

Generic Change Detection for Railway Infrastructure Data

FME WORLD
TOUR **2017**

André Zehnder
EBP Schweiz

About Me

- André Zehnder
- EBP Schweiz AG
- GIS & Data Analyst
- Geography, UZH
- FME since 2013.1



Services



Software development



Data analysis (spatial, temporal)



IT consulting

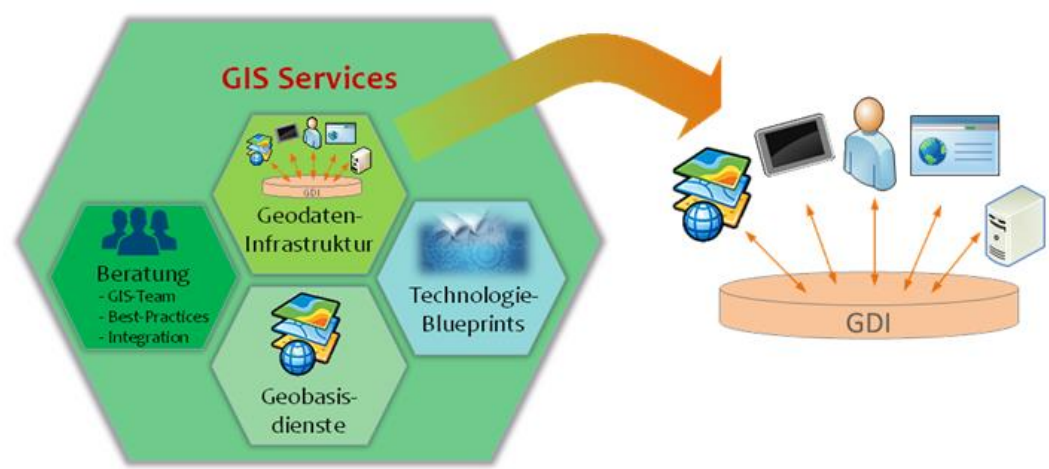
Business domains



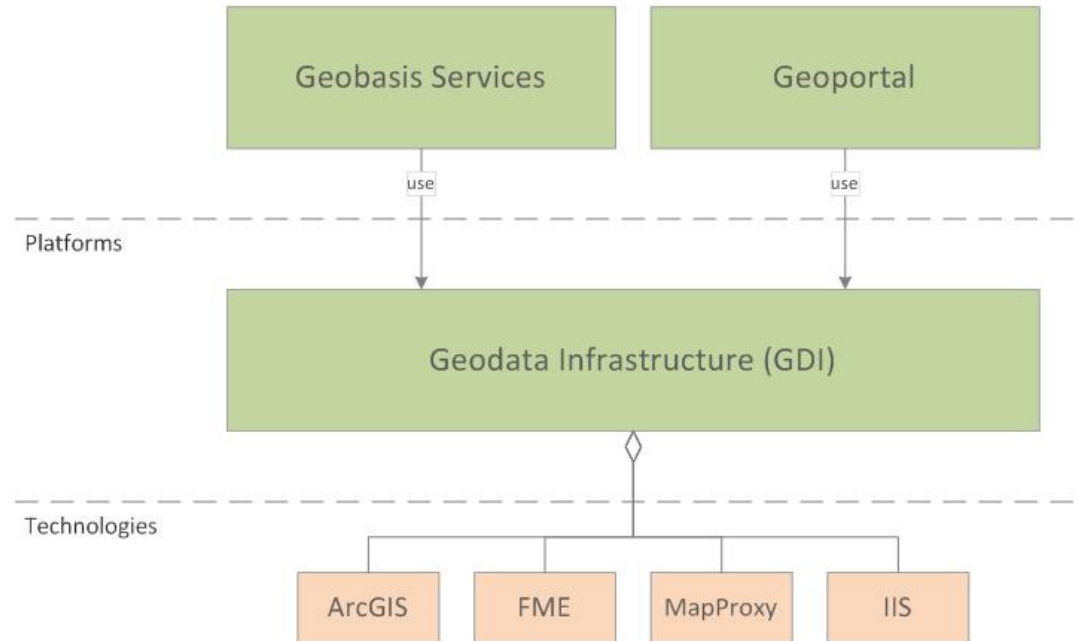
Background



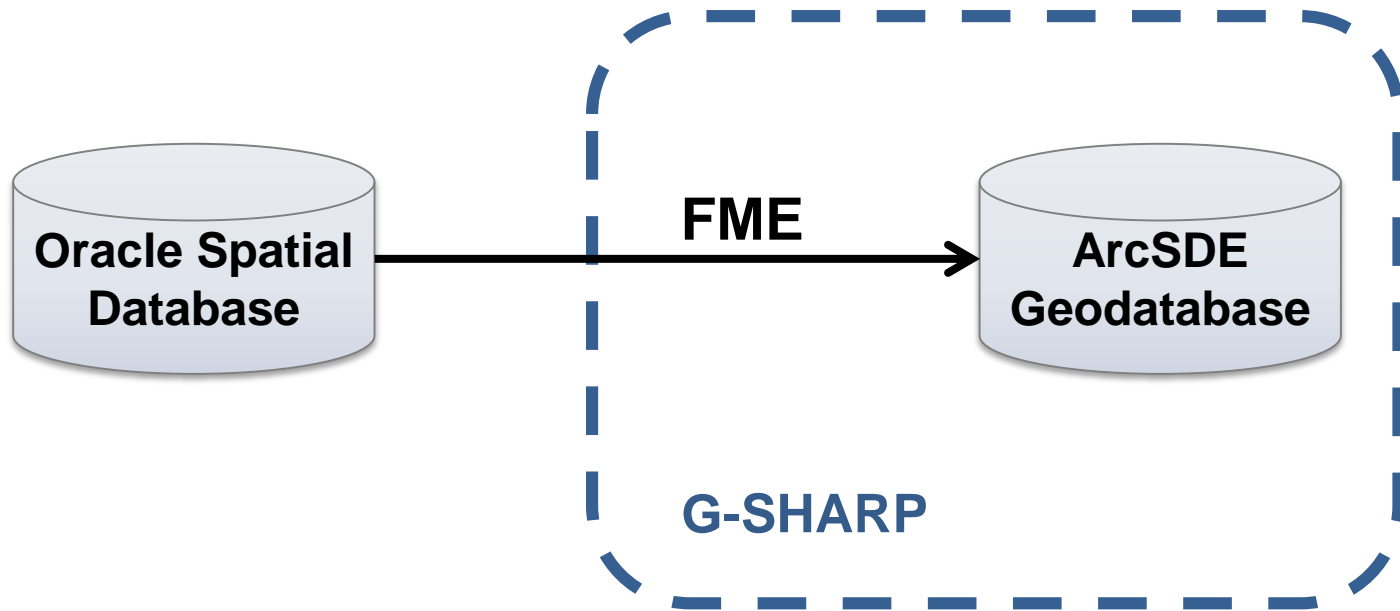
G-SHARP



- Geodata Infrastructure for SBB
- Serves Desktop, Web and Mobile Clients
- Key Technologies
 - ArcGIS Server
 - ArcGIS Desktop
 - FME Server
 - FME Desktop



Transfer of infrastructure data



Transfer of infrastructure data

Infrastructure data

- Railway tracks
- Buildings
- Signals
- Railway platforms

➔ 300 feature classes

