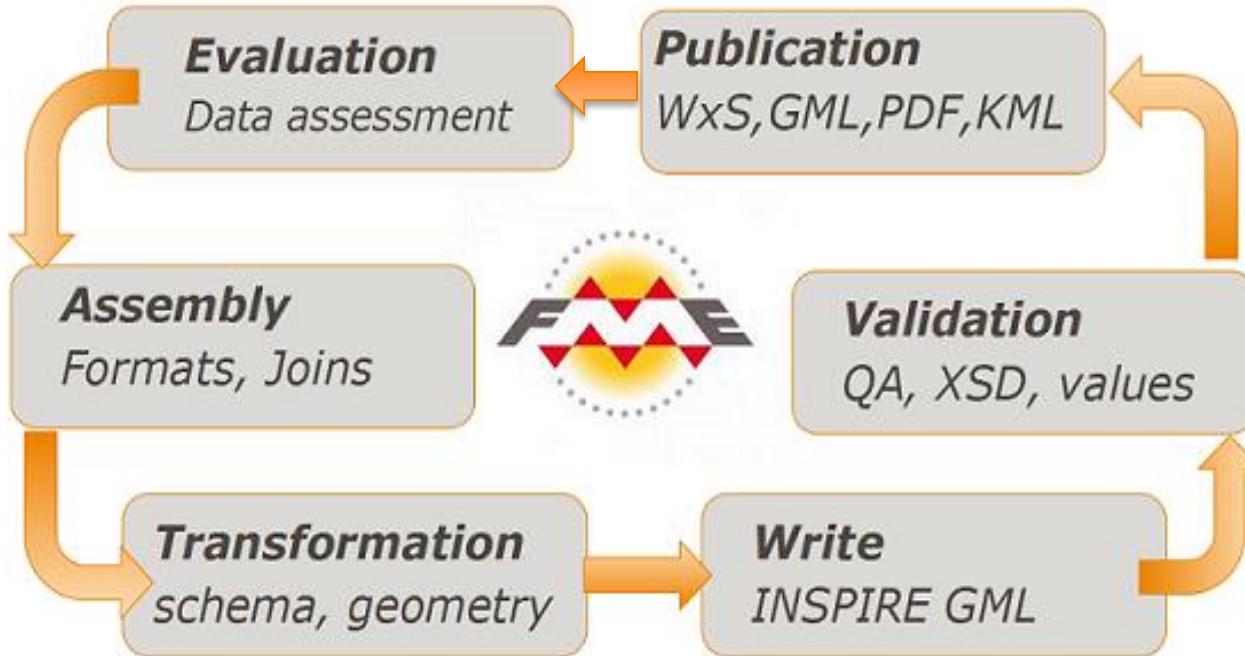
OGC®



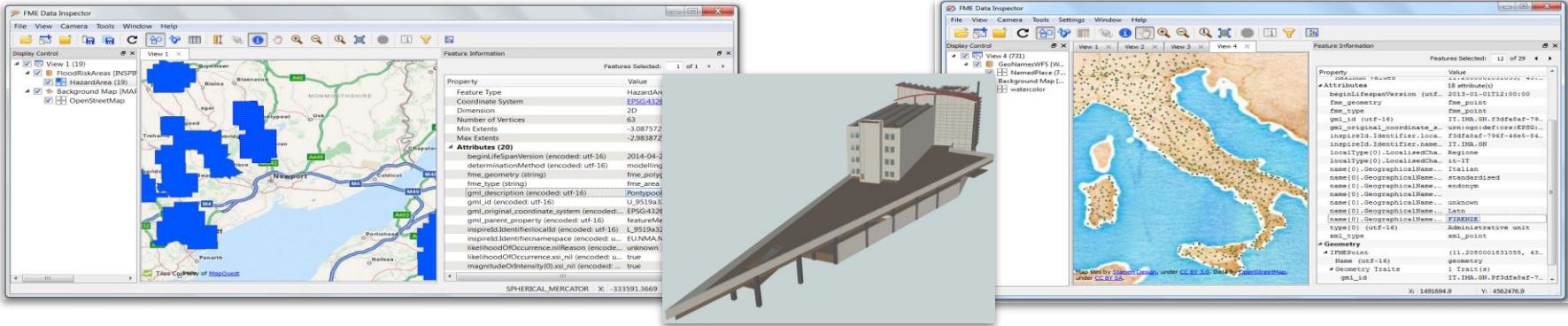
# Web Services & API's: What's Possible



# FME & INSPIRE - Life Cycle Support



# Your INSPIRE Viewer: Data Inspector



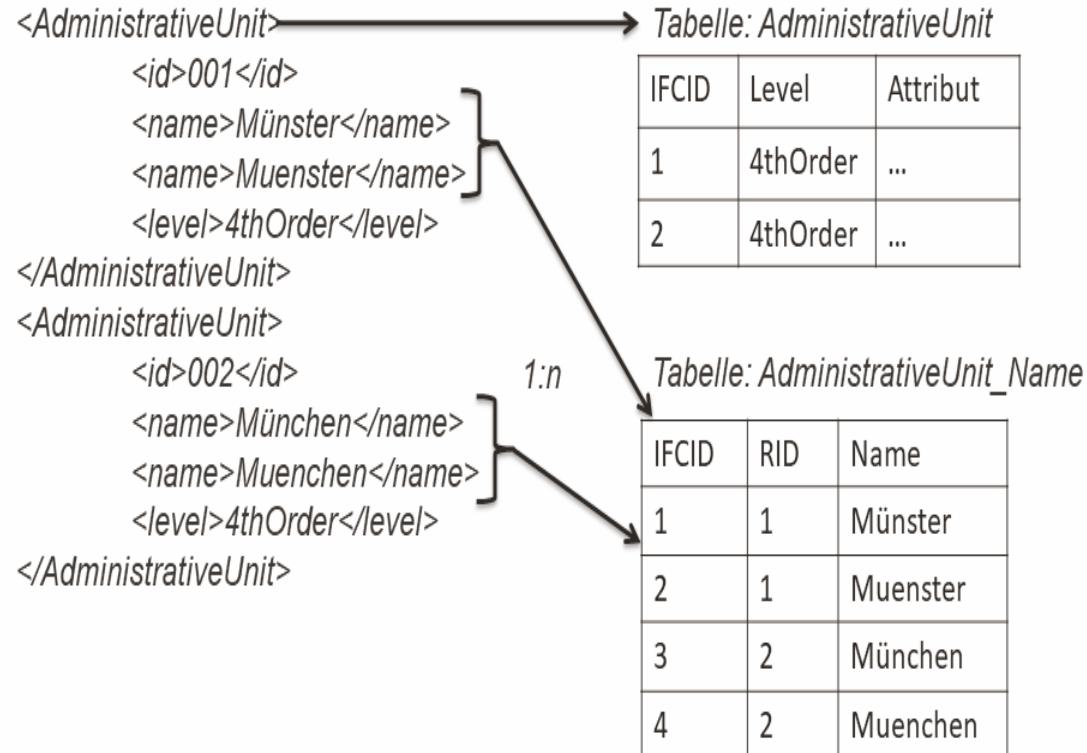
*Read any GML*



# Schema, Geometry Transformation

# Transforming your data to INSPIRE: Key Challenges

- Data **joins** from diverse sources
- **Nested**, object model vs relational (GIS)
- Spatial **reference**
- Complex, multi-**geometries**
- **Series** / lists
- **Presets** (codelists, namespaces)
- Business **rules**



# Transforming your data to INSPIRE

- **Application schema** based reader / writer
  - Populate required attribute and geometry schema
  - Reconcile **relational to object**
  - **Parent.child** field names, ids
- **All annexes** supported
- **All geometry** models: 2,2.5 & 3D
- Raster, Point clouds, Coverages

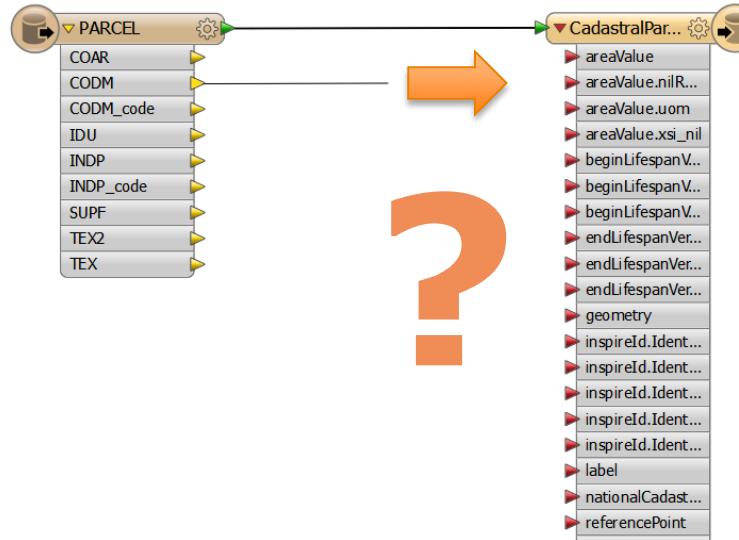
*No need to be an XML expert (XMLTemplater)*

Name	Type
► beginLifespanVersion	xml_datetime
► beginLifespanVersion.nilReason	xml_buffer
► beginLifespanVersion.xsi_nil	xml_boolean
► endLifespanVersion	xml_datetime
► endLifespanVersion.nilReason	xml_buffer
► endLifespanVersion.xsi_nil	xml_boolean
geometry	xml_geometry
► inspiredId.Identifier.localId	xml_buffer
► inspiredId.Identifier.namespace	xml_buffer
► inspiredId.Identifier.versionId	xml_buffer
► inspiredId.Identifier.versionId.nilReason	xml_buffer
► inspiredId.Identifier.versionId.xsi_nil	xml_boolean
► label	xml_buffer
► nationalCadastralReference	xml_buffer
► referencePoint	xml_geometry
► validFrom	xml_datetime
► validFrom.nilReason	xml_buffer
► validFrom.xsi_nil	xml_boolean
► validTo	xml_datetime
► validTo.nilReason	xml_buffer
► validTo.xsi_nil	xml_boolean
► basicPropertyUnit[],owns	xml_boolean
► basicPropertyUnit[],nilReason	xml_buffer

# Schema Mapping Tools for INSPIRE

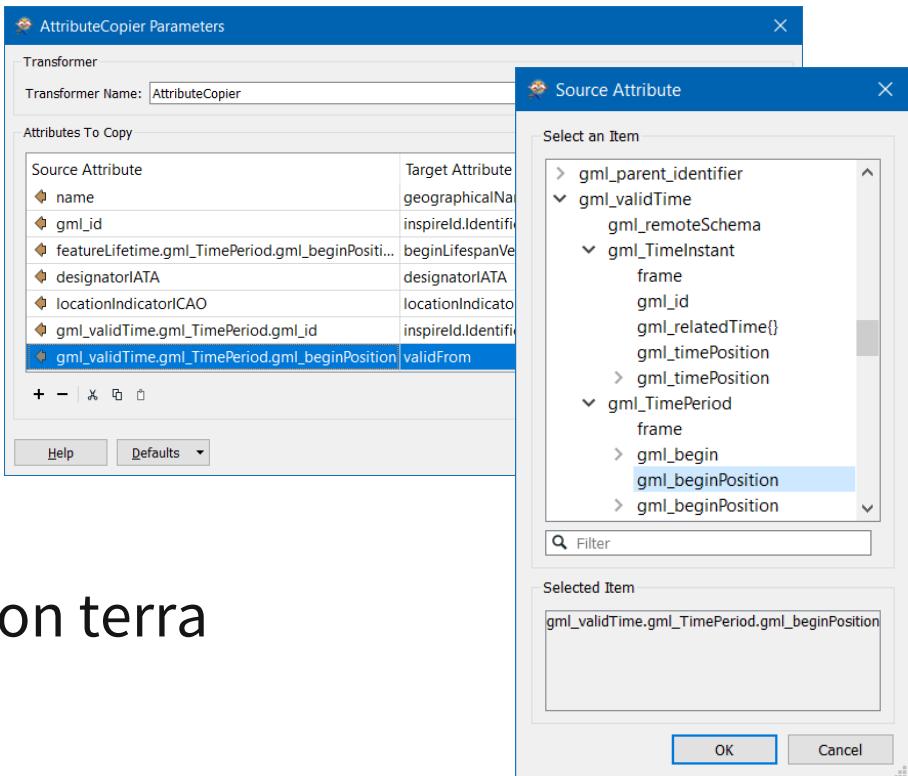
## The challenge:

- Map and transform your data and attributes into the INSPIRE schema.



# Schema Mapping Tools for INSPIRE

- Feature type mapping
- Attribute name mapping
- Attribute value mapping
- SchemaMapper
- INSPIRE Solution Pack from con terra



# GML Complex Geometry Support

Feature Type Properties

General User Attributes Format Attributes

Attribute Definition

Automatic  Manual  Dynamic

Name	Type
estimatedAccuracy.nilReason	xml_buffer
estimatedAccuracy.uom	xml_buffer
estimatedAccuracy.xsi_nil	xml_boolean
geometry	xml_geometry
inspireIdIdentifierInLocalId	xml_buffer

GeometryPropertySetter Parameters

Transformer

Transformer Name: GeometryPropertySetter

Geometry Part Selection

Geometry XQuery: <All parts>

General Parameters

Property to Set: Geometry Name

Overwrite Existing Properties: No

Traits from Attributes Parameters

Trait Counter Parameters

Geometry Name Parameters

Geometry Name: geometry

Help Defaults OK Cancel

# Natural Risk Zones: Flood Hazard Areas

1. Read source data [UK EA flood risk areas](#)
2. Simplify the geometry
3. Reproject BNG to INSPIRE crs: ETRS89
4. ID generation: `gml_id`, `localId`, inspire ID
5. Addition of required fields and schema mapping
6. Write & validate INSPIRE GML

# Natural Risk Zones: Add Writer

The image shows two overlapping dialog boxes. The top dialog is titled "Select 'INSPIRE Themes' Items" and lists several options with checkboxes:

- LandUseNomenclature (v4.0)
- MaritimeUnits (v3.0)
- MineralResourcesCore (v3.0)
- MineralResourcesCore (v4.0)
- NaturalRiskZones (v0.0)
- NaturalRiskZonesCore (v3.0)
- NaturalRiskZonesCore (v4.0)
- Network (v3.2)
- Network (v4.0)

A "Filter" input field and an "OK" button are at the bottom.

The bottom dialog is titled "Select Feature Types" and shows a list of feature types with checkboxes:

- GradeSeparatedCrossing
- GridCoverage
- HazardArea
- HazardCoverage
- MaintenanceAuthority
- MarkerPost
- MultiCurveCoverage
- MultiPointCoverage
- MultiSolidCoverage

A "Filter" input field, a "Select all" checkbox, and a "Sorted" checkbox are at the bottom, along with "OK" and "Cancel" buttons.

