



WORLD TOUR  
2019

**From site visit to monthly reporting**

**Integrating mobile apps with various business systems**

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Subodh Dhakal, Abley



# PRESENTATION AGENDA

- 1 NCTIR Introduction
- 2 The Problem
- 3 The Solution - FME's Role
- 4 Technical Details
- 5 Examples/Summary

START





# Who are we ?



## North Canterbury Transport Infrastructure Recovery



Programme funded by  
New Zealand Government

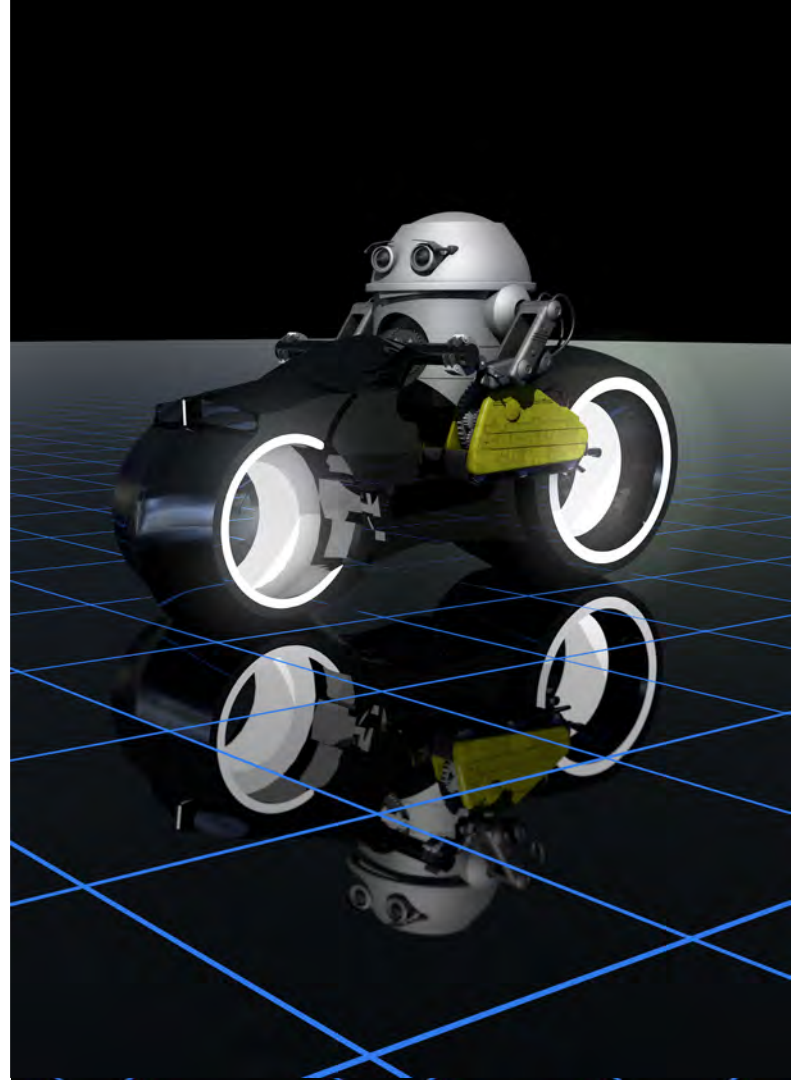
1700+



*“Carving Enduring Connections”*



# NCTIR Teams





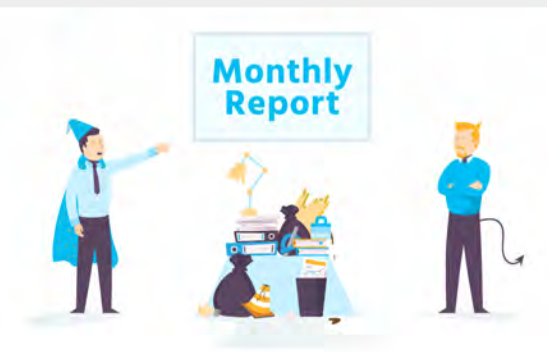
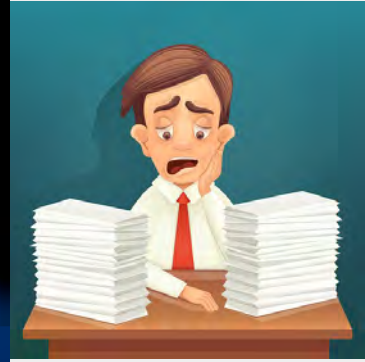
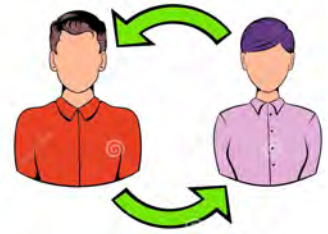


RANK	FEATURES	SCORE
1ST	COLLAPSIBLE BOOKMARKS	000,000
2ND	FRONTAL PLAYS	000,000
3RD	FRONTAL PLAYS	000,000
4TH	HEROSPACE GROUPER	000,000
5TH	LEG FE TERMS	000,000
6TH	USDSM CONTRACT	000,000
7TH	SQL F TELEWORKS	000,000

CONNECT TO MORE DATA AND SYSTEMS. AND MARK HISTORY!