➔ 60 million objects



Requirements

- Repeatable transfer of all data records
- Identify and write changes nightly
- Keep history of changes
- Minimal effort for maintenance
- Automatization of whole process
- Option to parallelize
- Scalability

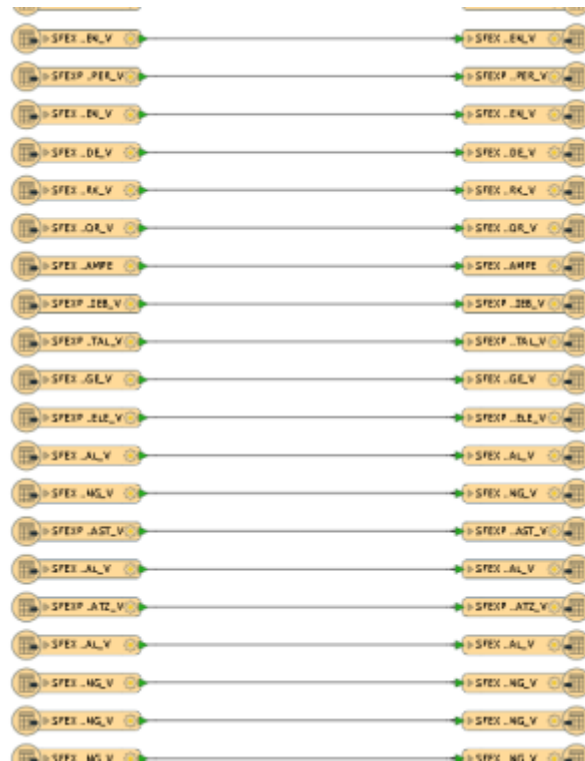
Implementation



A surreal, monochromatic landscape. In the upper left, a glass bottle is tilted, pouring a stream of water into a deep valley. The water flows down a steep, rocky slope. The valley floor is a mix of dark and light patches, possibly representing different terrain or vegetation. In the distance, a wide river or stream winds through the valley towards the horizon. The sky is filled with soft, wispy clouds, suggesting a dawn or dusk setting. The overall mood is serene and contemplative.