This dialog is titled "Feature Type" and contains tabs for "Parameters", "User Attributes", and "Format Attributes". The "User Attributes" tab is selected.

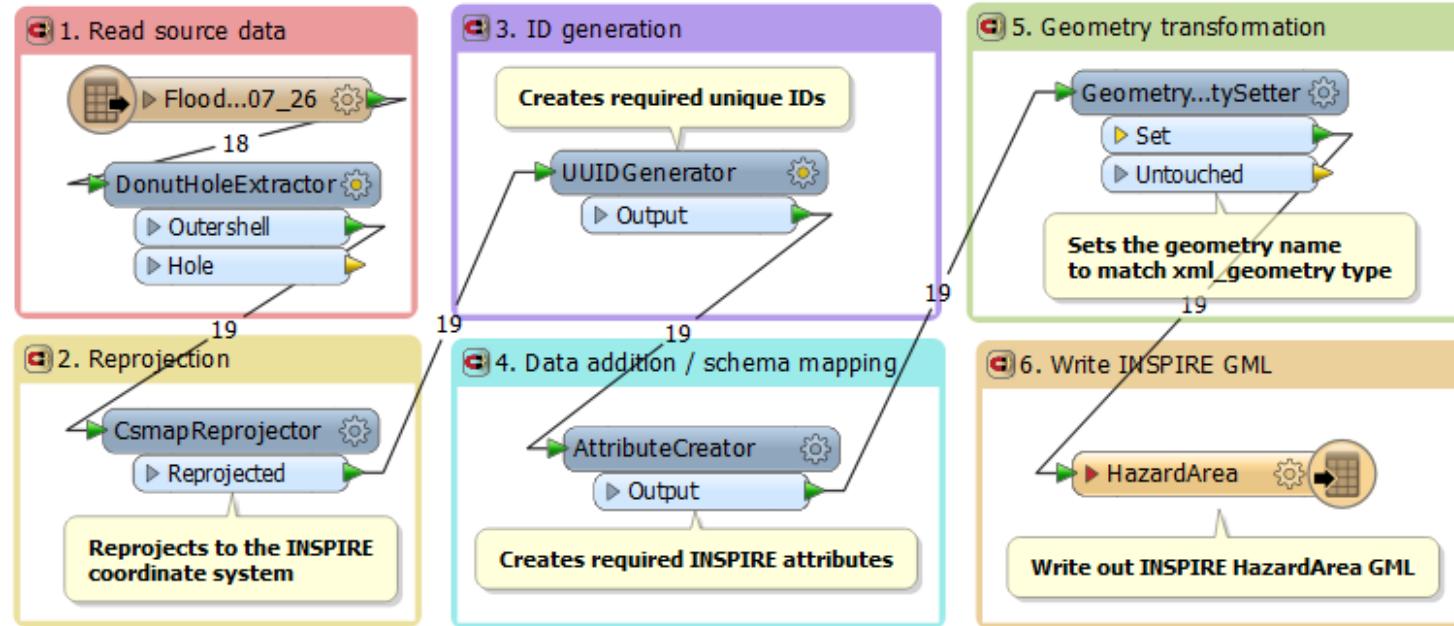
Under "Attribute Definition", there are three radio buttons: "Automatic", "Manual" (which is selected), and "Dynamic".

The main area is a table showing attribute definitions:

Name	Type	Width	Precision	Value
geometry	xml_geometry			
gml_boundedBy	xml_geometry			
gml_description	xml_buffer			
gml_description.gml_remoteSchema	xml_buffer			
gml_description.nilReason	xml_buffer			
gml_description.xlink_href	xml_buffer			
gml_description.xlink_title	xml_buffer			
gml_descriptionReference.gml_remoteSchema	xml_buffer			
gml_descriptionReference.nilReason	xml_buffer			
gml_descriptionReference.owns	xml_boolean			
gml_descriptionReference.xlink_href	xml_buffer			
gml_descriptionReference.xlink_title	xml_buffer			
gml_identifier	xml_buffer			
gml_identifier.codeSpace	xml_buffer			
gml_location	xml_geometry			
gml_metaDataProperty().about	xml_buffer			
gml_metaDataProperty().gml_GenericMetaData	xml_xml			

Buttons at the bottom include "Help", "Apply to...", "OK", and "Cancel".

# UK EA Flood Data to INSPIRE Natural Hazards: FME Workspace



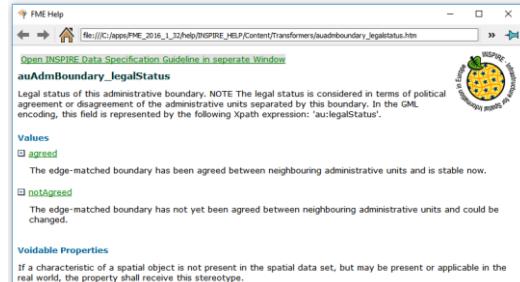
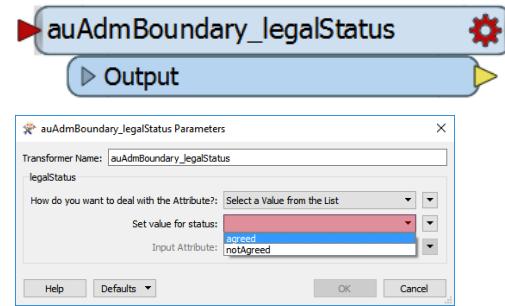
# Writing Considerations

- Unique IDs
- Feature relationships - parent / child ids
- Code lists
- Geometry names
- Required fields: ids, nilReason, lifespan, nspace
  - inspireId.Identifier.namespace
  - inspireId.Identifier.localId
- Start with a FME knowledge base tutorial
- Iteratively test validation of a few features

# **INSPIRE Solution Pack for FME**

# INSPIRE Solution Pack for FME

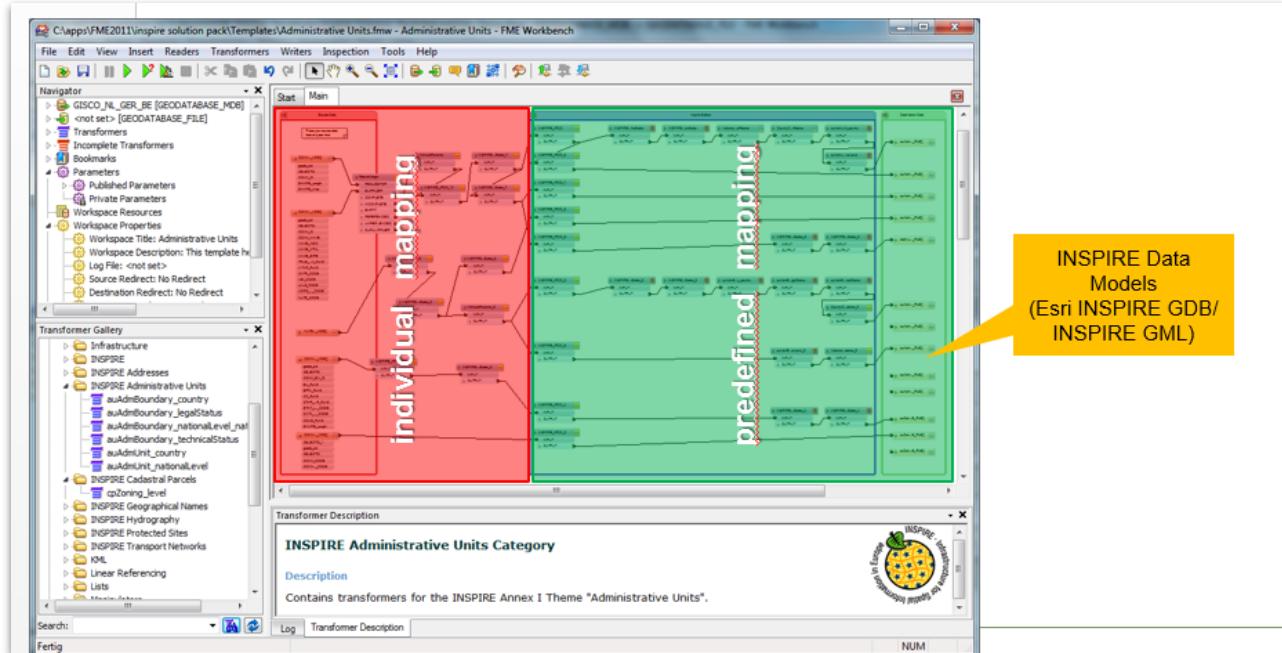
- Transformers incl. transformer help
- INSPIRE code lists
- Tutorials (GML and GDB template)
- Workspace templates
  - Esri GDB and INSPIRE GML
  - FME Hub
- Workspace template ATOM Feeds



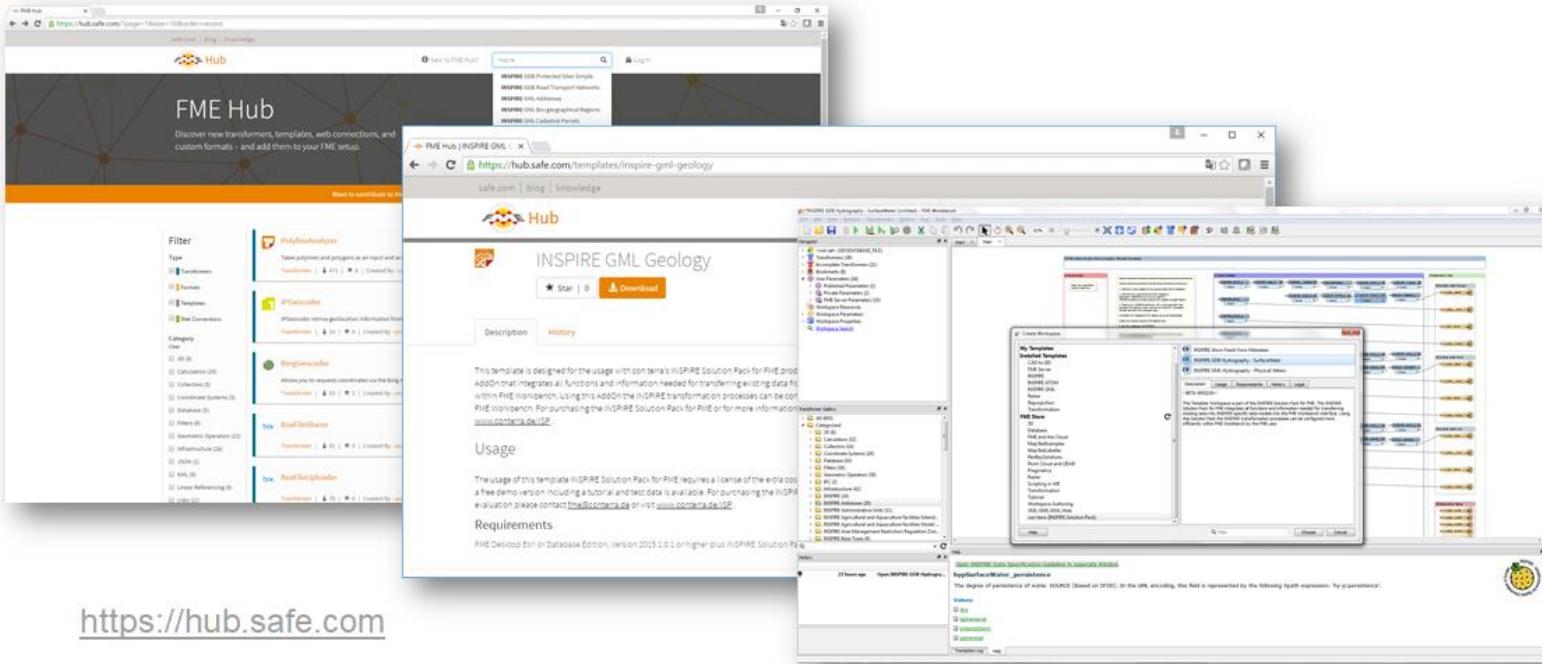
# INSPIRE Solution Pack for FME

## by con terra

FME Workbench  
“INSPIRE Template  
Workspaces”



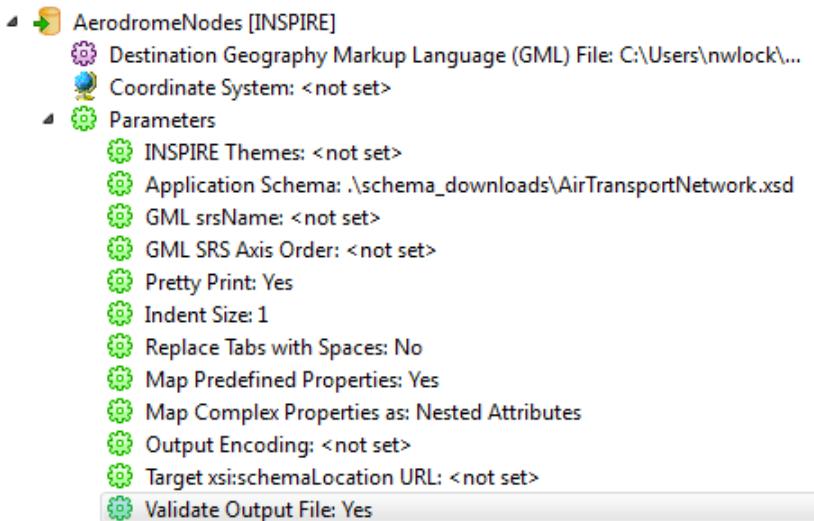
# INSPIRE Solution Pack Templates



# Data Validation

# FME for Validation

- XML application schema
- Geometry & Attribute
- Business rules
  - ETF WebApp



# Attribute & Geometry Validator

AttributeValidator Parameters

Transformer

Transformer Name: AttributeValidator

Validation Rules

Attributes to Validate	Validation Rule	Rule Configuration
name	Has a Value	<Unused>
name	Type	String
street	Encodable in	<input type="checkbox"/> Unicode 8-bit (utf-8)
addressNumber	Type	Integer
addressNumber	In Range	<input type="checkbox"/> (0,1000)

+ - ▲ ▼ × ✎ 🔍

Help Defaults OK Cancel

GeometryValidator Parameters

Transformer

Transformer Name: GeometryValidator

Validation

Set of Issues to Detect: Custom

Issue To Detect	Parameters
Area Orientation	Allow Left <input type="checkbox"/>
Duplicate Consecutive Points	Edit...
Contains -0, NaN, or Infinity	Don't Process Measure
Contains Null Geometry Parts	
OGC Simple Compliant	
OGC Valid Compliant	OGC Version 1.2.0
Contains Non-Planar Surfaces	Edit...
Self-Intersections in 2D	Edit...
Degenerate or Corrupt Geometries	Edit...
Surface Orientation	

+ - ▲ ▼ × ✎

Output

Detected Issue List Name: issues

Attempt Repair: Yes

Summary mode: Detailed

Help Defaults OK Cancel

# INSPIRE ETF Validator

ETF = Executable Test Framework

[https://hub.safe.com/transformers/inspire\\_etf-webapp\\_validator](https://hub.safe.com/transformers/inspire_etf-webapp_validator)

The screenshot shows a web browser window with the URL [https://hub.safe.com/transformers/inspire\\_etf-webapp\\_validator](https://hub.safe.com/transformers/inspire_etf-webapp_validator). The page is titled "INSPIRE ETF-Webapp Validator Transformer". It includes details such as "Created by: stijingoedertier", "88 Downloads", "Category: Web", and "Testsuite Success". Below this, there are tabs for "DESCRIPTION", "TESTSUITE", "HISTORY", and "COMMENTS (0)". A "Download" button is visible. The page content describes the transformer as a custom tool for running INSPIRE Executable Test Suites (ETS) on an ETF-webapp instance, using the INSPIRE sandbox by default. It also mentions Docker Hub and the European Union's INSPIRE Directive. At the bottom, it credits GIM and the Flemish Environmental Department.