# Challenges

Connect all the teams



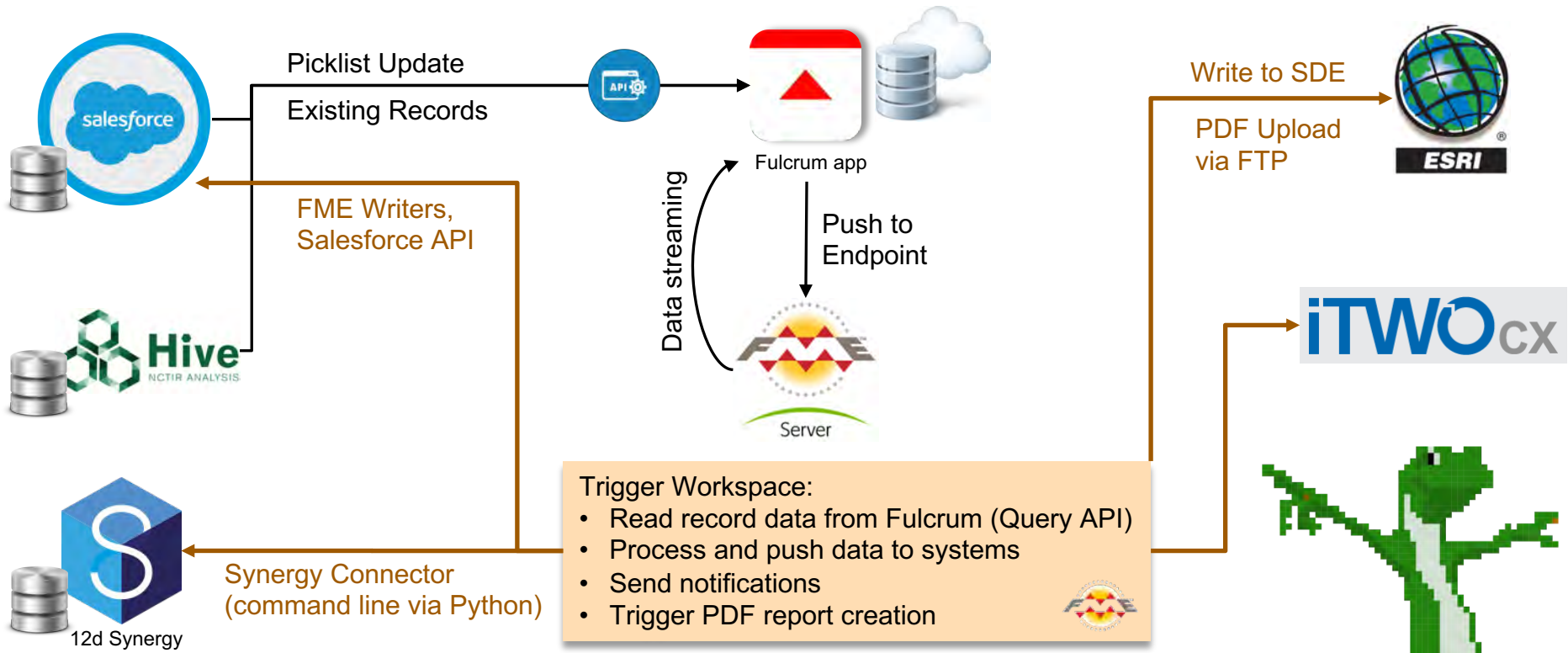
# Existing Systems





# System Integration







Fulcrum API:  
Get Record by ID



Flatten JSON



Map attributes



Write to  
destination  
database



Query new  
record from  
destination



Trigger PDF creation



# Solutions

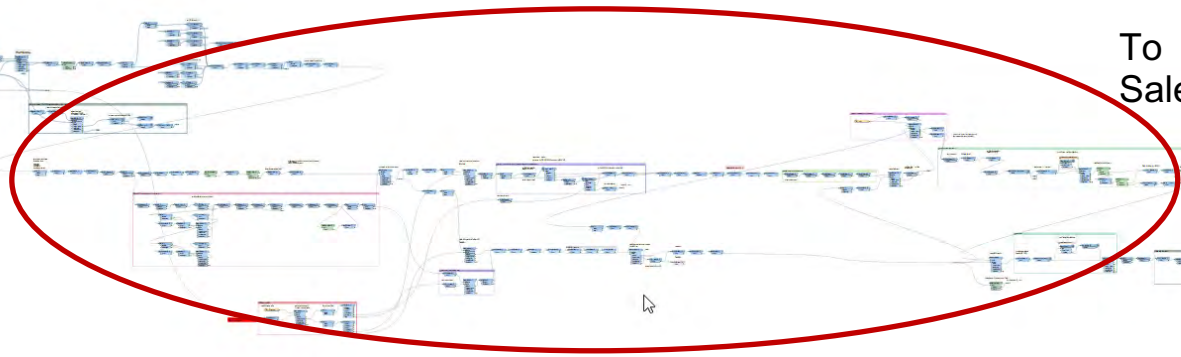
Eg. Workspace  
Constructions Observation

## Key Features:

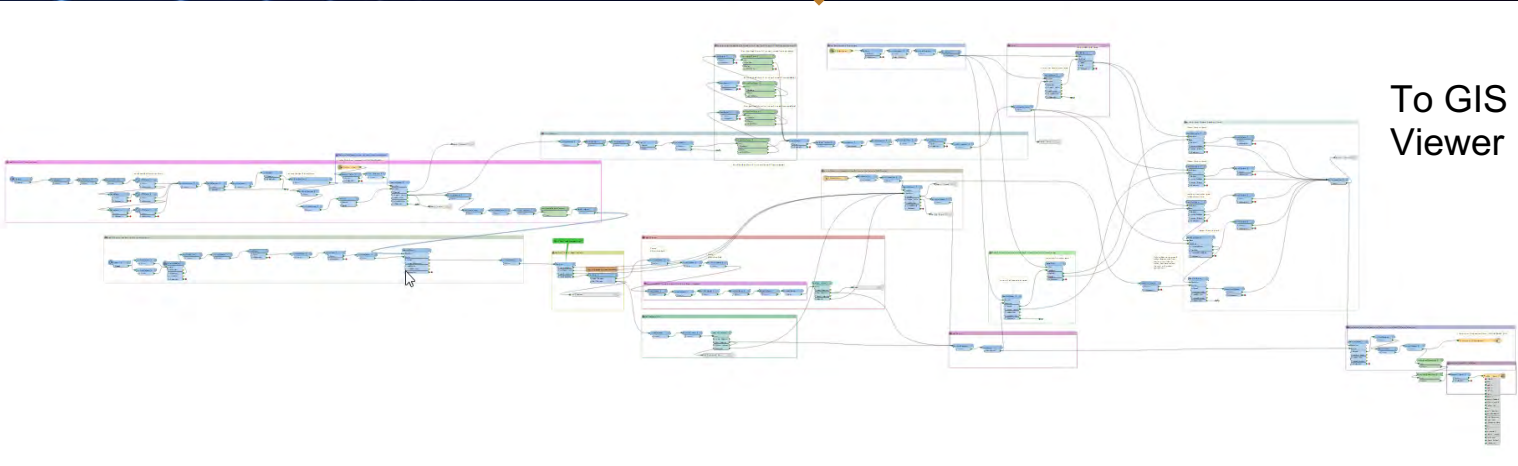
- Fulcrum -----→ Salesforce
- PDF report creation for all record
- Each record (location), PDF report access via GIS viewer
- 5200 + Record
- 40,000 + Photos