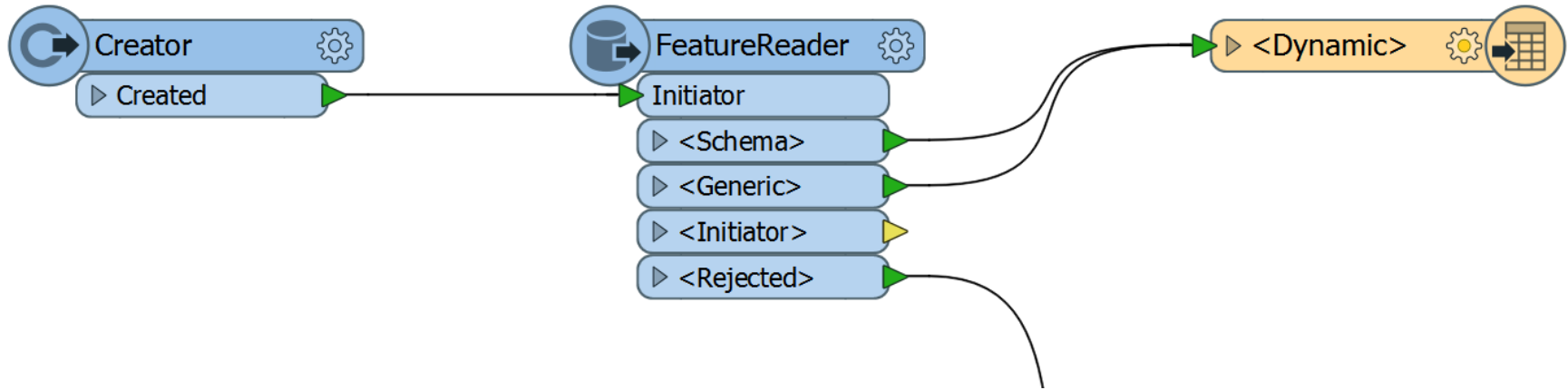
Basic Design

«Repeatable transfer of data»

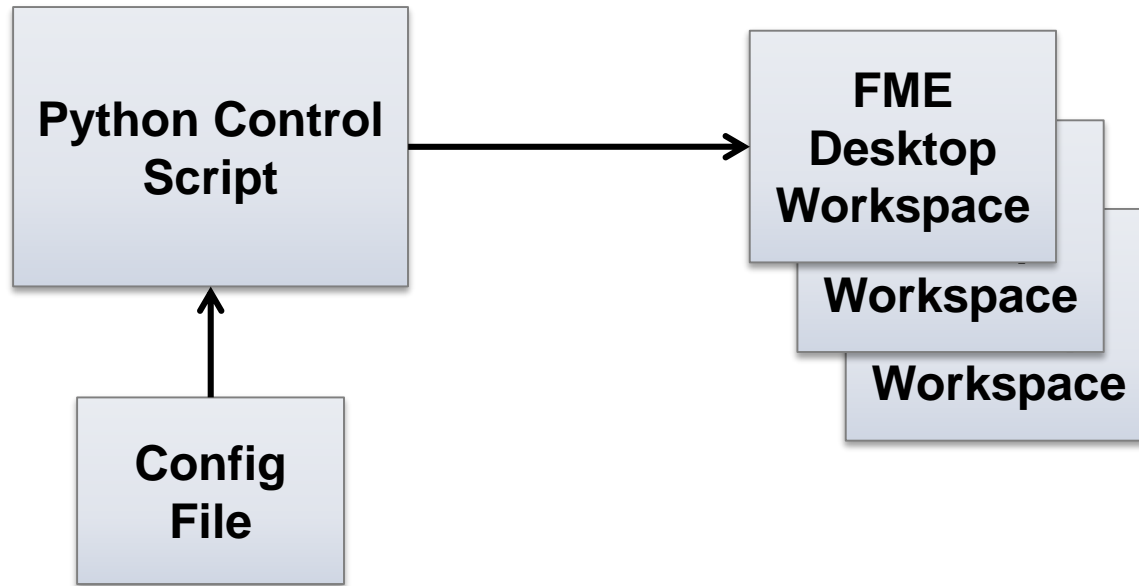


«Repeatable transfer of data»