INSPIRE ETF-Webapp Validator  
Transformer

Created by: stijingoedertier | [88 Downloads](#) | Category: Web | Testsuite Success

DESCRIPTION TESTSUITE HISTORY COMMENTS 0

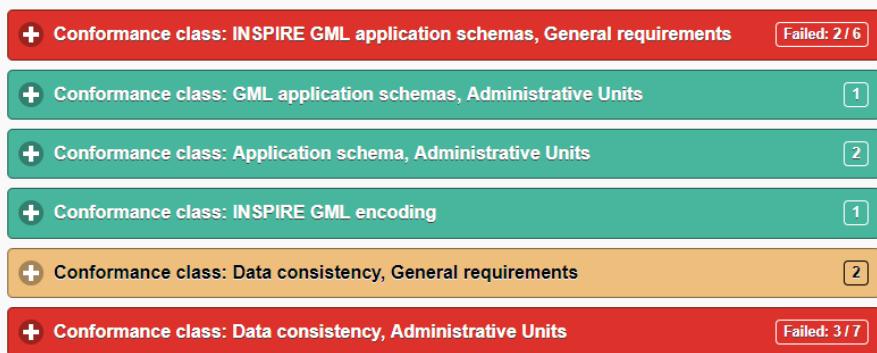
This custom transformer lets you run the INSPIRE Executable Test Suites (ETS) on an ETF-webapp instance. By default, the INSPIRE sandbox of the European Commission Joint Research Centre is used. For tests with larger datasets, it is possible (and recommended) to set up your own instance of ETF-WebApp, for instance using the image on [Docker Hub](#).

In the European Union, public entities must harmonise their spatial data and services according to the specifications of the [INSPIRE Directive](#), regulations, and technical guidelines.

This custom transformer was created by [GIM](#), a Safe Software gold partner based in Belgium. The work on this custom transformer was partly funded by the Luxembourgish mapping agency: [Administration du Cadastre et de la Topographie](#) and the Flemish Environmental Department: [Departement Omgeving](#).

# Troubleshooting Validation Problems

- Administrative Units
  - Using the ETF-Validator
  - <http://etf-validator.net/>



# Validation Example

## Admin Units

- Areas of same level may not overlap
- Boundaries need to match topological structure of Areas

**Area** Failed: 1 / 1

Verify whether administrative units having the same level of administrative hierarchy do not conceptually share common areas.

Status Failed  
Duration 7 s

**au-dc.e.1: Administrative units having the same level of administrative hierarchy do not con...**

Verify that the geometry of each administrative unit does not overlap with the geometries of other administrative units having the same level of administrative hierarchy as the examined one.

Relevant requirements:

- IR Requirement Annex II Section 4.4 (4): Theme-specific Requirements.  
Administrative units at the same level of administrative hierarchy shall not conceptually share common areas.

Source: [Abstract Test Case 'Area'](#), [INSPIRE Data Specification on Administrative Units](#), A.3.8

**Boundary** Failed: 1 / 1

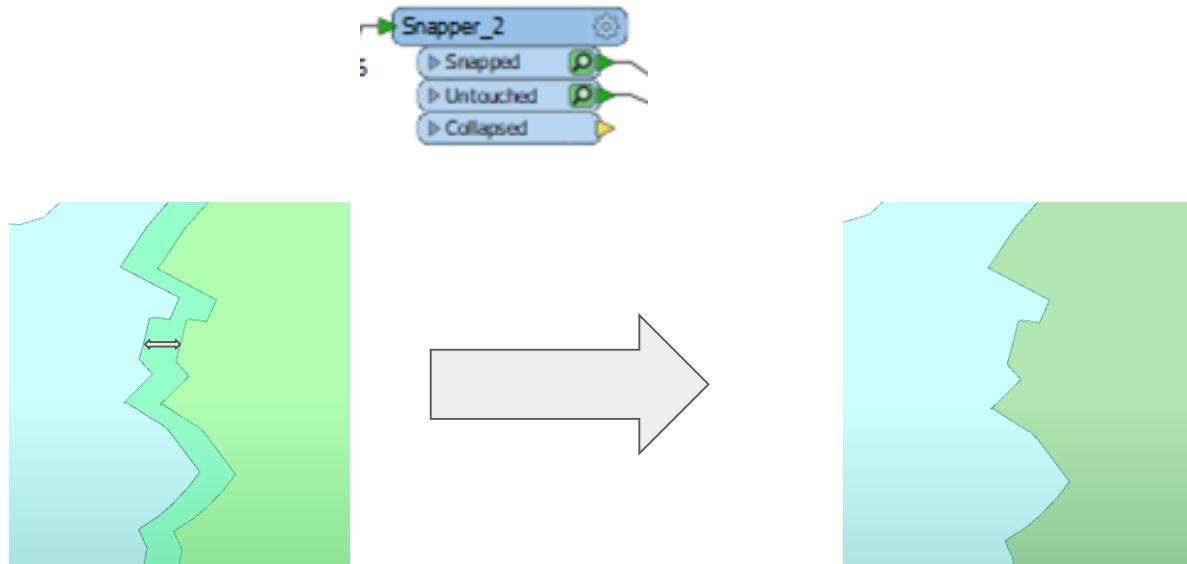
Verify whether all instances of the spatial object type administrative boundary correspond to the edges in the topological structure of the complete (including all levels) boundary graph.

Status Failed  
Duration 59 s

**au-dc.f.1: The geometry of each instance administrative boundary corresponds to an edge i...**

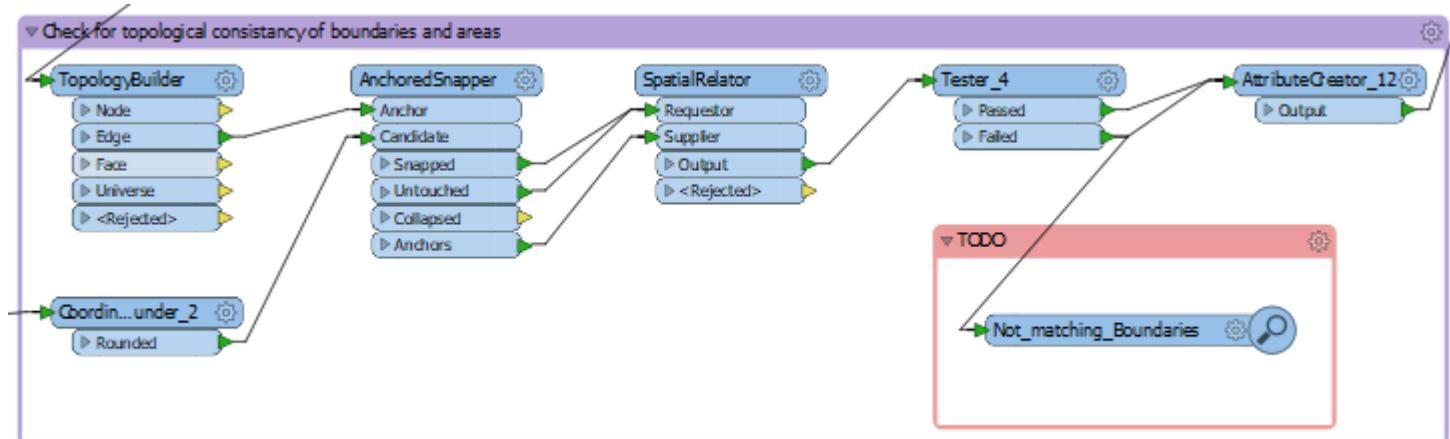
# Validation Example Admin Units

Snapping the Administrative Units Boundaries will remove the overlap



# Validation Example Admin Units

Use TopologyBuilder, AnchoredSnapper and SpatialRelator to detect and fix Boundaries



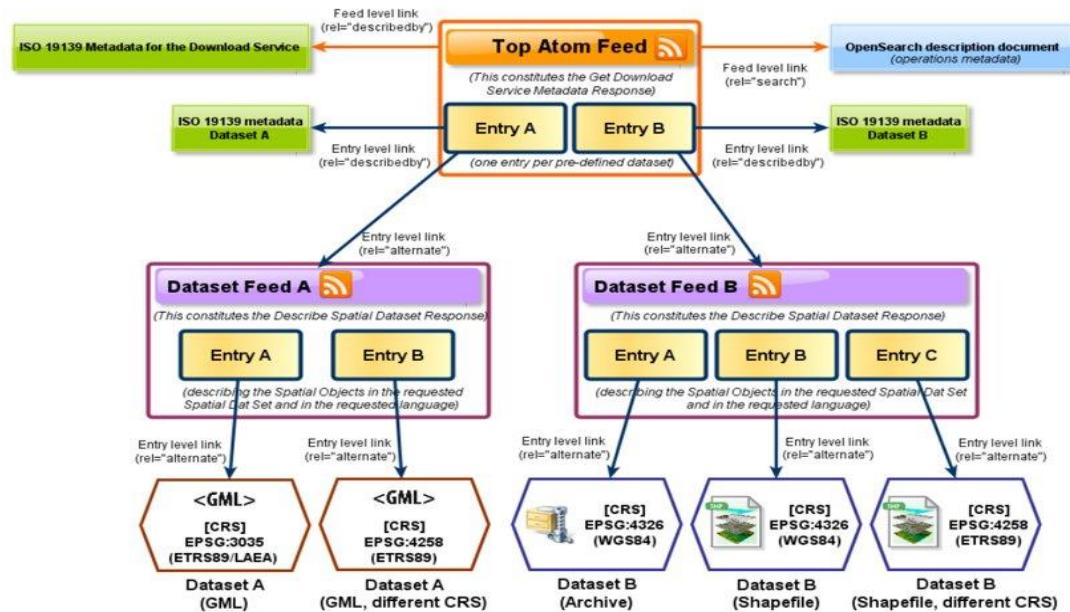
# Validation Summary

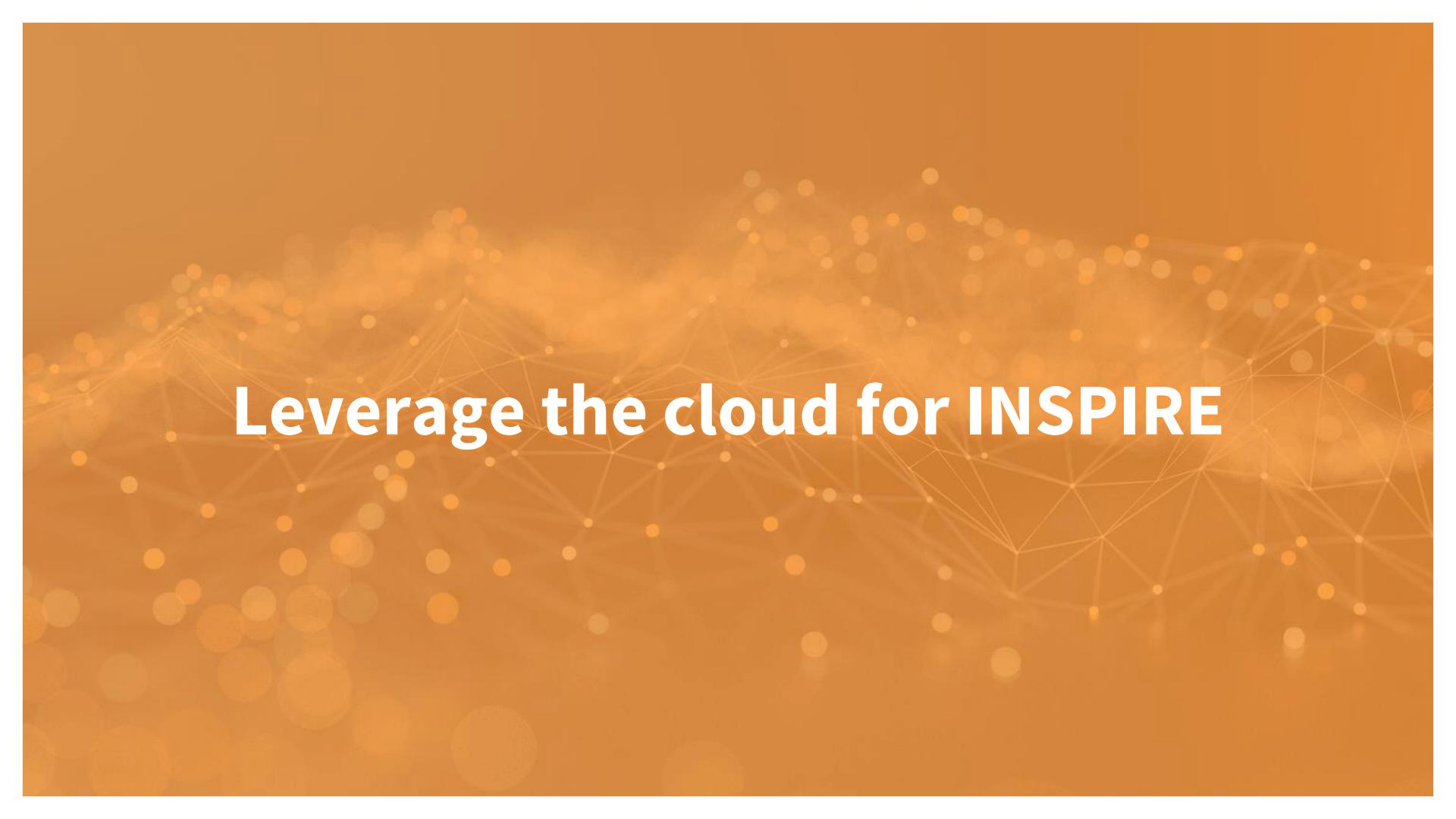
- FME is a powerful tool for all kinds of validation
- Geometry
- Attributes
- Business Rules (ETF Validator)
- It can help you to detect and **fix** errors

# Creating INSPIRE GML & ATOM Feeds

# ATOM Feeds

- Alternative way of providing data for INSPIRE
- XML based



The background of the slide features a warm orange gradient. Overlaid on this are several translucent, glowing yellow and white circular shapes of varying sizes, resembling bokeh lights or data points. A complex network of thin, light-colored lines forms a grid-like pattern across the slide, suggesting a digital or interconnected environment.