To  
Salesforce



To  
GIS  
Viewer



### Construction Observation Report

200173: KKN - Debris Flows, May 22, 2019, Bridge 115b piling rig platform preparation

Search places

Geotech visit? • Yes

Site Location • North

North Site • Rail

Brief Description (Describes record name, please keep it brief) Bridge 115b piling rig platform preparation

Asset Type • Geotechnical

COR Ref: • 15688

Observation Date • May 22, 2019

Observation Time • 15:38

Weather Conditions • Fine or Sunny

COR Issued • May 22, 2019

Observation By (OLD):

Observation By: • Daniel Ashfield

### HTTPCaller Parameters

Transformer Name: HTTPCaller\_8

Request URL: `https://api.fulcrumapp.com/api/v2/query/?token=${TOKEN}&format=json`

HTTP Method: GET

Query String Parameters

Name	Value
q	<code>SELECT * FROM "@Value_TABLE_NAME" WHERE _record_id = '\${MAIN_RECORD_ID}'</code>

Headers

Name	Value
format	json

Body

Response

Save Response Body To: Attribute

Response Body Attribute: `_response_body`

Response Body Encoding: <Auto Detect from HTTP Headers> (auto-detect)

Save Response Body To File

Response Headers and Status

List Attribute for Response Headers: `_headers`

Status Code Attribute: `_http_status_code`

Error Attribute: `_error`

HTTP Client Options

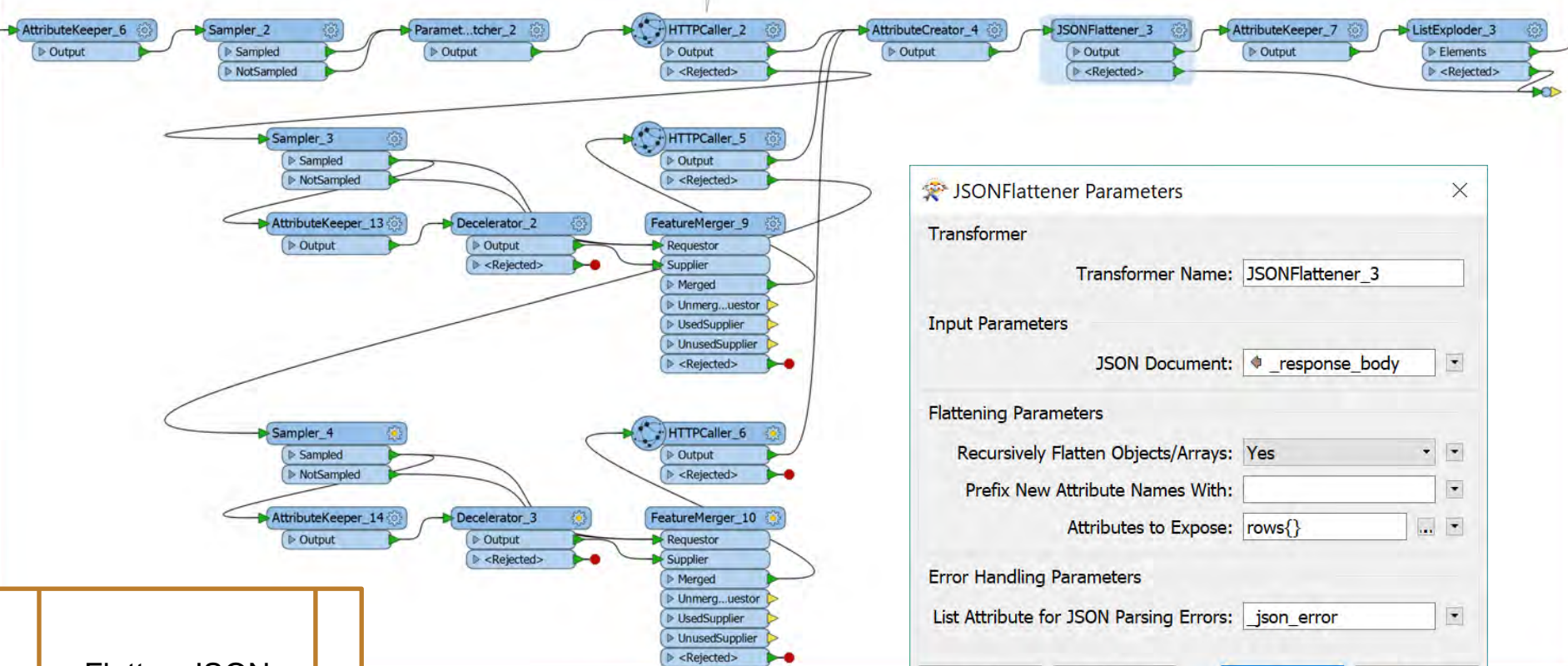
Use Authentication

Help Defaults OK Cancel

Fulcrum API:  
Get Record by ID



get all completed inspection sub-forms



### JSONFlattener Parameters

Transformer

Transformer Name:

Input Parameters

JSON Document:

Flattening Parameters

Recursively Flatten Objects/Arrays:

Prefix New Attribute Names With:

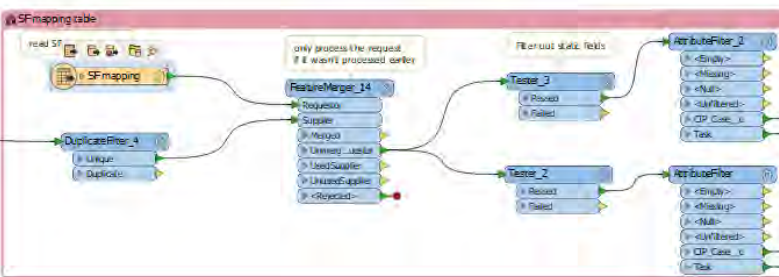
Attributes to Expose:

Error Handling Parameters

List Attribute for JSON Parsing Errors:

Help Defaults OK Cancel

Flatten JSON

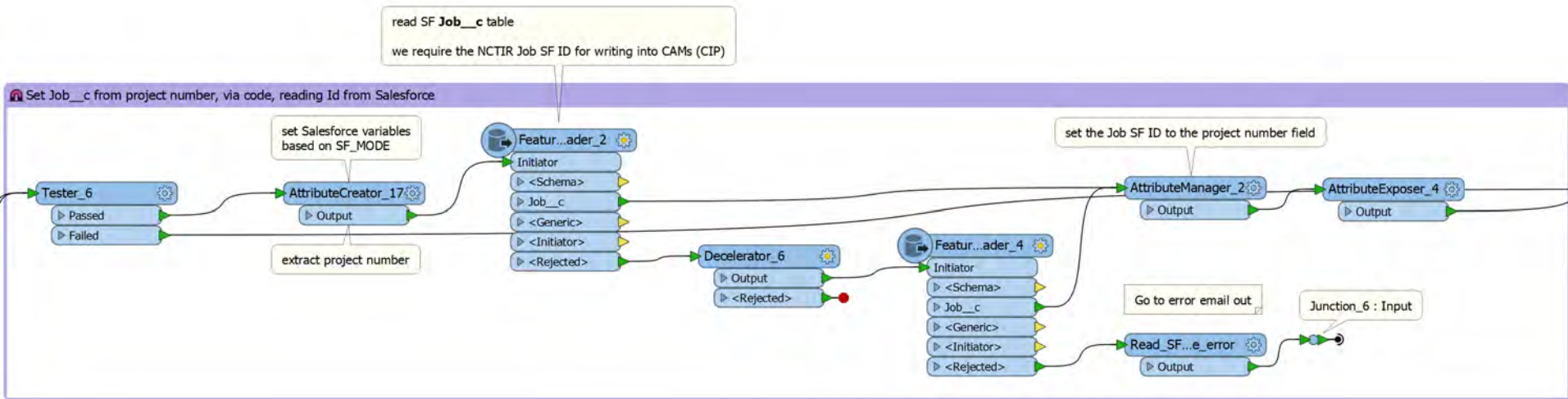


ion Log  
 y to find a DYNAMIC plugin for reader named 'SALESFORCE'  
 FI version of module 'SALESFORCE' matches current internal version (3.8 20161222)  
 ing reader for format: Salesforce  
 al version (3.8 20161222)

	A	B	C	D	E	F	G	
1	Fulcrum	Fulcrum field	Fulcrum field type	Fulcrum Label	SF object	SF Field	Field Action	Apply
14	COR	brief_description	TextField	Brief Description (Describes record)	CIP_Case__c			
15	COR	project_name	TextField	Project Name	CIP_Case__c			
16	COR	asset_type	ChoiceField	Asset Type				
17	COR	oor_ref	TextField	COR Ref:	CIP_Case__c			
18	COR	observation_date	DateTimeField	Observation Date	CIP_Case__c	Date_the_event_was_reported__c	write	
19	COR	observation_date	DateTimeField	Observation Date	CIP_Case__c	Date_the_event_occurred__c	write	
20	COR	observation_time	TimeField	Observation Time				
21	COR	weather	ChoiceField	Weather Conditions				
22	COR	next_high_tide	TimeField	Next High Tide				
23	COR	oor_issued	DateTimeField	COR Issued				
24	COR	observation_by	TextField	Observation By:	CIP_Case__c			
25	COR	delivery_team_representative	TextField	Construction Team Representative				
26	COR	hidden_chainage	ChoiceField	Hidden_Chainage				
27	COR	ramm_id	TextField	RAMM ID				
28	COR	ramm_rs	TextField	Actual Rail Chainage				
29	COR	ramm_chainage	TextField	Closest Road Chainage				
30	COR	site_locationchainage	TextField	Site Location/Chainage				
31	COR	health_and_safety_observation	YesNoField	Health and Safety Observations				
32	COR	hs_compliance	TextField	Comments				
33	COR	nature_of_observation	ChoiceField	Nature of Observation	CIP_Case__c			
34	COR	work_type	ChoiceField	Work Type	CIP_Case__c			
35	COR	documentation_involved	TextField	Documentation Involved:				
36	COR	plant_equipment_operating	TextField	Plant & Equipment Operating:				
37	COR	extent_of_observations_work	TextField	Extent of observations/ Work Status:				
38	COR	observation_summary	TextField	Observation Summary:	CIP_Case__c			
39	COR	general_site_inspection_photo	PhotoField	General Site Inspection Photos				
40	COR	general_site_inspection_video	VideoField	General Site Inspection Videos				
41	COR	construction_actions_required	YesNoField	Construction Actions Required?	CIP_Case__c			
42	COR	construction_actions	Repeatable	Construction Actions				
43	COR	geotech_activities_occurring	ChoiceField	Geotech Activities Occurring on Site				
44	COR	designers_email	ChoiceField	Select Designers to email. The email will be automatically generated, sent and have the relevant report attached				
45	COR	when_you_have_filled_out_all	Label	When you have filled out all of the required fields and are ready to submit, change the record complete option below to yes...				
46	COR	complete	YesNoField	Is this Record Complete?	CIP_Case__c	Category_Group_NZ__c	write	Quick
47	COR				CIP_Case__c	Close_Case__c	write	true
48	COR				CIP_Case__c	Was_a_Life_Saving_Rule_Breached	write	No
49	COR				CIP_Case__c	Risk_potential_consequence__c	write	Signifi
50	COR				CIP_Case__c	Risk_likelihood__c	write	Rare
51	COR				CIP_Case__c	Is_Subject_Environment__c	write	false
52	COR				CIP_Case__c	Source_NZ__c	write	Audit
53	COR				CIP_Case__c	What_happened__c	write	Const
54	COR				Task	Subject	write	COR
55	COR				CIP_Case__c	Is_Subject_Safety__c	write	false
56	COR				CIP_Case__c	Is_Subject_Quality__c	write	true
57	COR				CIP_Case__c	Integration_Source__c	write	Const
58	COR				CIP_Case__c	NCTR_Team__c	write	Const
59	COR	due_date_for_construction_ac	DateTimeField	Due date for construction action	Task	ActivityDate	write	Design