Better: Generic approach



Controlling and automatization



Two scenarios

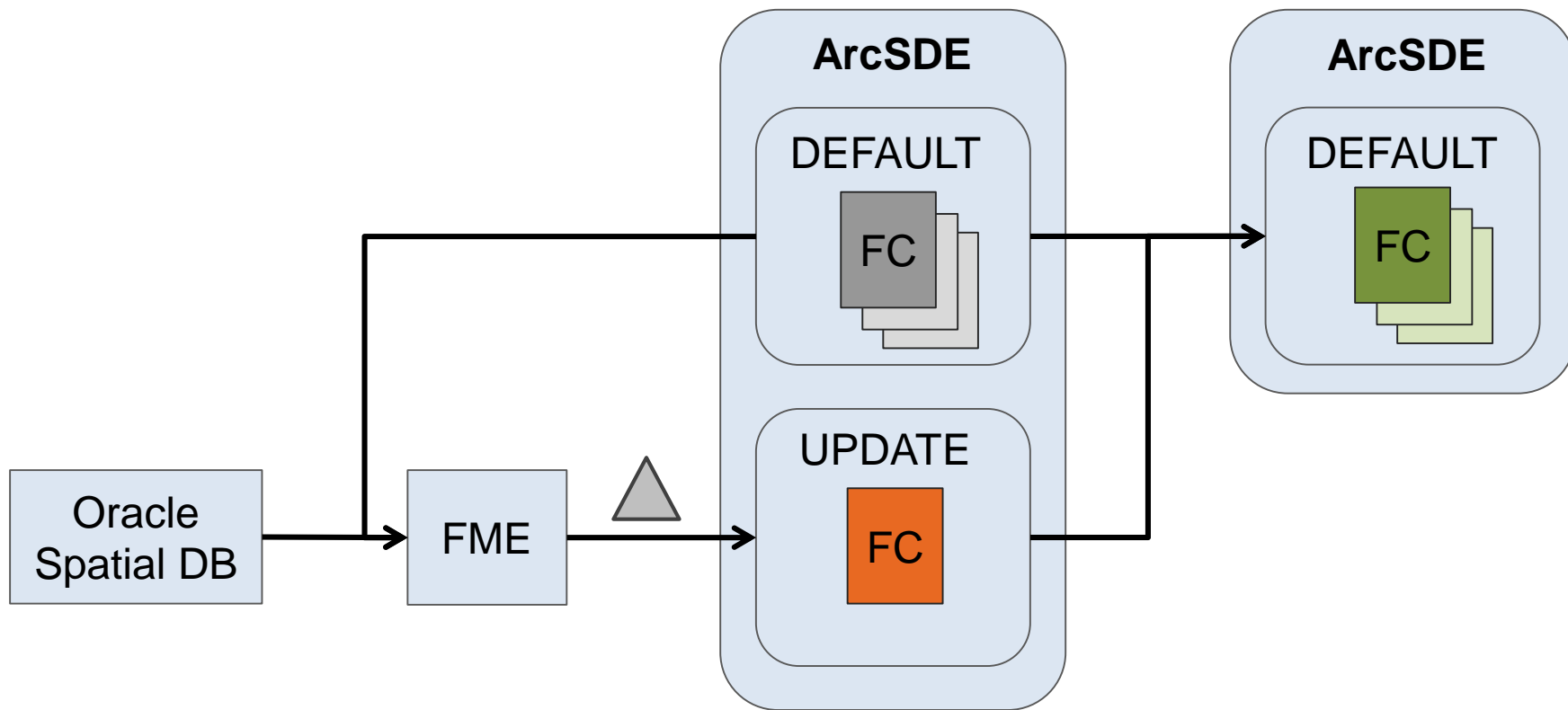
Full Load

- Transfer all records of feature class
- Define schema
- Activate ArcGIS Versioning and Archiving

Increment

- Transfer changes since last run
- Changes are written to «update» version
- Post changes to default version

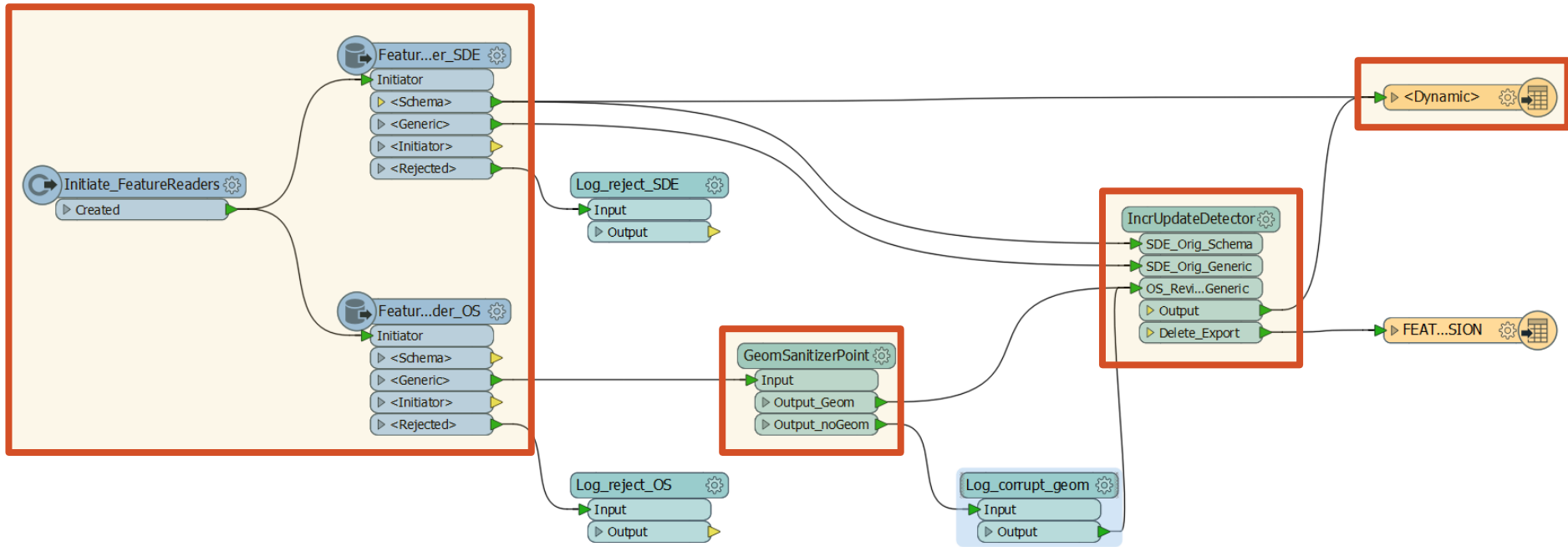
Increment Process



A black and white composite image. In the upper left, a bottle is tilted, pouring a thick, white liquid into a landscape. The landscape features a winding river or path through a valley, with mountains in the background under a cloudy sky. The overall scene is dark and atmospheric.