**Leverage the cloud for INSPIRE**

# **FME Cloud:**

## **6 Reasons**

- Data In Cloud
  - Innovate Faster
  - Focus Resources
  - Maximize Uptime
  - Strengthen Security
  - Save Money
- 

# Install FME Server Yourself

1. Build Integration workflow
2. Download FME Server
3. Acquire hardware to run FME Server
4. Configure server
  1. Install/Configure OS
  2. Install FME Server
  3. Configure network security
  4. Install SSL certificates
  5. Setup DNS
5. Plan for security updates
6. Plan for disaster recovery
7. Publish integration workflow

# Use FME Cloud

1. Build Integration workflow
2. Signup to FME Cloud
3. Click “Launch Instance” and make some configuration choices.
4. Wait 8 minutes and publish integration workflow.

## Steps to Initialize FME Server

[Launch Instance](#) Filter Status: Active [1 to 2 of 2](#)

PRICING	NAME	TYPE	STATUS	LAUNCHED AT	REGION
<input checked="" type="checkbox"/>	 Deans2018demo	Starter	<span>RUNNING</span>	2018-05-07 18:19:54 UTC+00:00	AUS Sydney (ap-southeast-2)
<input type="checkbox"/>	 Deans testing	Starter	<span>PAUSED</span>	2017-04-17 19:45:46 UTC+00:00	CA Montreal (ca-central-1)

**Deans2018demo** [Connect](#) [Action ▾](#)

<https://klworldtour-dean.fmecloud.com>

Details	Monitoring	Backups	Security	Activities	Alerts	Events
Type	Starter - 2 virtual cores, 4.0GB RAM					
FME Build	18305					
Region	AUS Sydney (ap-southeast-2)					
Primary Disk	10 GB					
Temporary Disk	10 GB					
Status	RUNNING					
Description	for KL World tour					
Launched at	2018-05-07 18:19:54 UTC+00:00					
Pricing Plan	On-demand					
OS Security Updates	Unattended					
Security Update Status	Your instance is up to date					

[Chat with us](#)

# FME Cloud is FME Server

- Easy way to publish a workspace as a web service usable by anyone from a web browser or app - no code
- Schedule jobs, download, stream, notifications & other services (REST API)

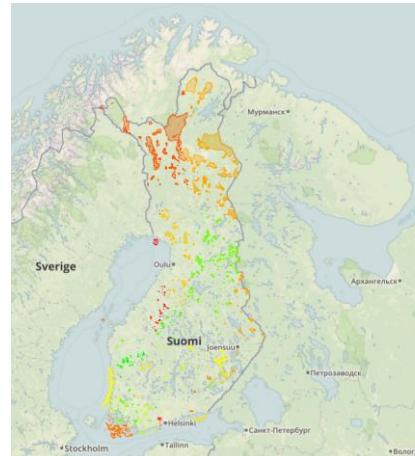
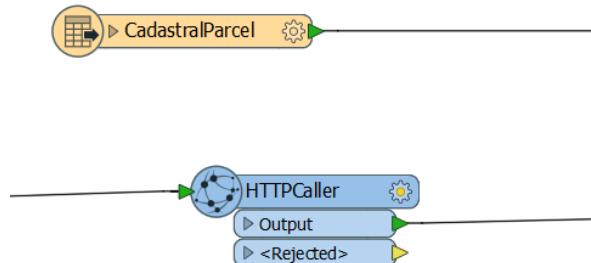
The screenshot shows the 'Run Workspace' page for the 'INSPIRE/AirportsWFStoJSON' workspace. The left sidebar includes options like Run Workspace, Jobs, Schedules, and Resources. The main area displays workspace parameters: Repository (INSPIRE), Workspace (AirportsWFStoJSON.fmw), Service (Select a Service), and Published Parameters (bboxEast, bboxSouth, bboxWest, bboxNorth, Max). A 'Data Streaming' button is highlighted in green.

The screenshot shows the 'Engines & Licensing' management interface. It features a central diagram of the system architecture: a 'Job Router' (Active) at the top, connected to an 'Engine Manager' (Leader Engines: 2) which in turn manages two 'Engine' nodes ('localhost\_Engine2' and 'localhost\_Engine1'). On the left, a sidebar lists Resources, Connections, Projects, Dashboards, and ADMIN sections (Security, System Cleanup, Backup & Restore, System Configuration, Features, Encryption, Services, CORS). On the right, a 'Node Information' panel provides details for the 'localhost\_Engine1' node, including Category (Engine), Name (localhost\_Engine1), Host (localhost), and Status (Idle).

# Connecting Web Services & APIs

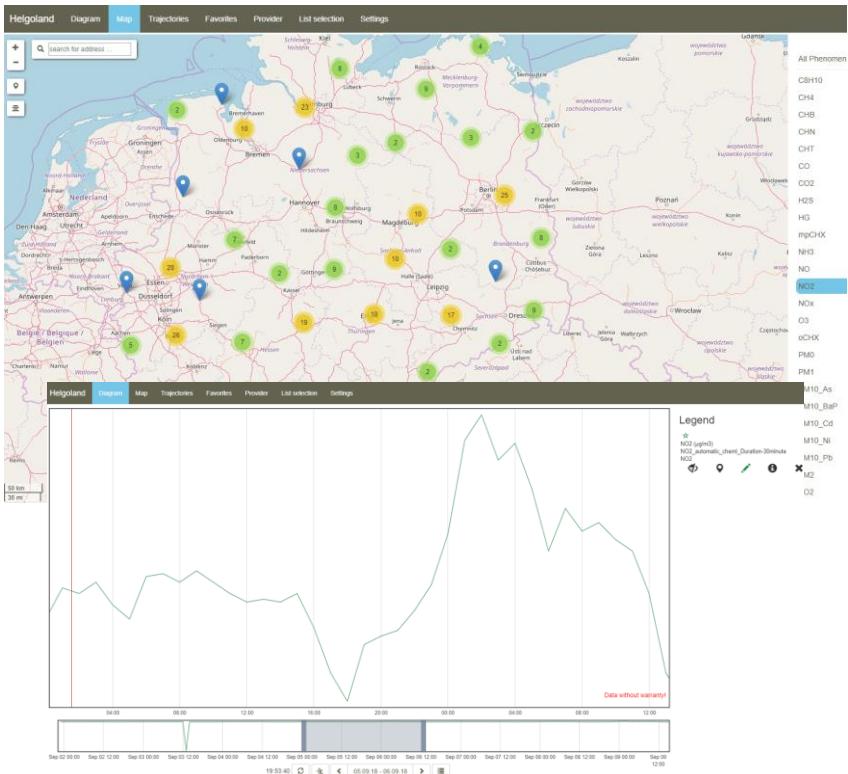
# Leveraging INSPIRE Data Using FME

- FME Readers (INSPIRE GML, ATOM, WFS, WMS, WCS etc.)
- FME HTTPCaller (any web service)
- Data Inspector



# Air Quality Data

- Load data & automate updates
- Endpoints
  - Stations (INSPIRE Data)
  - Sensor Data (52north SOS)
    - Series REST API
    - SOS endpoint

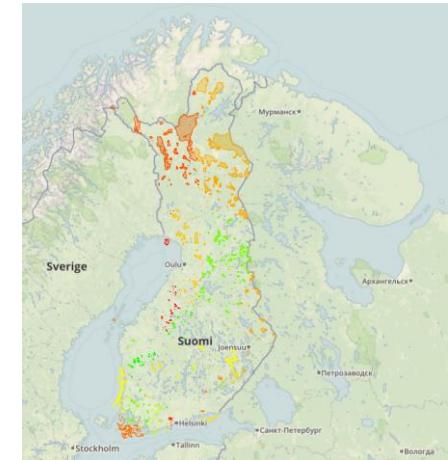


# Connecting Services & APIs

## Demo Combining Data for Finland:

1. Finnish Environment Institute (SYKE)  
ATOM Feed Protected Areas
2. Real-time Air Quality Index
3. European Environment Agency  
Air Quality Time Series

Visualize air quality in Finnish protected areas: real-time and historically



# Connecting Services & APIs

## Data Source 1

Finnish Environment Institute (SYKE)

*ATOM Feed: Nature conservation and wilderness areas*

The screenshot shows the SYKE website homepage. At the top, there are language links (Suomeksi, På svenska), navigation links (environment.fi, ym.fi, ara.fi, Give feedback, Perso), and the logo for the Finnish Environment Institute. Below the header, there's a main menu with links to Home, Current, Research & Development, Experts, Services, Publications, Open information, and SYKE Info. The 'Open information' link is highlighted. On the left, there's a sidebar with links to Spatial datasets, Satellite observations, and Open web services. The 'Open web services' section is currently selected. It contains a sub-menu with Home, Open information, and Open web services. Below this, there's a banner for 'AVOINTIETO 10 YUOTTA OPENDATA 10 YEARS'. The main content area describes what an open web service is and lists various types of interfaces available, such as Spatial data interfaces (INSPIRE view and download services, WMS/WFS, ATOM, Other view services, EsriREST, WMS), Open Interfaces for Environmental Data (OData, REST, RSS), Satellite observations (EsriREST), and Discovery service (CSW).

The screenshot shows a web browser window displaying an ATOM feed titled 'Luonnonsuojelu- ja erämaa-alueet'. The browser's address bar shows the URL: www3.ymparisto.fi/d3/atom/luonnonsuojelualueet.xml. The feed interface includes options to 'Subscribe to this feed using Live Bookmarks' (with a dropdown menu), 'Always use Live Bookmarks to subscribe to feeds', and a 'Subscribe Now' button. Below the feed, there's a section titled 'Luonnonsuojelu- ja erämaa-alueet (tuotesyöte)' with two entries: 'Valtion omistamat luonnonsuojelualueet' (Wednesday, May 23, 2018, 10:49 AM) and 'Yksityisten mailla olevat luonnonsuojelualueet' (Wednesday, May 23, 2018, 10:49 AM).

# Summary: Leveraging INSPIRE

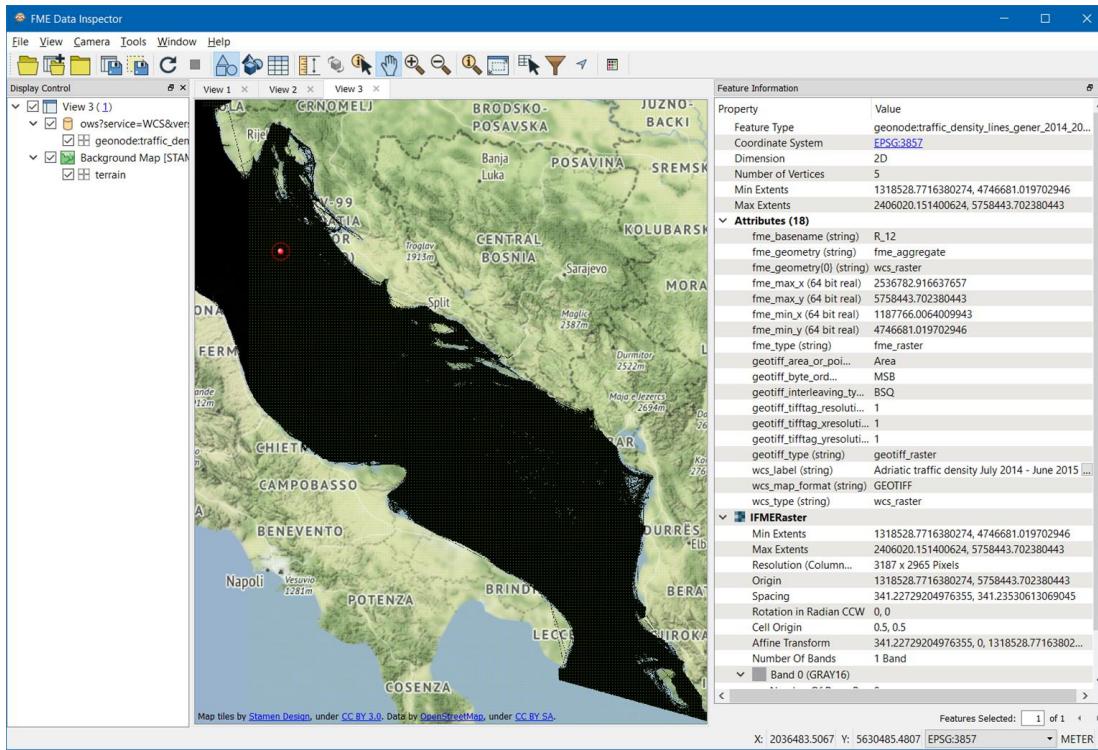
- Read INSPIRE Services and combine with your in-house data using FME
- Connect to other services and APIs with FME  
    HTTPCaller
- Mash up!