Map attributes





FeatureReader Parameters

Transformer  
Transformer Name: FeatureReader\_2

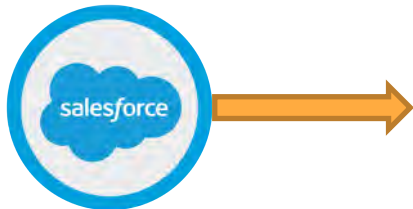
Reading  
Reader  
Format: Salesforce  
Dataset: \*\_SF\_URL  
Parameters... Coord. System: Unknown

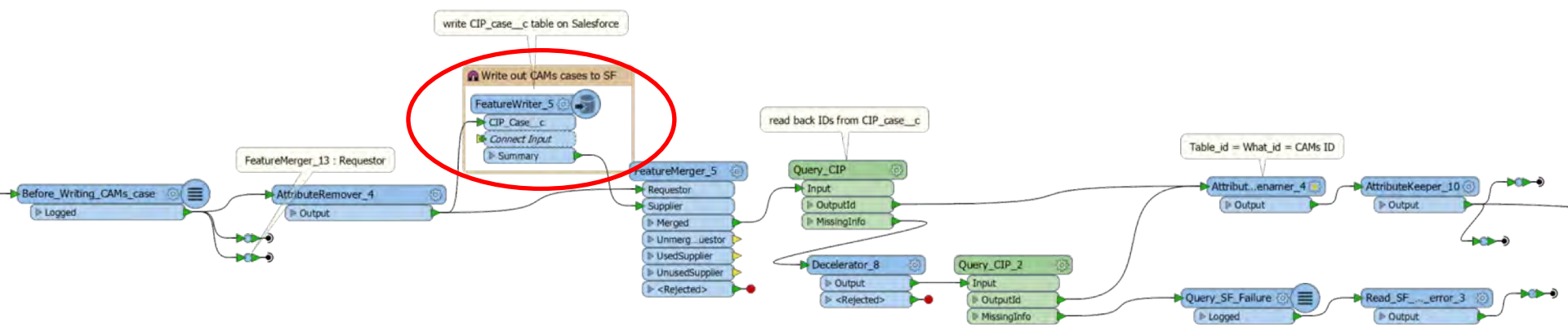
Constraints  
Feature Types to Read: Job\_\_c  
WHERE Clause: Code\_\_c = '@Value(projectNo)'

Max Features to Read:

Schema/Data Features  
 Enable Cache

Read from  
Salesforce





FeatureWriter Parameters

Transformer Name: FeatureWriter\_5

Format: Salesforce

Dataset: SF\_URL

Coord. System: Same as source

Feature Types

CIP\_Case\_c

Object Name: CIP\_Case\_c

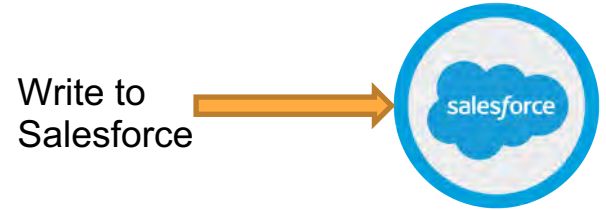
Schema Sources: login.salesforce [SALESFORCE] - 2

Schema Definition Name: Default from Object name above

Writer Mode: UPSERT

UPSERT Key Field: Id

Write to destination database









### FMEServerJobSubmitter Parameters

Transformer Name: FMEServerJobSubmitter

Connection: [Dropdown]

Embed Connection Parameters

FME Server URL: https://fme.nctir.com

Username: SchefferE

Password: [Masked]

Status: **Not Connected**

Job Parameters

Repository: Scheduled

Workspace: Create Construction Observation Reports.fmw

Wait for Job to Complete: No

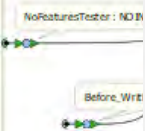
Parameter	Value
<input type="checkbox"/> RUN_TYPE	<input type="checkbox"/> instantly
<input type="checkbox"/> _REPORT_FOLDER	<input type="checkbox"/> \\nzchcglopfreg1\ker\GIS Transfer\Fulcrum\Apps\Construction Observation Report\Reports
<input type="checkbox"/> TABLE_NAME	<input type="checkbox"/> Construction Observation Report
<input type="checkbox"/> SUB_TABLE_NAME	<input type="checkbox"/> construction_actions
<input type="checkbox"/> DAYS_RETRO	<input type="checkbox"/> 1
<input type="checkbox"/> MAIN_RECORD_ID	<input type="checkbox"/> \$(MAIN_RECORD_ID)
<input type="checkbox"/> TOKEN	<input type="checkbox"/> \$(TOKEN)
<input type="checkbox"/> WEBHOOK_ID	<input type="checkbox"/> fulcrum_webhook_id
<input type="checkbox"/> SF_CAMs_ID	<input checked="" type="checkbox"/> cams_id
<input type="checkbox"/> SF_MODE	<input type="checkbox"/> P