Generic change detection

Increment-Workspaces



Increment-Workspaces

The screenshot shows the 'Feature Type Properties' dialog box with the 'General' tab selected. The 'General Parameters' section includes the following fields:

- Feature Class or Table Name: `fme_feature_type`
- Table Qualifier: (empty)
- Writer: `<Unused> [GEODATABASE_SDE]`
- Geometry: **From Schema Definition** (highlighted in a red box)

The 'Dynamic Properties' section is checked and expanded, showing a 'Schema Definition' section with a list of geometry types:

- `geodb_point`
- `geodb_polygon`
- `geodb_polyline`
- `geodb_relationship`
- `geodb_simple_edge`
- `geodb_simple_junction`
- `geodb_table`

The 'Schema Definition Name' field is highlighted in a red box and contains the text: **From Schema Definition**
First Feature Defines Geometry Type

Callouts and annotations include:

- A blue callout on the left with a circular arrow icon, containing the text 'Initiate_FeatureReaders' and 'Created'.
- A red-bordered box on the right containing the text '<Dynamic>' with a gear icon.
- A yellow-bordered box on the right containing the text 'FEAT...SION' with a gear icon.

Buttons at the bottom of the dialog include 'Help', 'Apply to...', 'OK', and 'Cancel'.

Increment-Workspaces

The screenshot shows the 'Feature Type Properties' dialog box with the 'Dynamic Properties' section expanded. The table below lists the properties and their values:

fme_format_long_name (string)	Oracle Spatial Object
fme_format_short_name (string)	ORACLE_SPATIAL
fme_geometry{0} (string)	fme_no_geom
fme_geometry{1} (string)	fme_point
fme_geometry{2} (string)	fme_line
fme_geometry{3} (string)	fme_area
fme_geometry{4} (string)	fme_point
fme_geometry{5} (string)	fme_line
fme_geometry{6} (string)	fme_area
fme_geometry{7} (string)	fme_arc
fme_geometry{8} (string)	fme_ellipse
fme_geometry{9} (string)	fme_area
fme_geometry{10} (string)	fme_collection
fme_geometry{11} (string)	fme_surface
fme_geometry{12} (string)	fme_solid
fme_geometry{13} (string)	fme_surface
fme_geometry{14} (string)	fme_solid
fme_schema_handling (string)	schema_only
fme_type (string)	fme_no_geom

At the bottom of the table, there is a checkbox labeled **IFMNULL**.

Annotations in the image include:

- Left side: 'Initiate_FeatureReaders' (with a gear icon) and 'Created' (with a right-pointing arrow) pointing to the 'Dynamic Properties' section.
- Right side: '<Dynamic>' (with a gear icon and a table icon) pointing to the top of the table, and 'FEAT...SION' (with a gear icon and a table icon) pointing to the bottom of the table.

Buttons at the bottom of the dialog include 'Help', 'Apply to...', 'OK', and 'Cancel'.