# FME Enhancements

# FME: Recent / Upcoming Enhancements

- XML/GML/JSON
    - XML application schema R/W
    - Improved performance
    - Web connections / API's
  - OGC / INSPIRE
    - GML 3.2.2, GML 3.3
    - WFS3, WCS Readers
    - GML: coverage, schema
  - Partial runs, Library & schema updates
- 

# OGC WCS Reader: FME 2019



# Coverages: Specialised Observations

FME Data Inspector

File View Camera Tools Window Help

Display Control View 1

coverageOut [INSPIRE] (2)  
GridSeriesObservation (1)  
SF\_SpatialSamplingFeature  
Background Map [STAMEN]  
terrain

Feature Information

Property	Value
Feature Type	SF_SpatialSamplingFeature
Coordinate System	EPSG4258
Dimension	2D
Number of Vertices	109
Min Extents	19.93481, 59.83333
Max Extents	30.15, 66.66667

Attributes (9)

Name	Type	Value
fme_geometry	fme_aggregate	
fme_type	fme_point	
gml_id	(encoded: UTF-16LE)	enn-s-1-
gml_original_coordinate_s...	EPSG4258	
gml_parent_id	(encode...	WFS-41ymO.GyiRsOxWBhT.1c09jh6uTowuoWbbp...
gml_parent_proper...	featureMember	
samplingFeature_xsi...	featureOfInterest	
xml_ns_uri	(encode...	http://www.opengis.net/samplingSpatial/2.0
xml_type	(string)	xml_point

IFMEMultiPoint (109 Parts)

Name	Type	Value
shape	Geometry Traits (1)	
19.93481, 60.09726	Part 0: IFMEPoint	pointMember
23.59606, 61.55632	Part 1: IFMEPoint	pointMember
24.55, 64.08333	Part 2: IFMEPoint	pointMember
23.78004, 62.24759	Part 3: IFMEPoint	pointMember
24.50483, 62.02121	Part 4: IFMEPoint	pointMember
25.86667, 63.06667	Part 5: IFMEPoint	pointMember

IFMEPointCloud

Name	Type	Value
result	Geometry Traits (50)	
59.83333, 19.93481, 1461844800	Min Extents	
66.66667, 30.15, 1461970800	Max Extents	
x	Components (26)	
Real64, Min: 59.83333, Max: 66.66667	x	
Real64, Min: 19.93481, Max: 30.15	y	
Real64, Min: 1461844800, Max: 1461970800	z	
Real64, Min: 2.03, Max: 288	Geopoint	
Real64, Min: -3.49, Max: 15.19	Temperature	
Real64, Min: 1008.09, Max: 1029.5	Pressure	
Real64, Min: 39.7, Max: 100	Humidity	
Real64, Min: 1.11, Max: 12.57	WindDirection	
Real64, Min: 0.11, Max: 259	WindSpeedMS	
Real64, Min: -9.92, Max: 4.98	WindIMS	
Real64, Min: -5.03, Max: 12.37	WindWMS	
Real64, Min: 0.42, Max: 12.61	MaximumWind	

Feature Information

Property	Value
Feature Type	GridSeriesObservation
Coordinate System	Unknown
Dimension	3D
Number of Vertices	3924
Min Extents	59.83333, 19.93481, 1461844800
Max Extents	66.66667, 30.15, 1461970800

Attributes (15)

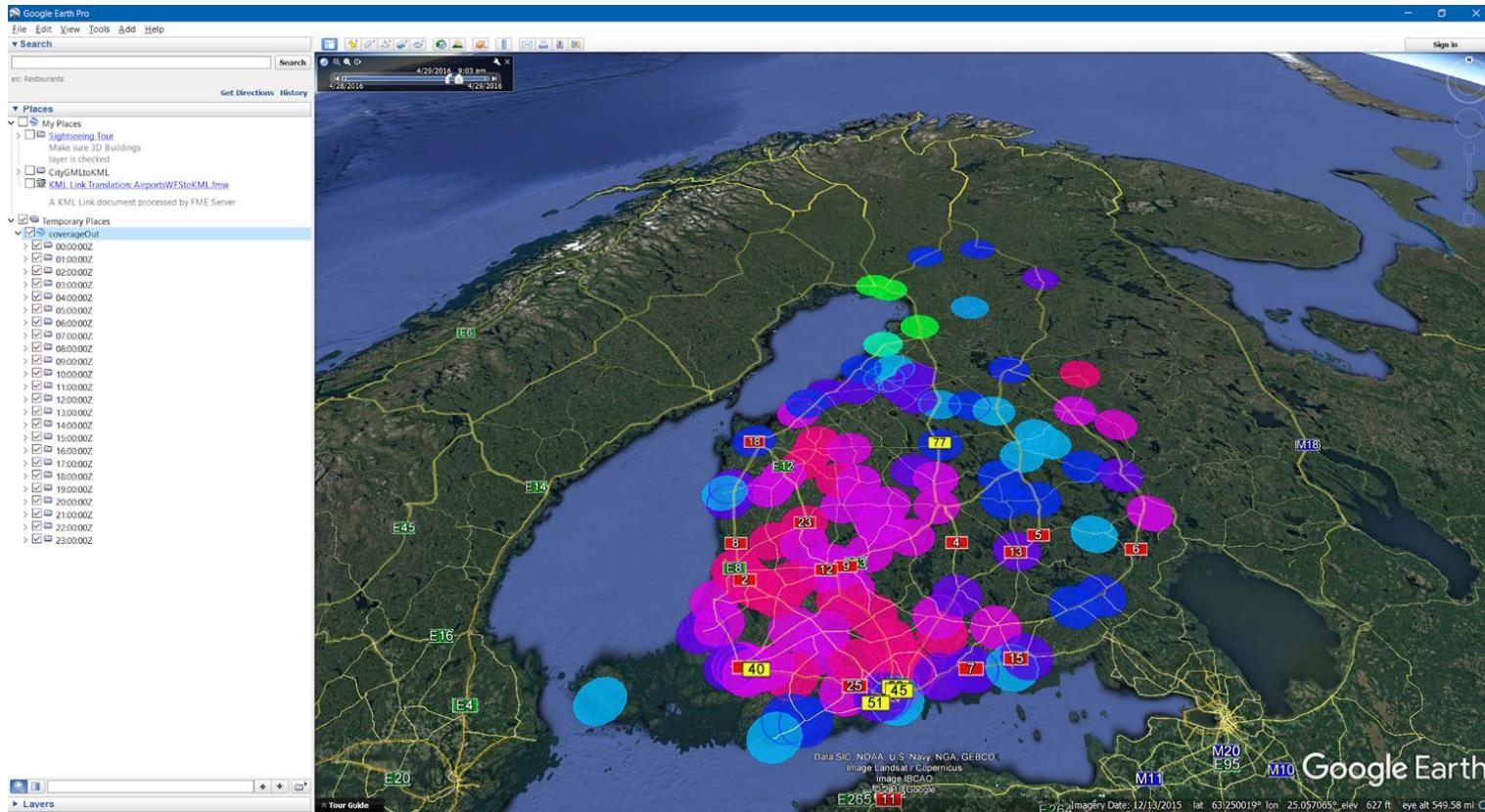
Name	Type	Value
fme_geometry	fme_polygon	
fme_type	fme_point_cloud	
gml_id	(encoded: UTF-16LE)	WFS-41ymO.GyiRsOxWBhT.1c09jh6uTowuoWbbp...
gml_original_coordinate_s...	http://xml.fmi.fi/gml/crs/compoundCRS.ph...	
gml_parent_proper...	featureMember	
observedProperty xlink_h...	http://data.fmi.fi/inspire/process/hirlam	
parameter[0].NamedValue...	http://xml.fmi.fi/inspire/process/hirlam	
parameter[0].NamedValue...	>_xmlvalue xmlnscom="http://www.opengis...	
phenomenonTime (encoded: UTF-16LE)	>_xmlphenomenonTime xmlnscom="http://www.opengis...	
procedure (encode...	>_xmlprocedure xmlnscom="http://www.opengis...	
procedure xlink_h...	>_xmlprocedure xlink_h...	
resultTime.gml_Timelinstan...	2016-04-28T06:00:00Z	
resultTime_ns_uri (encode...	time-1	
xml_type	(string)	xml_point
	Components (26)	3924 Points
	Name	result
	Geometry Traits (50)	
	Min Extents	59.83333, 19.93481, 1461844800
	Max Extents	66.66667, 30.15, 1461970800
	Components (26)	x ... RadiationDiffuseAccumulation
	x	Real64, Min: 59.83333, Max: 66.66667
	y	Real64, Min: 19.93481, Max: 30.15
	z	Real64, Min: 1461844800, Max: 1461970800
	Geopoint	Real64, Min: 2.03, Max: 288
	Temperature	Real64, Min: -3.49, Max: 15.19
	Pressure	Real64, Min: 1008.09, Max: 1029.5
	Humidity	Real64, Min: 39.7, Max: 100
	WindDirection	Real64, Min: 1.11, Max: 12.57
	WindSpeedMS	Real64, Min: 0.11, Max: 259
	WindIMS	Real64, Min: -9.92, Max: 4.98
	WindWMS	Real64, Min: -5.03, Max: 12.37
	MaximumWind	Real64, Min: 0.42, Max: 12.61

O&M data from Finnish Meteorological Institute

<https://en.ilmatieteenlaitos.fi/open-data-sets-available>

X: 32.5948 Y: 63.7740 EPSG4258 DEGREE

# Coverages: Specialised Observations



# **Workshop Exercises:**

# **Flood Warning Assistant**

- Exercise 1 Data extraction and loader
- Exercise 2 Flood warning REST service querier and database updater
- Exercise 3 Flood and impact HTML report generator

# Team Safe: Flood Warning Assistant

- Climate change impacts increases risk of natural hazards such as floods
- Leverage INSPIRE basemap info combined with real time data
- Generate results easily accessible to public via web and mobile

The BBC News website features a prominent headline: "UK weather: More rain forecast after flash floods across Britain". Below the headline is a photograph of a flooded street in Laxey, Isle of Man, with water flowing over a green metal railing. A video player icon is visible in the bottom left corner of the image. At the bottom of the image, a caption reads: "Residents were trapped in their homes in the village of Laxey on the Isle of Man".

OS Open Map - Local

Data type: Vector  
Supply format: ESRI® Shape ▾  
Version: 04/2019

Selecting National Grid Reference squares

Using the map on the right, or a [full size version](#), identify which square(s) you want to download. Select or deselect squares by clicking on the map on the right.

To manually select or deselect multiple squares from the two letter reference list, press and hold the CTRL key (Windows) or the Command key (OS X) while selecting from the list.

Note: this is the vector version of OS Open Map - Local. Download sizes vary by area. It's also available in [raster data format](#).

OS Open Map - Local is a street-level digital map that clearly shows roads, road names, electric car charging points and major public buildings.

To view the area covered by each map tile, see our [tile locator map](#).

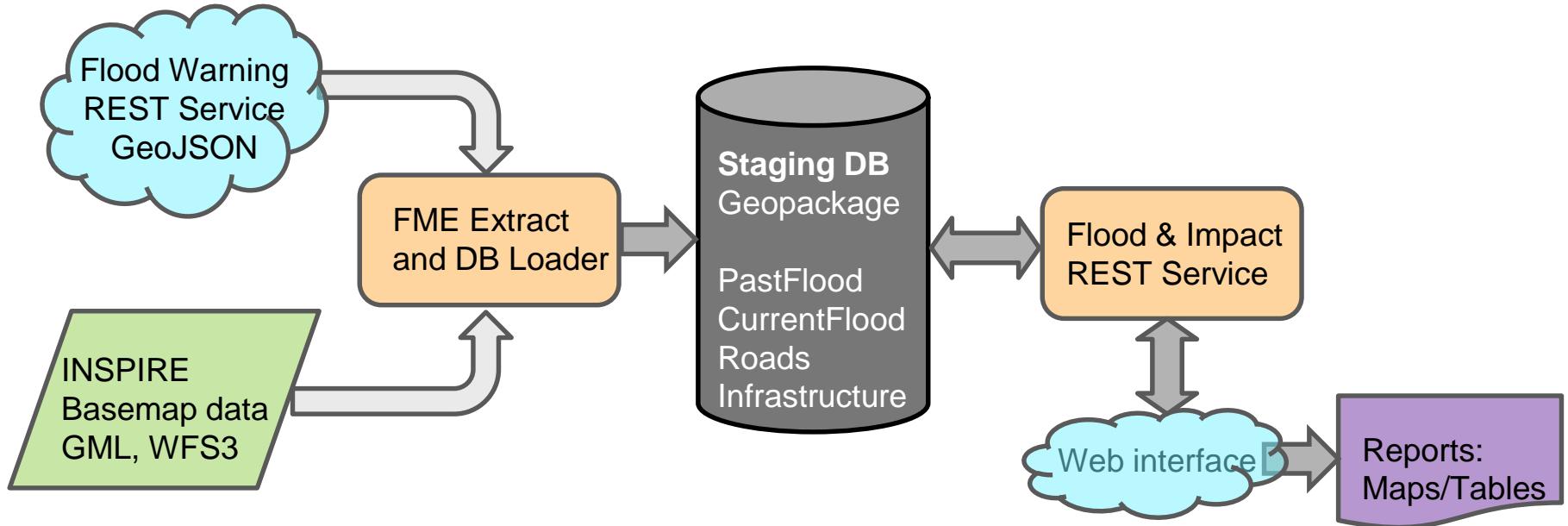
Feature Information

Property	Value
Feature Type	road_RoadLink
Coordinate System	EPSG:27700
Dimension	2D
Number of Vertices	13
Min Extents	376617.49, 299717.86
Max Extents	376617.71, 301392.71

Attributes (31)

Attribute	Value
beginNodeSpanX	<null>
beginNodeSpanY	inapplicable
beginNodeX	true
beginNodeY	link_1f2d5a5bd52-9710-4128-88e8-13829ec47e0c
endNodeX	false
endNodeY	line
featureType	road
geom_type	LineString
geom_type	LineString
formOfWk	Single Carriageway
formOfWkURI	<a href="http://www.os.uk/xml/codelist/">http://www.os.uk/xml/codelist/</a>
grid_id	1enc0de..
grid_original_C	urn:ogc:def:crs:EPSG:27700
grid_parent_C	OSOpenRoads
grid_parent_P	featureMember
inNetwork	true

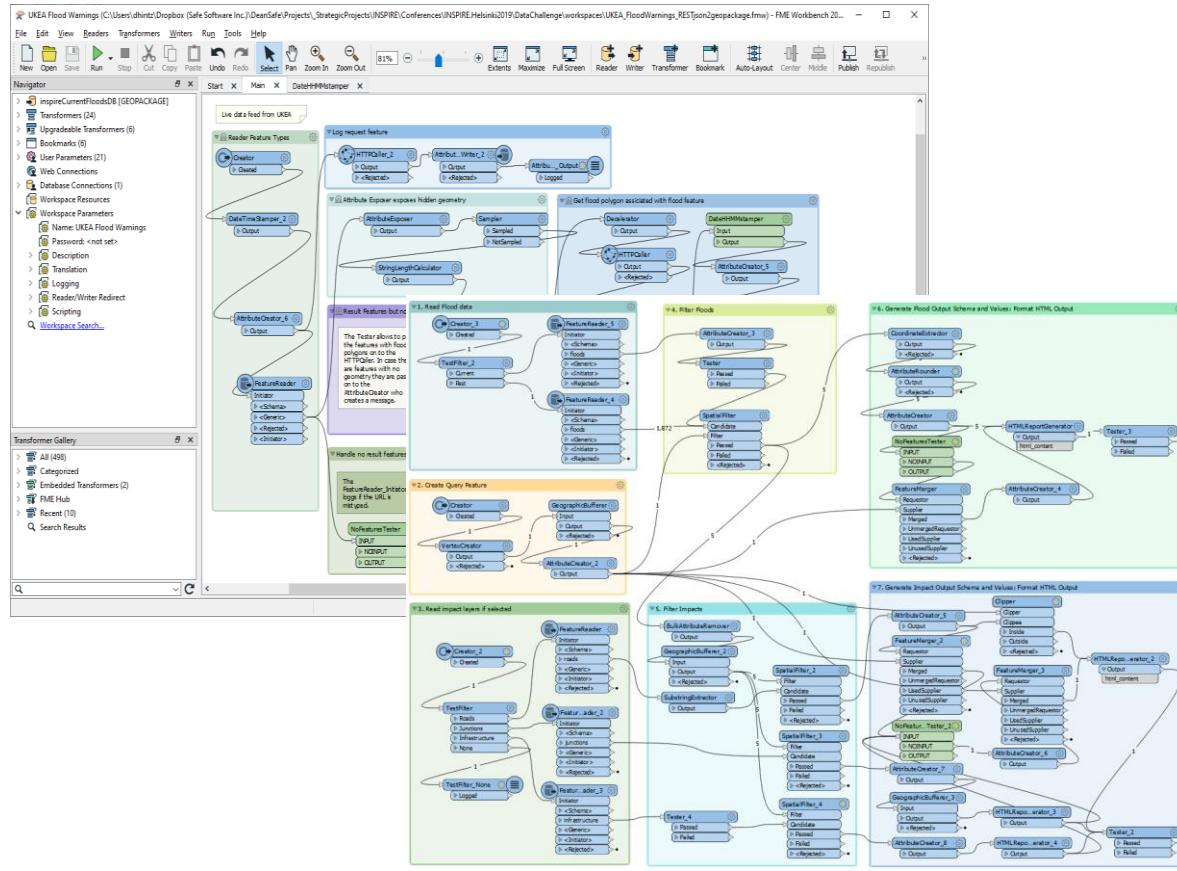
# Flood Warning Assistant: Architecture



- Extract/loader reads from flood warning service & basemap datasets then loads database – flood info updated hourly
- Flood and Impact Service accepts requests from web form and generate HTML reports

# Flood Warning and Potential Impact: FME Workspaces

1. Data Extract/Loaders read GML/WFS3 basemaps, flood data GeoJSON, load into staging database tables on geopackage
2. Flood warning loader queries REST service, parses JSON response, calls feature service and converts GeoJSON response to feature records for geopackage
3. Flood and Impact reporter takes web form area of interest REST calls, queries staging database, and generates flood detail and impact assessment reports (HTML)



# Flood Warning & Potential Impact: Web form & Reports

Safe Software Demos | INSPIRE Flood Warning Assistant

UK flood data provided by: [UK Environment Agency](#) Finnish flood data provided by: [Finnish Land Survey of Poland](#)

Select warning type and set buffer amount. Click on map to select an area of interest. Then select impact type. Leave impact type = None for flood warnings.