Advanced

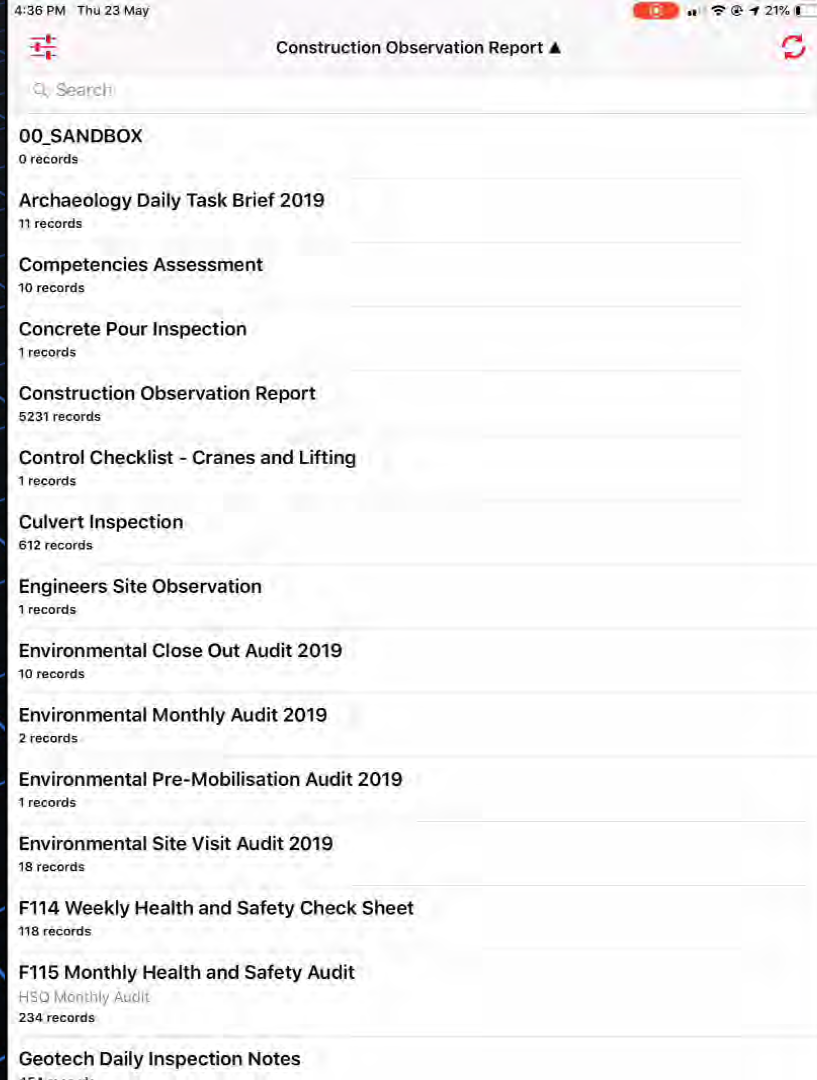
Help Defaults

OK Cancel

write logs and create rep



Trigger PDF creation



Fulcrum (iPad)



**Fulcrum** Construction Observation Report

Search your data... 5237 records

Download Data

**Filter Data**

**Record Updated**

- All
- Today
- Yesterday
- Last 7 days
- Last 30 days
- This Month
- Last Month
- Specific Range

Start date... End date...

**Status**

- Incomplete
- Complete
- Complete with Actions

**Assignment**

Record ID	Status	Updated	Assigned	Updated By	Project	Brief Description (Describes record name, please keep it brief)
d6493fe4-1898-47ce-abab-b7c13c358ff7	Incomplete	5/24/2019, 10:31:55 AM		Iain Murch	200125: Secondary Slips - Kaikoura North - Slip Clearance And Stabilisation Works	Temporary works to stabilise boulder
952c797d-736c-4803-83e9-263934b579a5	Complete	5/24/2019, 7:23:34 AM		Kevin Wang	200259: NZTA - Clarence River Bridge - Strengthening Of The Remaining Piers	Pier E Excavation
fd2a138f-79ab-4214-b1f2-3ccac2a81f56	Complete with Actions	5/23/2019, 5:21:57 PM		Lawrence Elliot	300201: SH1 Improvement - South - Hikurangi I Safe Stopping Area	
5f25f60a-3ba6-45dd-9a81-e82f6e440f3f	Complete with Actions	5/23/2019, 5:20:12 PM		Lawrence Elliot	300105: SH1 Improvement - Central - Informal Stopping Areas	Central informal stopping areas rock bollards
6a75314b-4c9d-40ae-afa0-d3db3bfd7a66	Complete with	5/23/2019, 5:04:46 PM		Emma Winthrop	200001: KKN - Slip 1a - Slip Clearance & Stabilisation Works	Build bridges
a57ef107-6e10-4d4e-8278-558fddcca102	Complete	5/23/2019, 4:21:05 PM		Telfon Matthews	300302: SH1 Improvement - North - Okiwī Bay Safe Stopping Area	Earthworks update



Fulcrum app

Push to  
Endpoint



**Webhook – guaranteed delivery**  
(repeat POST if FME Server not responding)



vs.

**FME Server – Job Queue**  
(not responding if no free engine)

logfile



PostgreSQL





Fulcrum app

Push to  
Endpoint



## PostgreSQL logging

- Avoid duplicate processing
- Avoid clashing
- Allows simultaneous read/write access
  
- Overnight process: pick up any failed runs



PostgreSQL





Fulcrum API:  
Get Record by ID



Flatten JSON



Fulcrum API:  
Photos & Videos



Create Map



HTML Template:  
Create PDF



Upload PDF  
Email PDF



report layout.htm - Word

FILE HOME INSERT DESIGN PAGE LAYOUT REFERENCES MAILINGS REVIEW VIEW DEVELOPER 12d Synergy SCHEFFLER, Ekkehard

Calibri (Body) - 11

AaBbCcDd AaBbCcDd AaBbCc AaBbCcDd AaBbCcDd AaBbCcDd AaBbCcDd AaBbCcDd AaBbCcDd

Normal No Spac... Heading 1 Heading 2 Title Subtitle Subtle Em...