Increment-Workspaces

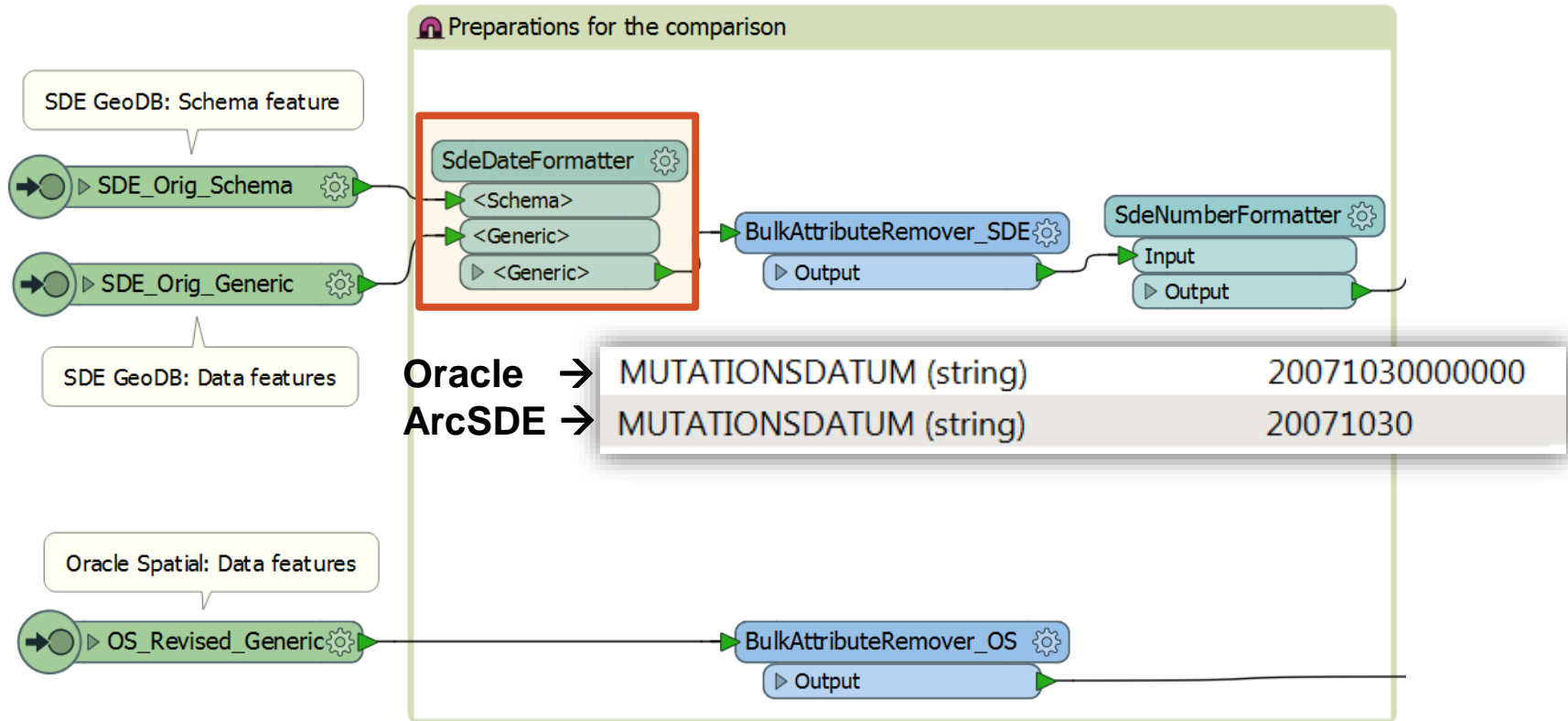
The screenshot displays the 'Feature Type Properties' dialog box in ArcGIS. The 'User Attributes' tab is active, showing a list of attributes for the 'IFMEAggregate' feature type. The 'Dynamic Properties' section is checked, and a list of dynamic properties is shown, including 'fme_format_long_name', 'fme_format_short_name', and 'IFMEAggregate (10 Parts)'. The 'IFMEAggregate' part is expanded, showing ten sub-parts: 'Part 0: IFMEPath (18 Segments)', 'Part 1: IFMEPath (11 Segments)', 'Part 2: IFMELine (7 Coordinates)', 'Part 3: IFMELine (4 Coordinates)', 'Part 4: IFMEPath (3 Segments)', 'Part 5: IFMELine (4 Coordinates)', 'Part 6: IFMEPath (8 Segments)', 'Part 7: IFMELine (2 Coordinates)', 'Part 8: IFMELine (2 Coordinates)', and 'Part 9: IFMEPoint'. The 'Dynamic Properties' section is also expanded, showing 'fme_schema_handling (string)' with a value of 'schema_only' and 'fme_type (string)' with a value of 'fme_no_geom'. The 'IFMENUMUL' attribute is also visible.

Annotations on the image include:

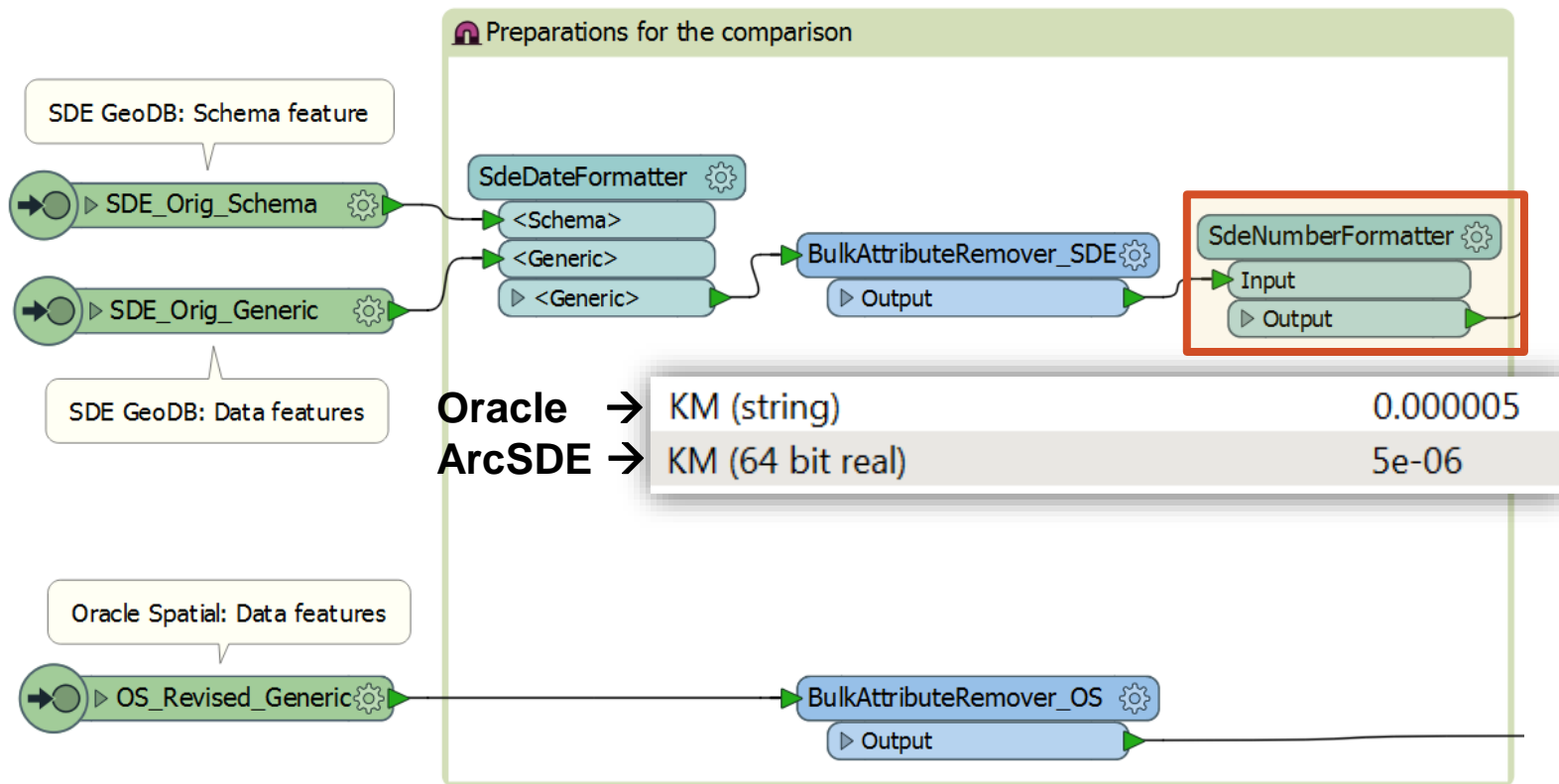
- A blue callout box on the left with a circular arrow icon, containing the text 'Initiate_FeatureReaders' and 'Created'.
- A red-bordered box on the right containing a yellow callout box with a right-pointing arrow and the text '<Dynamic>', next to a gear and a table icon.
- A yellow callout box on the right with a right-pointing arrow and the text 'FEAT...SION', next to a gear and a table icon.

Buttons at the bottom of the dialog include 'Help', 'Apply to...', 'OK', and 'Cancel'.