A new page will open with a report of the flood or impact warnings related to your area of interest.

**Parameters**

Warning Type (Past=default):

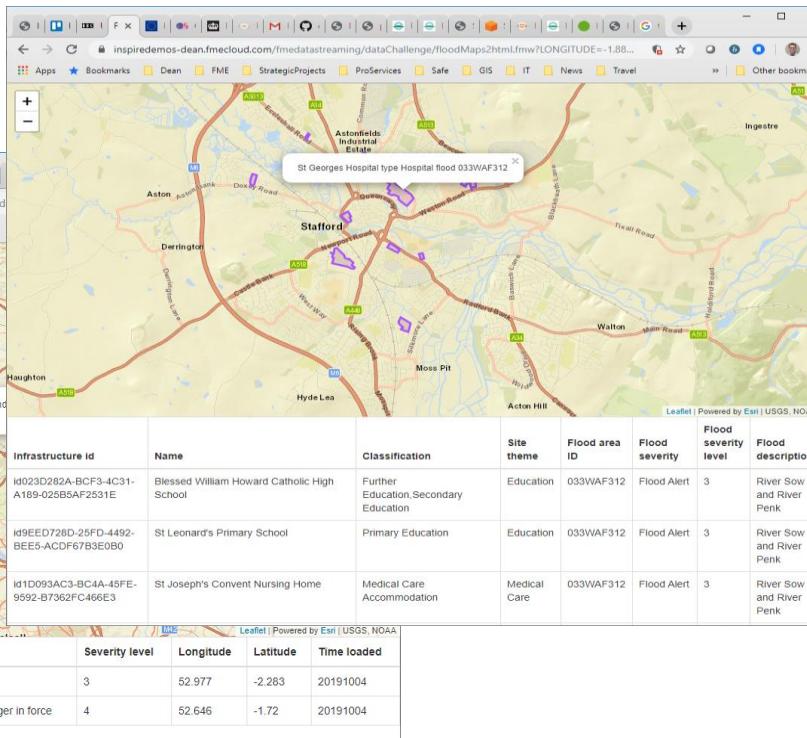
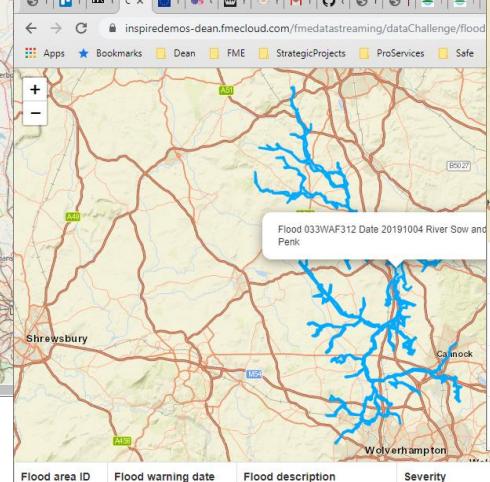
Past  
 Expired  
 Alert  
 Warning

Impact Type:

Roads  
 Junctions  
 Infrastructure

Buffer distance: None

**Submit**



1. Select area of interest
2. Select flood warning type / time
3. Choose to display flood warnings or associated impacts
4. View warnings or impacts displayed on web map and table

# **Hands-on Part I – Extract and Load to Database**

- Exercise 1: Data extraction and loading - basemap, impact layers
- Exercise 2: Live data feed to geopackage - dynamic data



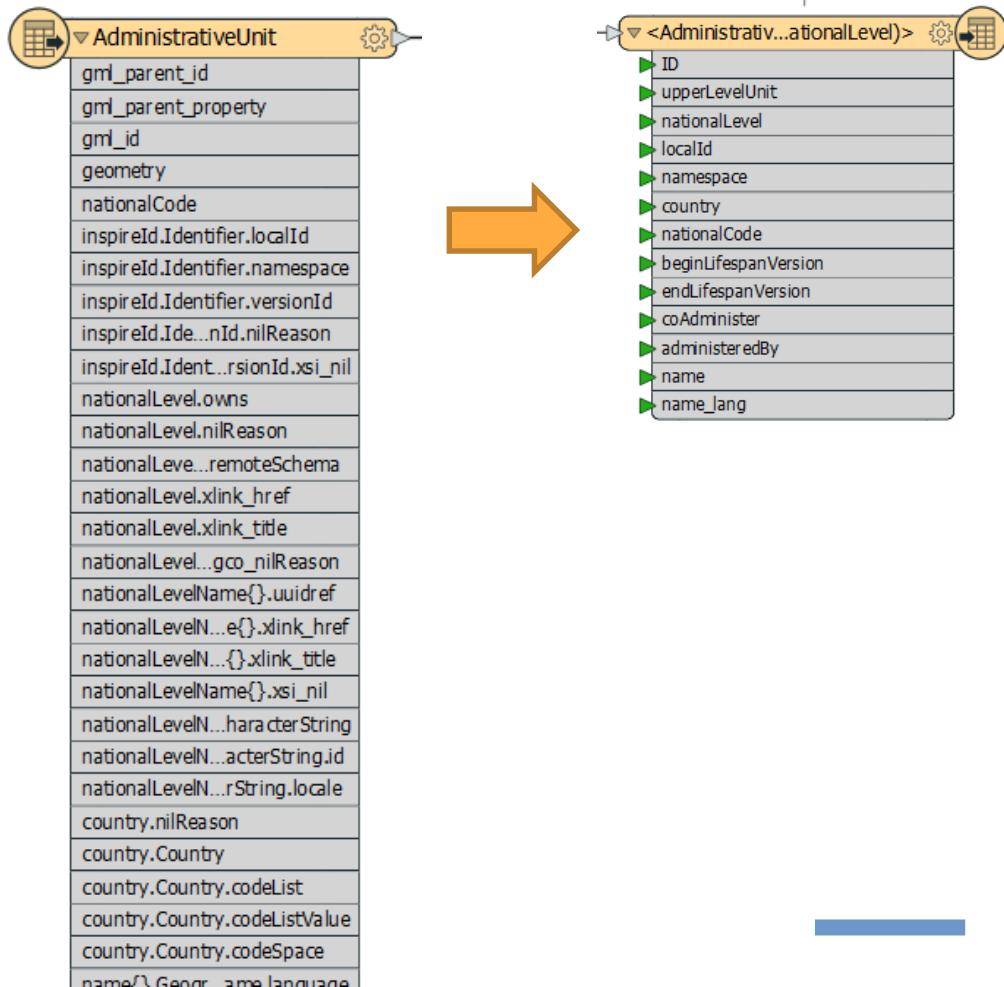
# Implementation Challenges

# INSPIRE Implementation Challenges

- Finding data - data problems - alternative data sources? - E.g. Eionet - Reporting Obligations Database (ROD)
- Schema - model transformations to simplifiy data model from complex INSPIRE schema
- Geometry simplification
- Troubleshooting: INSPIRE GML, WFS, logs, debug mode

# Schema simplification

- Different purposes
  - Make use of data in other applications
  - Storage in relational Database Systems
  - Use of Alternative Encodings



# Schema simplification

- Different purposes
  - Make use of data in other applications
  - Storage in relational Database Systems
  - Use of implementation or of Alternative Encodings

The image shows two configuration dialog boxes side-by-side, both titled with their respective transformer names and featuring a close button (X) in the top right corner.

**AttributeRenamer Parameters**

Transformer Name: `AttributeRenamer_9`

Attributes To Rename

Input Attribute	Output Attribute	Default Value
<code>inspireId.Identifier.localId</code>	<code>localId</code>	
<code>inspireId.Identifier.namespace</code>	<code>namespace</code>	
<code>country.Country</code>	<code>country</code>	

**AttributeCopier Parameters**

Transformer Name: `AttributeCopier_3`

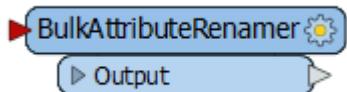
Attributes To Copy

Input Attribute	Output Attribute	Default Value
<code>graphicalName.spelling{0}.SpellingOfName.text</code>	<code>residenceOfAuth...</code>	
<code>nationalLevelName{0}.LocalisedCharacterString</code>	<code>nationalLevelNa...</code>	
<code>upperLevelUnit.xlink_href</code>	<code>upperLevelUnit</code>	
<code>administeredBy{0}.xlink_href</code>	<code>administeredBy</code>	
<code>coAdminister{0}.xlink_href</code>	<code>coAdminister</code>	

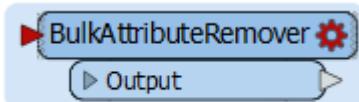
Buttons at the bottom: Help, Presets, OK, Cancel, Import ...

# Schema simplification

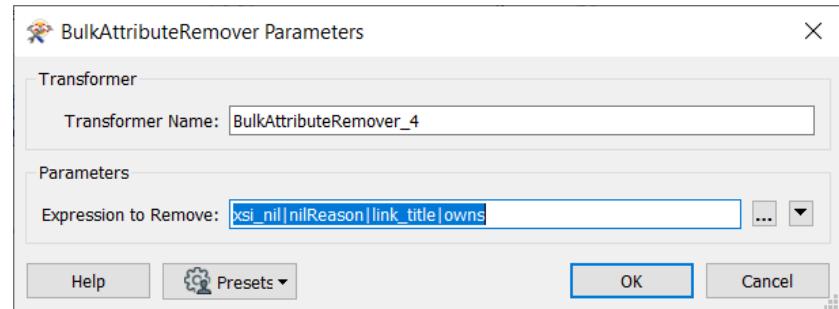
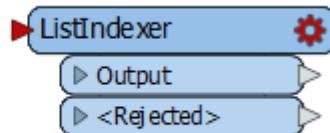
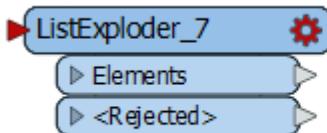
- BulkAttributeRenamer



- BulkAttributeRemover

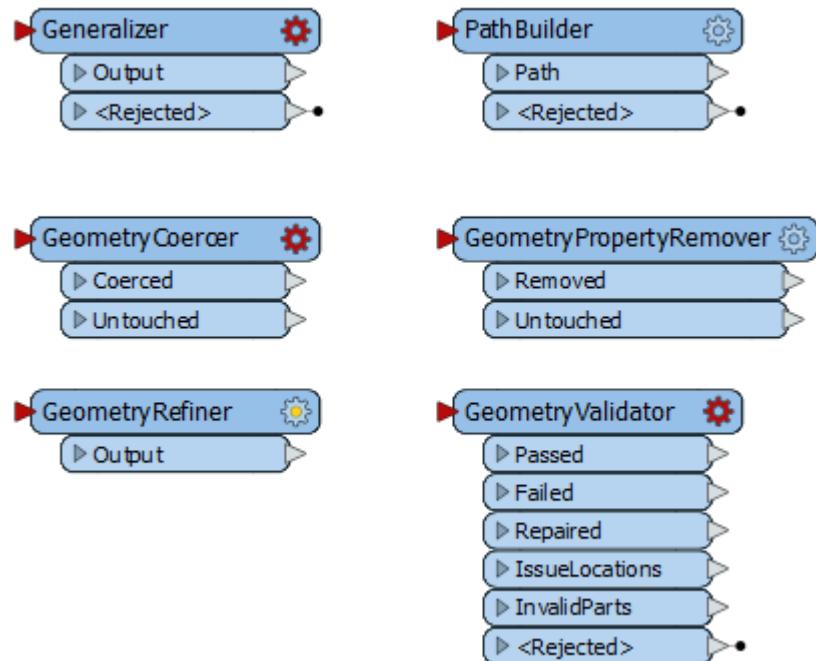


- ListTransformers



# Geometry Simplification

- Remove vertices – Douglas, Thin, Deveau, Wang, etc
- Coerce to simpler geometry
- Build paths from aggregates
- Refine geometry
- Remove unwanted geometries
- Validate and repair geometries



# TroubleShooting

- GML
- INSPIRE GML (3.2.2)
- WFS
  - urls from FME log -> browser
  - Check describeFeatureType, namespaces
- debug mode – WFS POST



# **Hands-on Part II - Data Processing & Publication**

- Exercise 2: Live flood warning data feed to database
- Exercise 3: Query database and generate flood and impact reports
- Wrap-up / QnA (demo some more refined version - flood etc)