@Value(html\_header)

## Slope Movement Observation Report

Geotech Inspector	@Value(inspector)
Closest Road Chainage	@Value(_road_chainage)
Closest Rail Chainage	@Value(_rail_chainage)
Report emailed to	@Value(email_recipient)
	@Value(

@Value(\_kiwirail\_callout)

@Value(\_slope\_event\_details)

25 WORDS ENGLISH (NEW ZEALAND)

```

0091 <td colspan="2" style="text-align:center;">Slope Movement Observation Report
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```

**NCTIR**  
New Zealand Civil Transport Infrastructure Research Centre

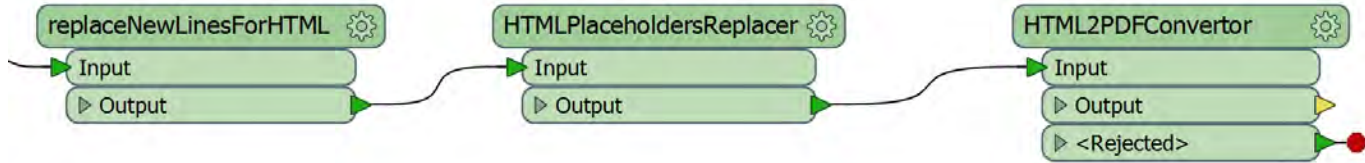
Slope Movement Observation Report

Date: 06/06/2016

Geotech Inspector: Mark Tait  
 Closest Road Chainage: 1573.000000 (based on markers, 1573.000000 given by user)  
 Closest Rail Chainage: 1771.0000  
 Report emailed to: m.tait@nctir.co.nz; s.ahmed@nctir.co.nz; s.ahmed@nctir.co.nz; p.hart@nctir.co.nz; p.hart@nctir.co.nz; s.ahmed@nctir.co.nz; s.ahmed@nctir.co.nz; s.ahmed@nctir.co.nz

Slope Event Details	
NCTIR Site ID	1560
Site Location	South
Site Name	SH1573
Date	05 May 2016
Time	10:00:00
Event Type	Rockfall - Single block
Source Material	Claystone (shaly, flinty) / sandstone (interbedded)
Spore / Age at Source	Natural source
Total Volume of Fallen Material	~1700
Maximum Block Size	1.5 x 1.5 x 1.5m
Average Block Size	0.3 - 0.5m
Recycled Material	No
Observed	No
Is This Area Covered by the Barrier?	No - With provision of Trees
Occurrence Date	Natural release
Trigger	No
Protection Measures Present	Yes
Type of Protection Present	None
Performance of Protection Measure	Debris stopped by gradient
Monitoring / Fence Present	No
Fence Reported	No
Alarm Triggered	No
Footprint Impact of Debris	Controlled release of material / control
Debris Location	No
Recycled Impact on Equipment or Personnel	No
Recycled Material	No