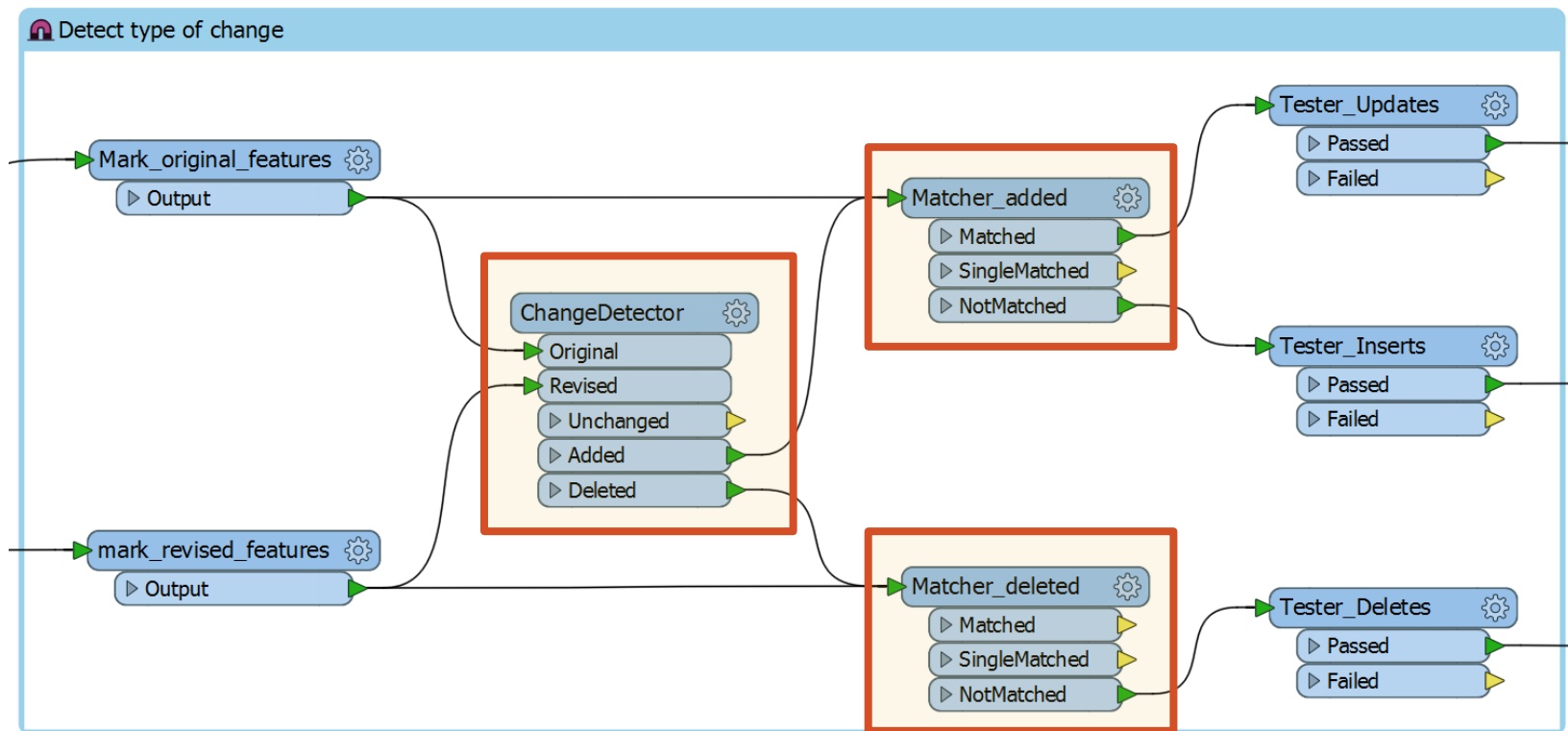
Step 1: Harmonize sources



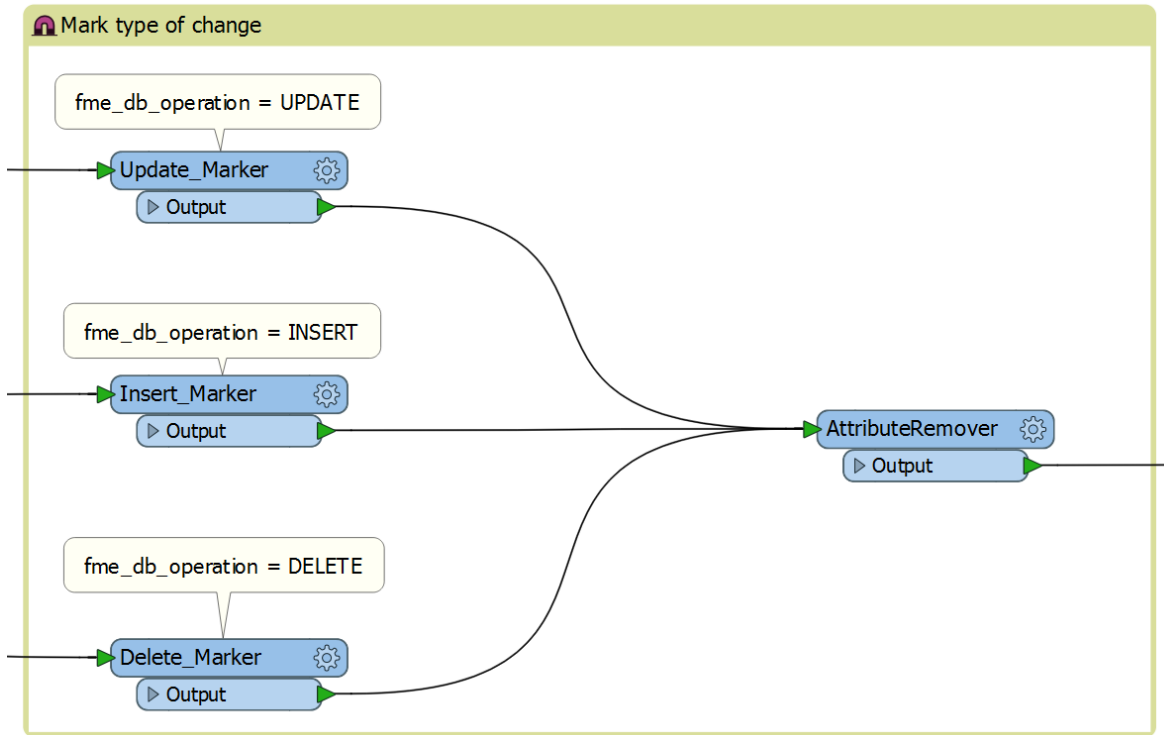
Step 1: Harmonize sources



Step 2: Detect changes



Step 3: Mark changes



Reward of all the efforts...

```
2017-03-14 12:25:07 | INFO: Start rebuilding of indexes.  
2017-03-14 12:25:42 | INFO: Finished rebuilding of indexes.  
2017-03-14 12:25:52 | INFO: Start updating statistics.  
2017-03-14 12:29:32 | INFO: Finished updating statistics.  
2017-03-14 12:29:32 | INFO: Writing start condition value to  
the SFEXP database.  
2017-03-14 12:29:38 | INFO: Status 'READ SUCCESS' successfully  
written to status table of SFEXP.  
2017-03-14 12:29:38 | INFO: Increment process is complete.
```

Take home messages

- Generics worthwhile for large-scale projects
 - Take care of source-specific properties
 - Schema is separately
-

If I had three wishes...

- Add option in ChangeDetector to ignore Format Attributes
- Treat dates as dates, not strings
- Allow linking geometry type of Writer to published parameter





Thanks to...

- Jürg Mannes
- Lukas Schildknecht



Thank you!

Did we spark
your interest?

Any further
questions?

andre.zehnder@ebp.ch