**Demo:** <https://playground.fmeserver.com/demos/>

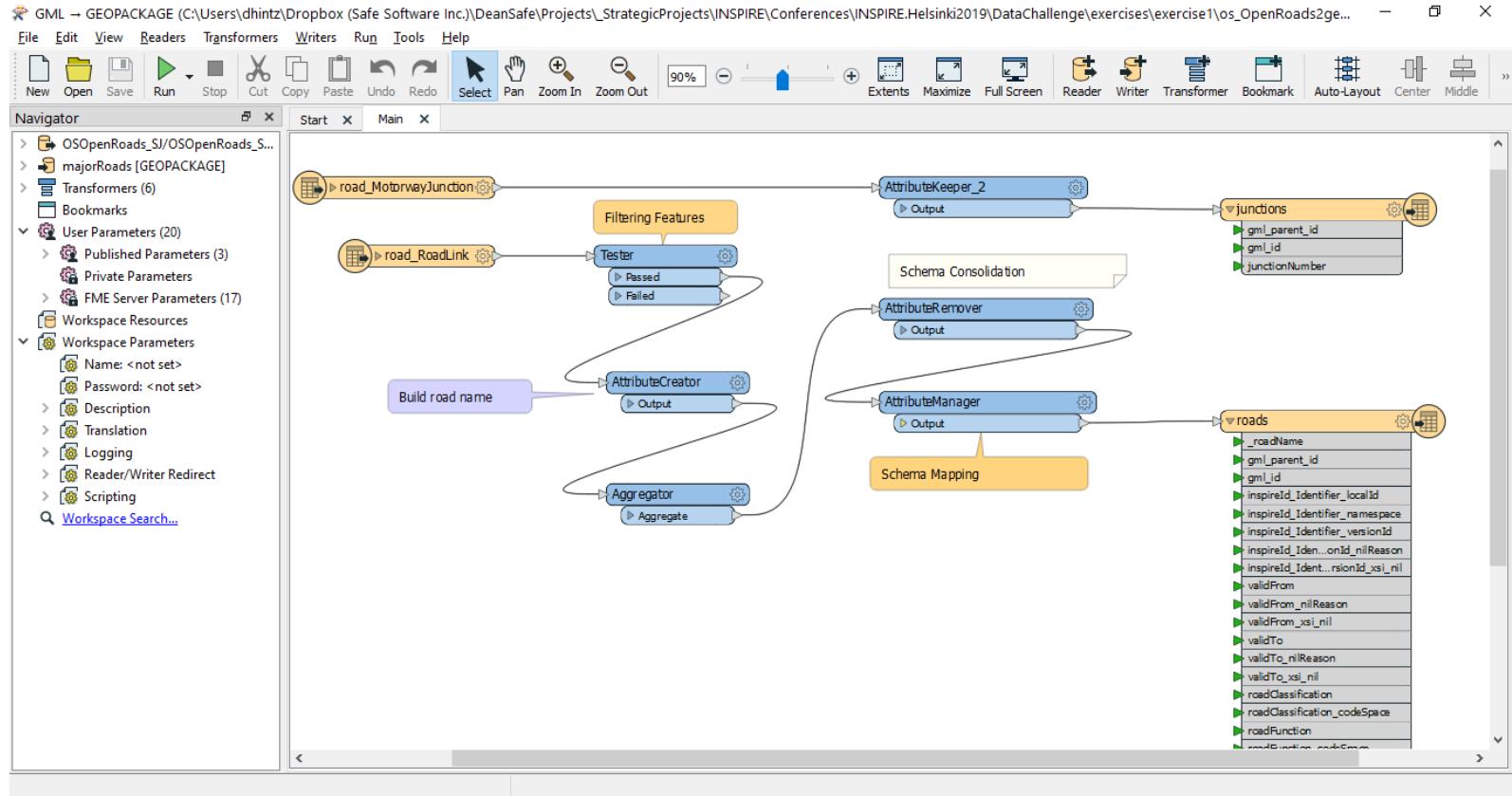
**FME Server Cloud:** <https://inspiredemos-dean.fmecloud.com>

- Users: Students0-4, pass:
- Please sign up – 1 user per student#

The background of the slide features a warm orange gradient. Overlaid on this are two distinct patterns: a dark, semi-transparent network of interconnected white lines forming a mesh-like structure, and a series of glowing, out-of-focus yellow and white circular lights (bokeh) of varying sizes scattered across the surface.

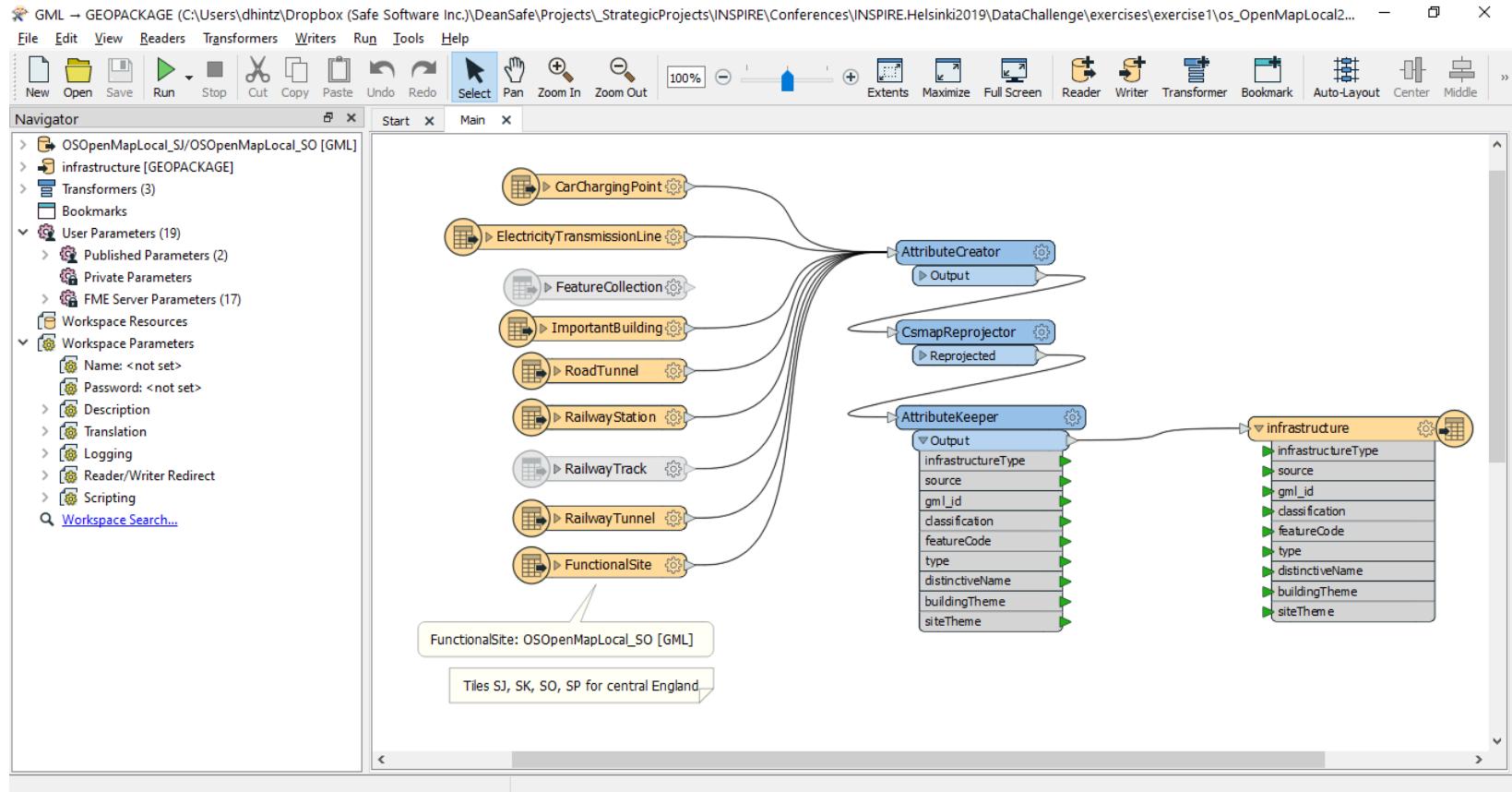
**Wrap - Up**

# OS Open Roads GML Extract and Load to Geopackage



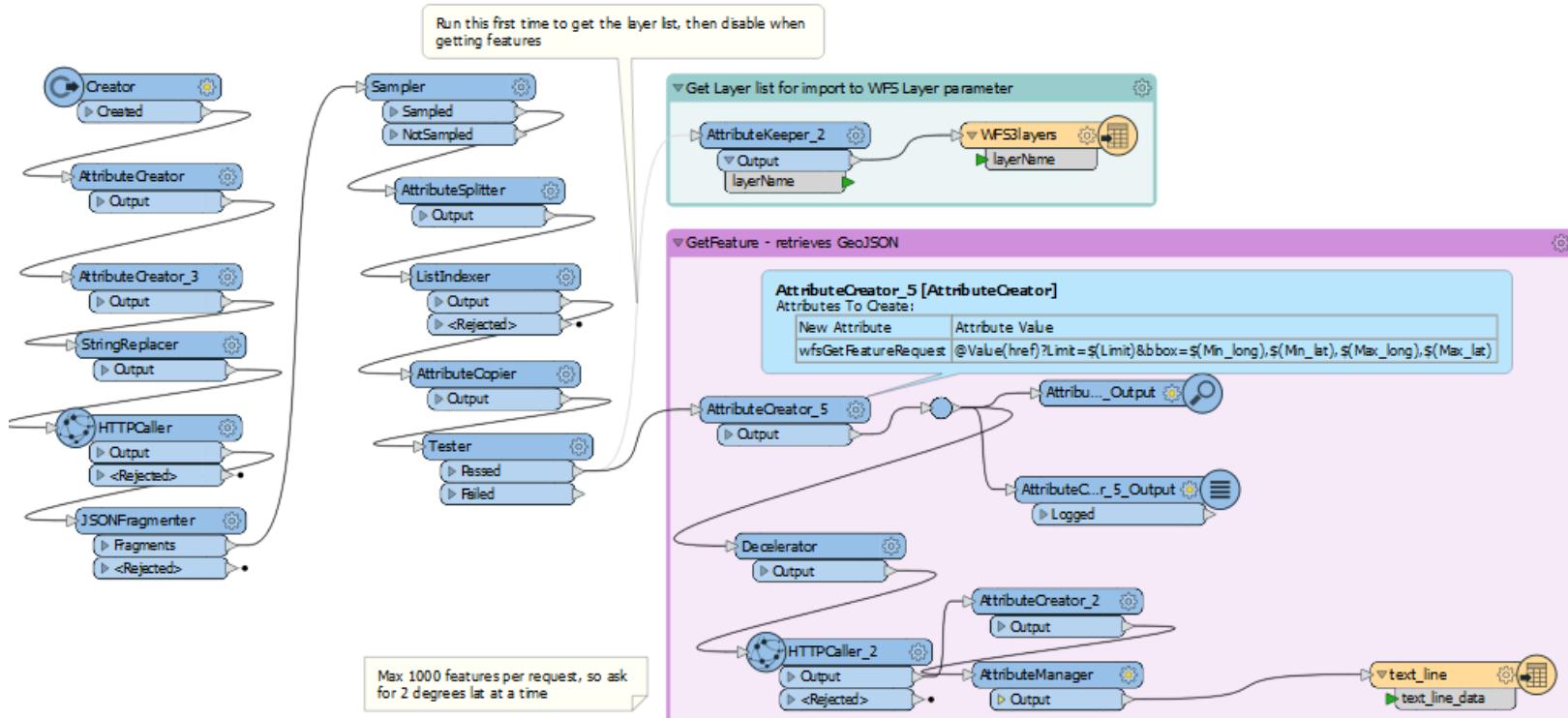
Extract from INSPIRE+ GML basemaps and load into staging database tables on geopackage

# OS Open Map Local GML Extract and Load to Geopackage



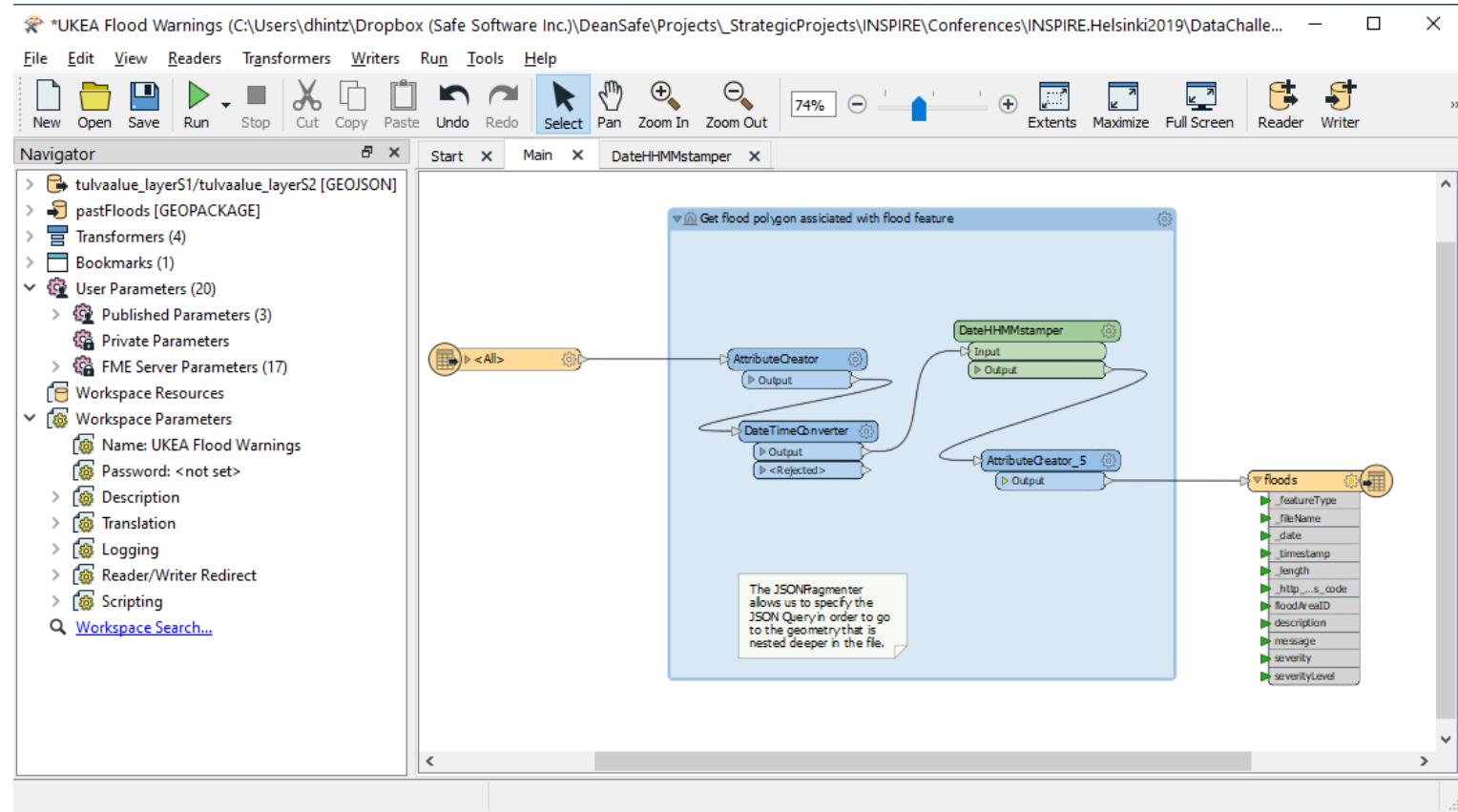
Extract from INSPIRE+ GML basemaps, and loads into staging database tables on geopackage