Other Relevant Information	A single 400mm diameter concrete block fell into the 100% fence. Some discussion of debris release / control of the fence is through of just a 100% fence. Just to the left of post a block had been in reality on the top of the 100% fence. Debris released, or delayed or otherwise weather affected formerly lost work.
Actions Taken	Recommended monitoring





@Value(html\_header)

## Slope Movement Observation Report

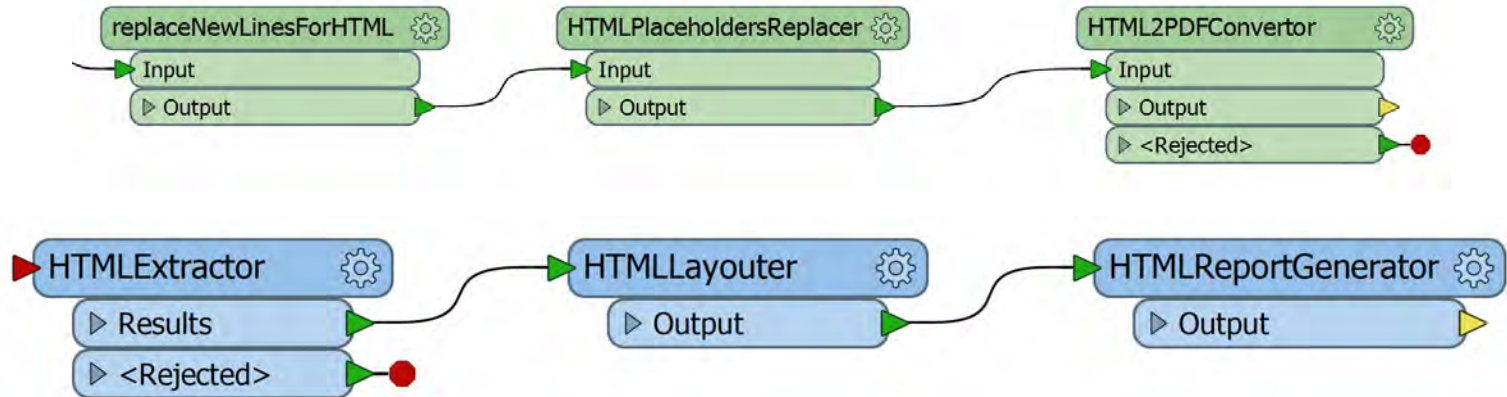
		@Value(_record_id)
<b>Geotech Inspector</b>	@Value(inspector)	
<b>Closest Road Chainage</b>	@Value(_road_chainage_updated)	
<b>Closest Rail Chainage</b>	@Value(_rail_chainage_updated)	
<b>Report emailed to</b>	@Value(email_recipient_all)	
	@Value(_overview_map)	

@Value(\_kiwirail\_callout)

@Value(\_slope\_event\_details)



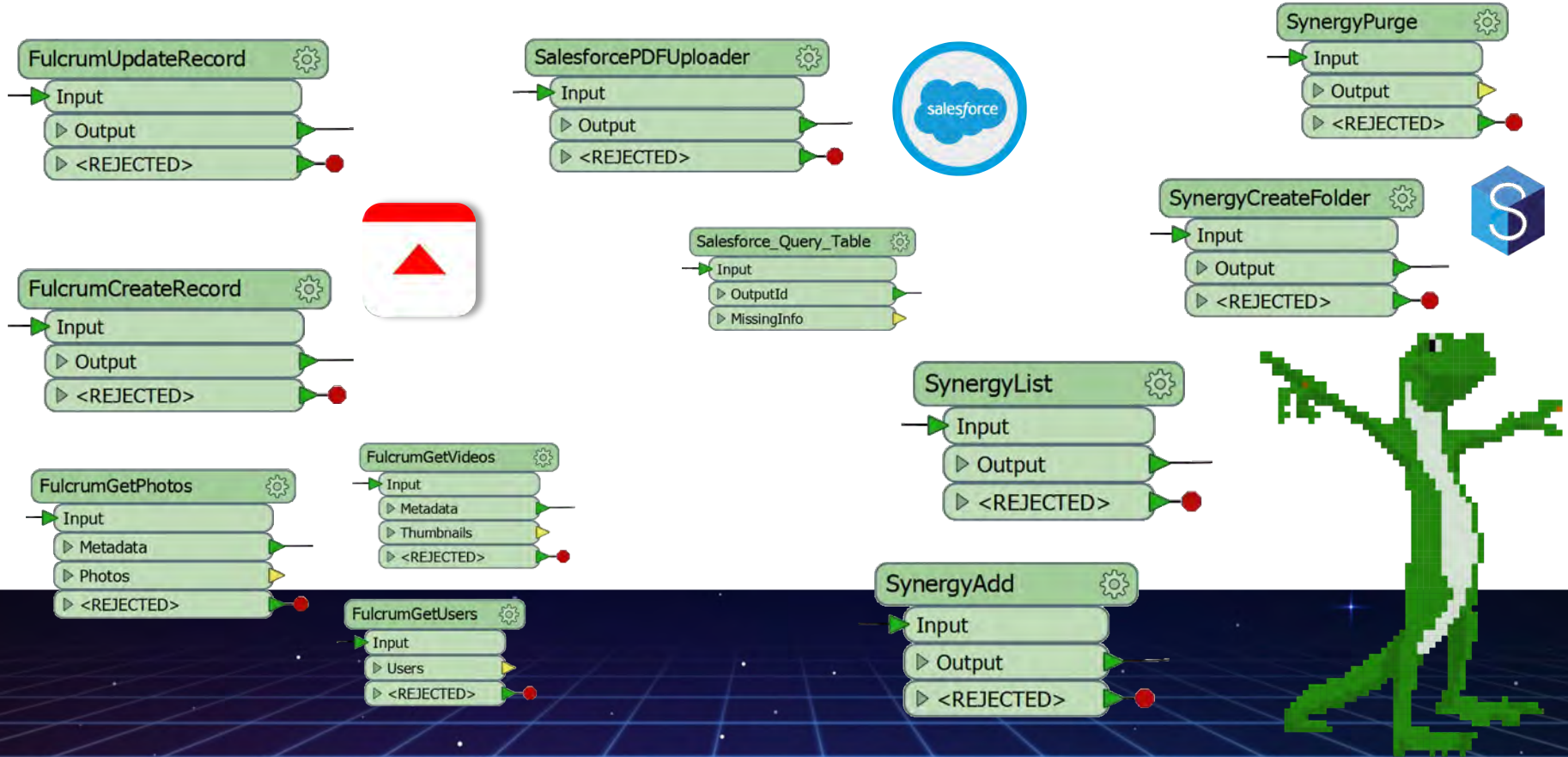


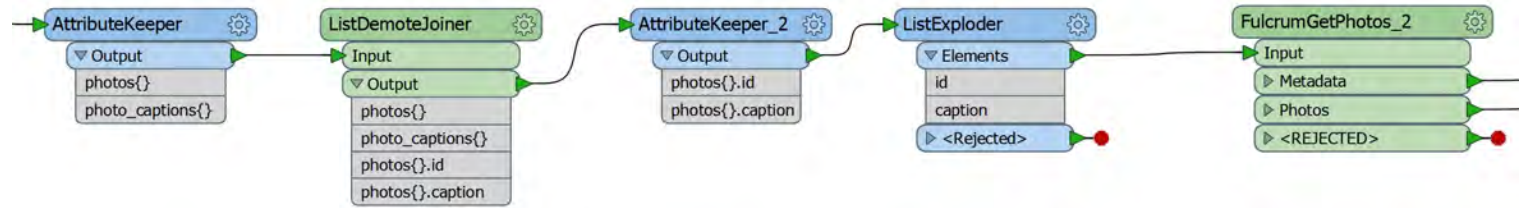


From FME 2018



# Custom Transformers





photos{  
photo\_captions{

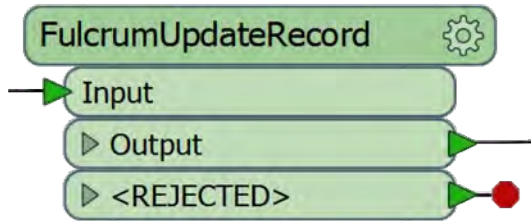


photos{}.id  
photos{}.caption



id  
caption





## Best Practice

- Handle all errors
- Don't drop features or attributes
- **<REJECTED> port**
- Avoid attribute name clashes
- Expose script parameters
- Place scripts into Custom Transformers
- Avoid *FME\_MacroValues['TRANSF\_PARAM']*
- Careful with Python Function naming
- ...?



**Reporting at NCTIR**



Find address or place



Scale bar: 6km  
Coordinates: 378,786.590 700,224.210 Meters

Layer List

- Fulcrum Inspection ...
- Road Culvert Inspection ...
- Slope Movement Observations ...
- MNL Culvert Inspection ...
- Construction Observations ...
- All Other Values
- AR
- BR
- EL
- GE
- GT
- LD
- RD
- RL
- RR
- RW
- ST
- SW
- TU
- KiwiRail Call Out ...
- Survey ...
- Specific mean annual low flow (NIWA) ...
- Seven-day mean annual low flow (NIWA) ...



# THANK YOU!

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