# NLSF WFS3 Extract and Transform to GeoJSON



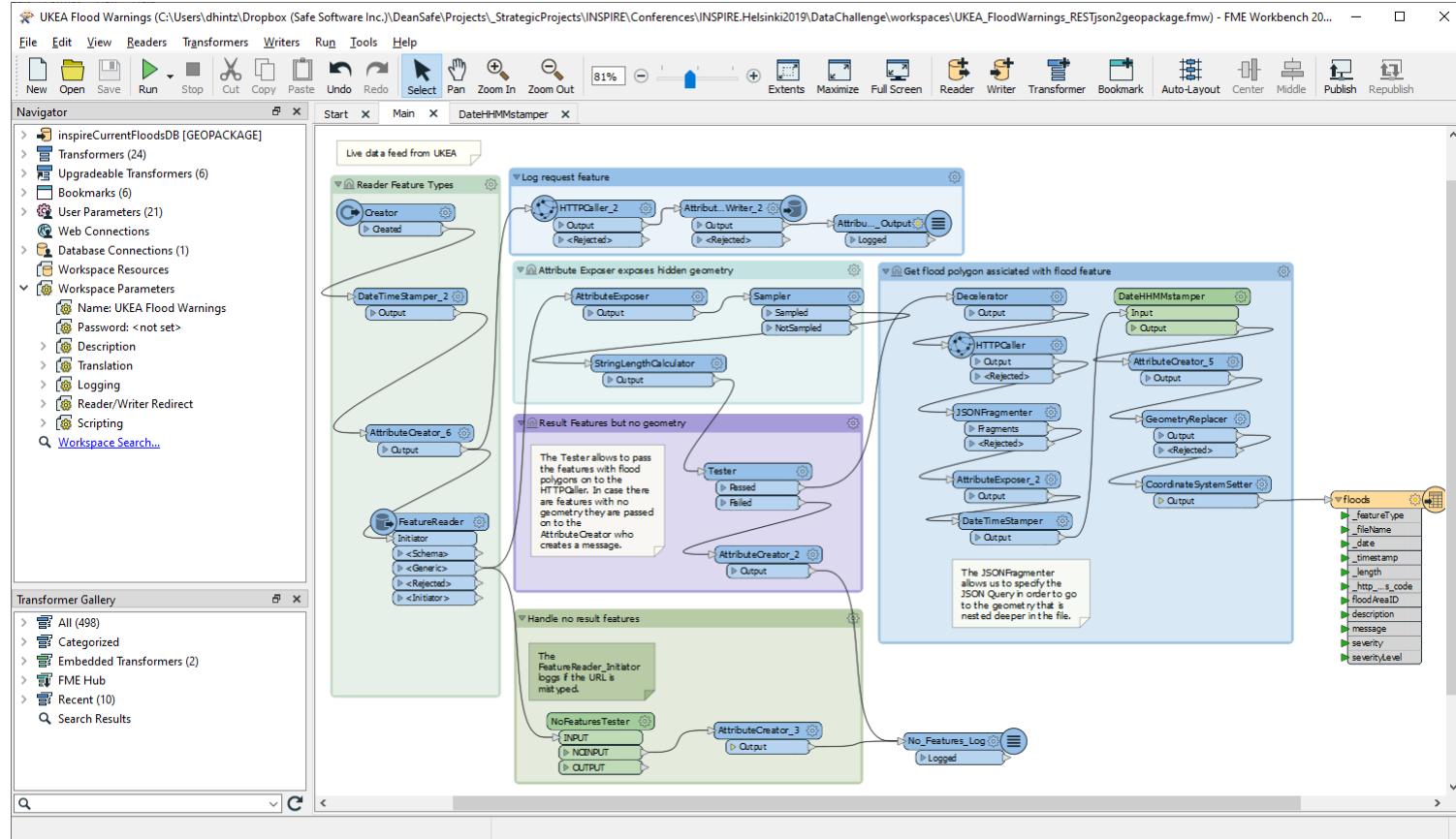
Read past FI floods from NLSF WFS3, and load into staging database tables on geopackage

# NLSF WFS3 GeoJSON Load to Geopackage



Read past FI floods from NLSF WFS3 GeoJSON, and load into staging database tables on geopackage

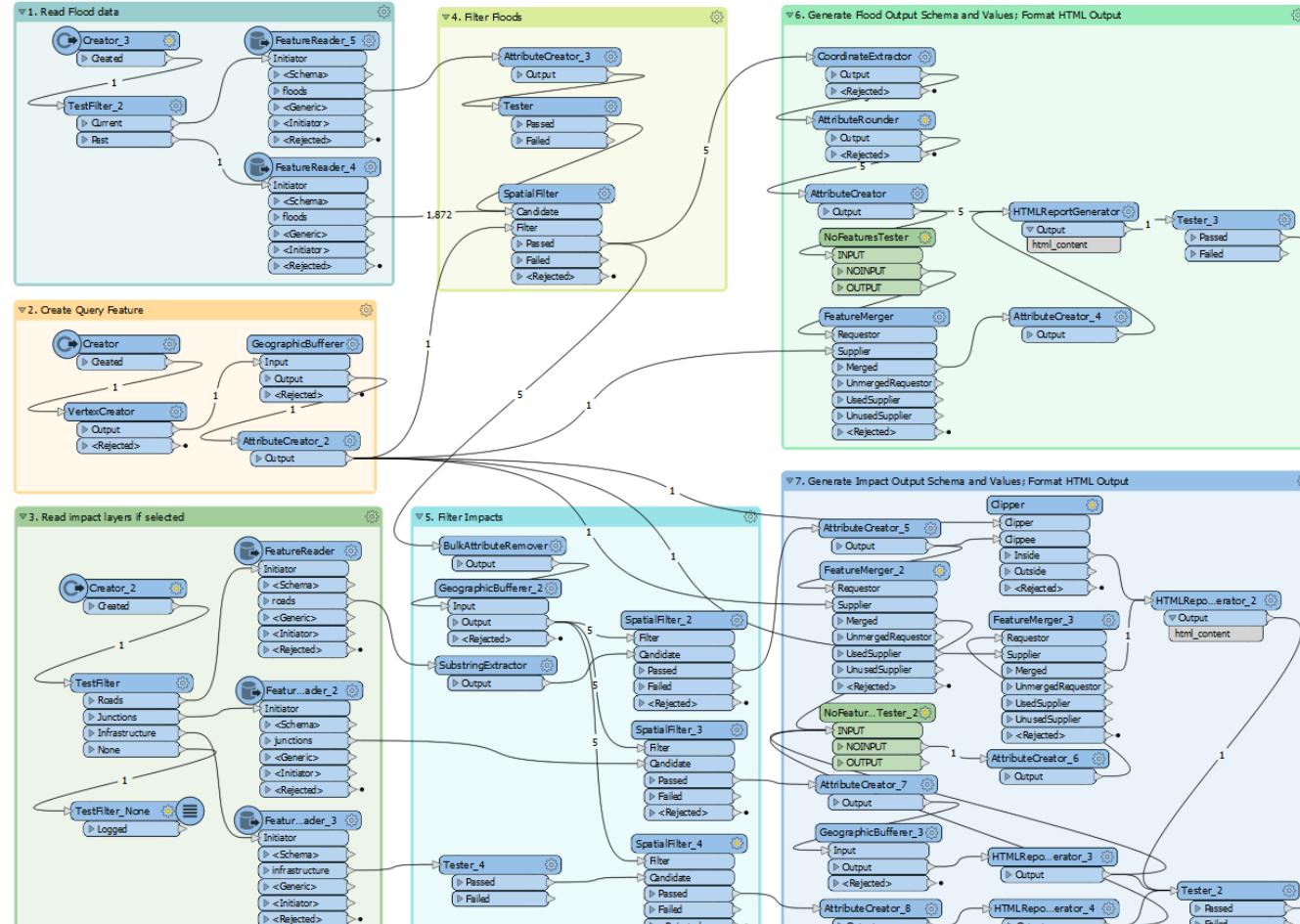
# Flood Warning: Data Extract and Load to Geopackage



queries REST service, parses JSON response, calls feature service, loads into staging database geoPackage

# Flood Warning and Potential Impact: FME Workspaces

Flood and Impact reporter takes web form area of interest REST calls, queries staging database, and generates flood detail and impact assessment reports (HTML) with inset map and tables



# Conclusions

# Keys to Success with FME & INSPIRE

- Support domain expert collaboration
- Both consume and produce = better implementations
- Balance between flexibility and usability
- Integrate with existing workflows
- Rapid prototyping = easy wins early
- Automate and future-proof

# Key Take-aways: FME and INSPIRE



- FME simplifies INSPIRE compliance - without any coding
- **Prepare data** for INSPIRE through data extraction, transformation and schema mapping
- **Write & Validate INSPIRE GML** using schemas and validators to ensure compliance
- **Share INSPIRE** data using FME Server's web services
- **Leverage INSPIRE** data and services - integrate with in-house data to support existing workflows and enable new

## **INSPIRE is just the start, not the destination**

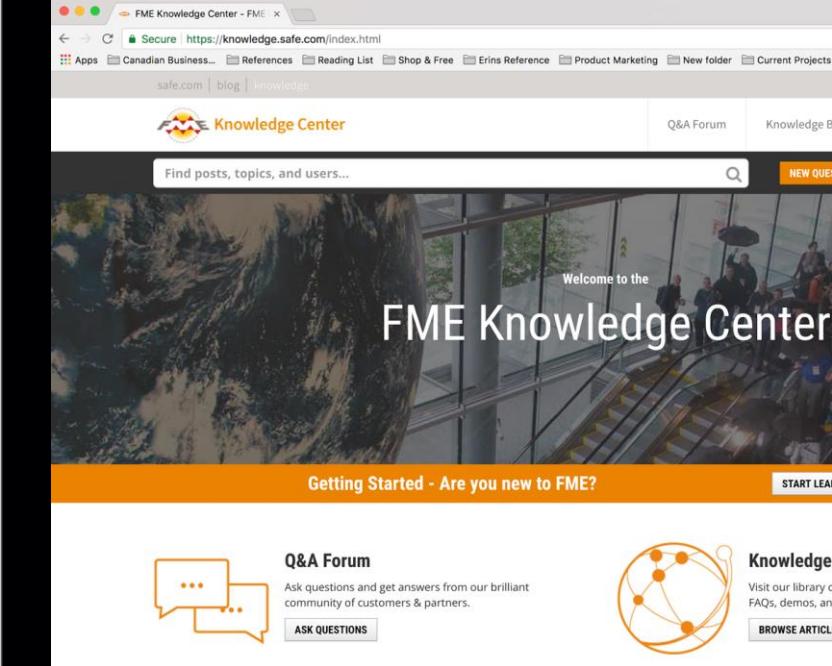
- Harmonize INSPIRE data
- Consume INSPIRE data
- Learn one tool for all your integration needs
- Easily document and share workflows

# FME Partners Providing INSPIRE Solutions

- **Spatialworld**, Finland (National Land Survey)
- **con terra** (> 100 implementations across Europe)
- **SWECO**, KMD Denmark, SGU Sweden
- **Metria**, Swedish EPA
- **GeoData**, Norwegian National GeoPortal
- **1-Spatial & Dotted Eyes**, UK
- **GIM**, Belgium
- **ISOGeo**, France (SDI Platform)
- **AED Sicad** (NAS to INSPIRE conversions)
- **Veremes**, France

# Get started with free resources at safe.com

- ✓ Free FME Trial / Home / Edu
- ✓ Free Online Training
- ✓ Free Tutorials
- ✓ Free Webinars
- ✓ Free Knowledge Center



The screenshot shows the homepage of the FME Knowledge Center. At the top, there's a navigation bar with links for Apps, Canadian Business..., References, Reading List, Shop & Free, Erins Reference, Product Marketing, New folder, and Current Projects. Below the navigation is a search bar with the placeholder "Find posts, topics, and users...". The main header features the FME logo and the text "Knowledge Center". A large banner image shows a modern office interior with people on escalators. Overlaid on the banner is the text "Welcome to the FME Knowledge Center". Below the banner, there's a section titled "Getting Started - Are you new to FME?" with a "START LEARNING" button. To the left of this section is a "Q&A Forum" icon with two speech bubbles and the text "Ask questions and get answers from our brilliant community of customers & partners." A "ASK QUESTIONS" button is located below this. On the right side of the banner is a "Knowledge Library" icon with a globe and the text "Visit our library of FAQs, demos, and articles." A "BROWSE ARTICLES" button is located below this.

# INSPIRE-Specific Resources

## Knowledge Center

search 'eu inspire tutorial'

other tutorials: XML, GML, JSON, 3D

## FME Community, FME Hub

search 'inspire'

search 'fmeserver playground'

## safe.com/inspire

## conterra.de/ISP

The screenshot shows a web page from the FME Knowledge Center. At the top, there's a navigation bar with a logo, the text "Knowledge Center", and a "Q&A Forum" link. Below the navigation is a search bar with the placeholder "Find posts, topics, and users...". The main content area has a breadcrumb trail: "Home / \*FME Desktop /". A user profile picture and the text "Home / Tutorial: EU INSPIRE Initiative" are displayed. Below this, it says "NatalieAtSafe created · Oct 09, 2015 at 07:31 PM · MitaAtSafe edited · Aug 09 at 08:50 PM" and "Article created with FME Desktop 2014". The title of the article is "Introduction to INSPIRE GML & FME". The text explains that FME simplifies the process of achieving EU INSPIRE\* compliance - without any coding - through its abilities to:

- Read INSPIRE data using a number of readers, including the INSPIRE GML Reader
- Prepare data for contribution to INSPIRE through data transformation and schema mapping
- Write INSPIRE GML using the INSPIRE GML Writer, with built-in application schemas
- Validate INSPIRE GML to ensure compliance with EU standards
- Share INSPIRE data using FME Server's web services

FME supports all aspects of INSPIRE requirements from consumption to publication:

The diagram illustrates the FME INSPIRE process flow, showing the following steps in a circular sequence:

- Evaluation** (Data assessment) leads to **Publication** (WxS, GML, PDF, KML).
- Publication** leads to **Validation** (QA, XSD, values).
- Validation** leads to **Write** (INSPIRE GML).
- Write** leads to **Transformation** (schema, geometry).
- Transformation** leads back to **Evaluation**.
- A central **FME** logo is positioned between the validation and write steps.

# Thank you!

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