

A nighttime photograph of a city street, likely in London, featuring a stone building on the left and a street sign for 'Lambeth Bridge'. The scene is illuminated by streetlights and traffic lights, with long, colorful light trails in red, blue, and yellow streaking across the frame. A large white circle is overlaid in the center, containing the title and author information.

DATA & CONTENT: EFFICIENCY GAINS THROUGH MODEL DRIVEN APPROACH

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OVERVIEW



CONSISTENCY
IS 



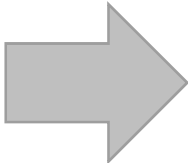
HISTORY OF MODELLING AND IMPLEMENTATION IN THE OS



Product Management Team

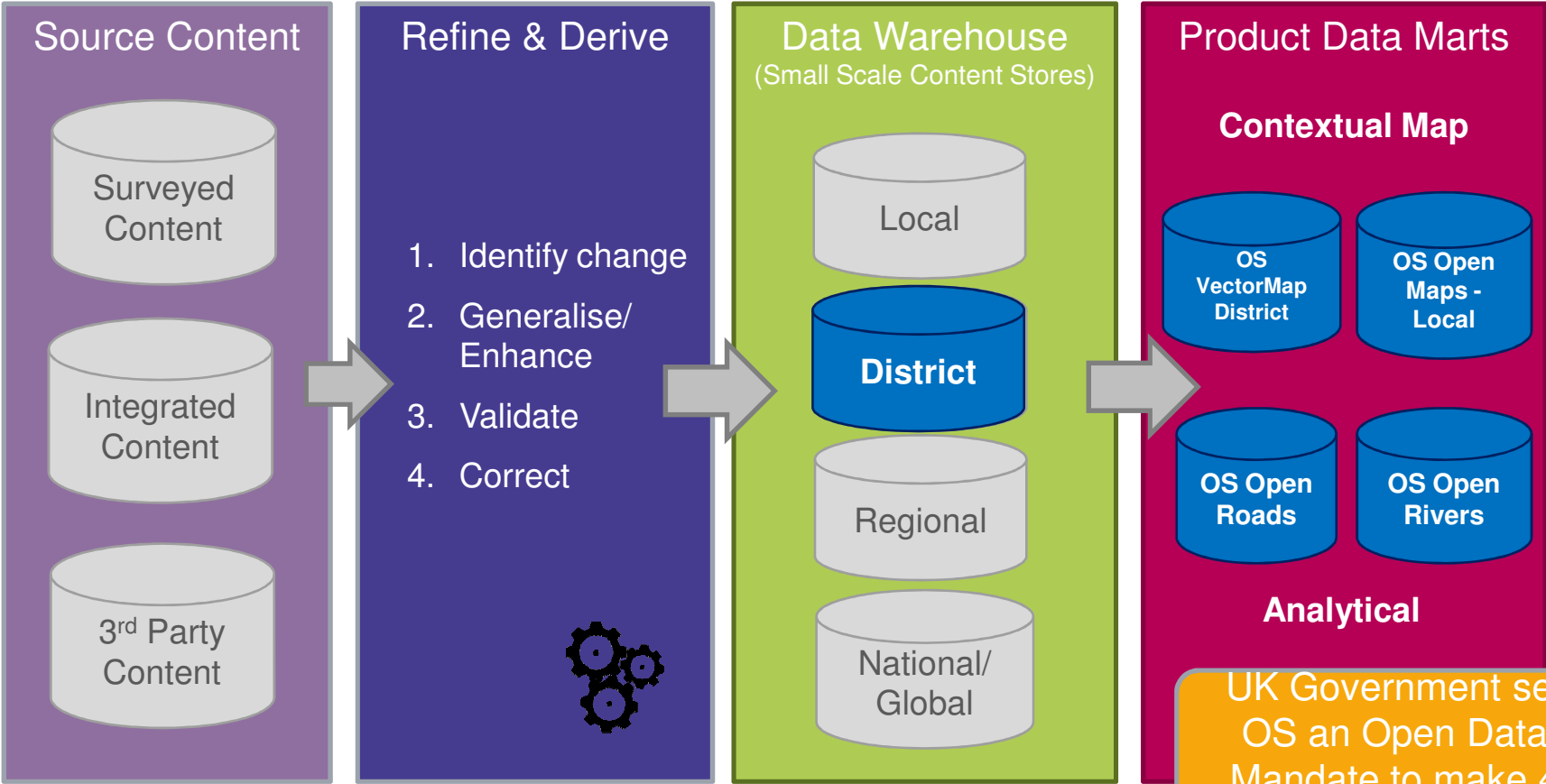


Logical model



Manually generate implementation schema

EXAMPLE: IMPROVING DATA MODELLING CONSISTENCY: SMALL SCALE CONTENT GENERALISATION (GENIE)

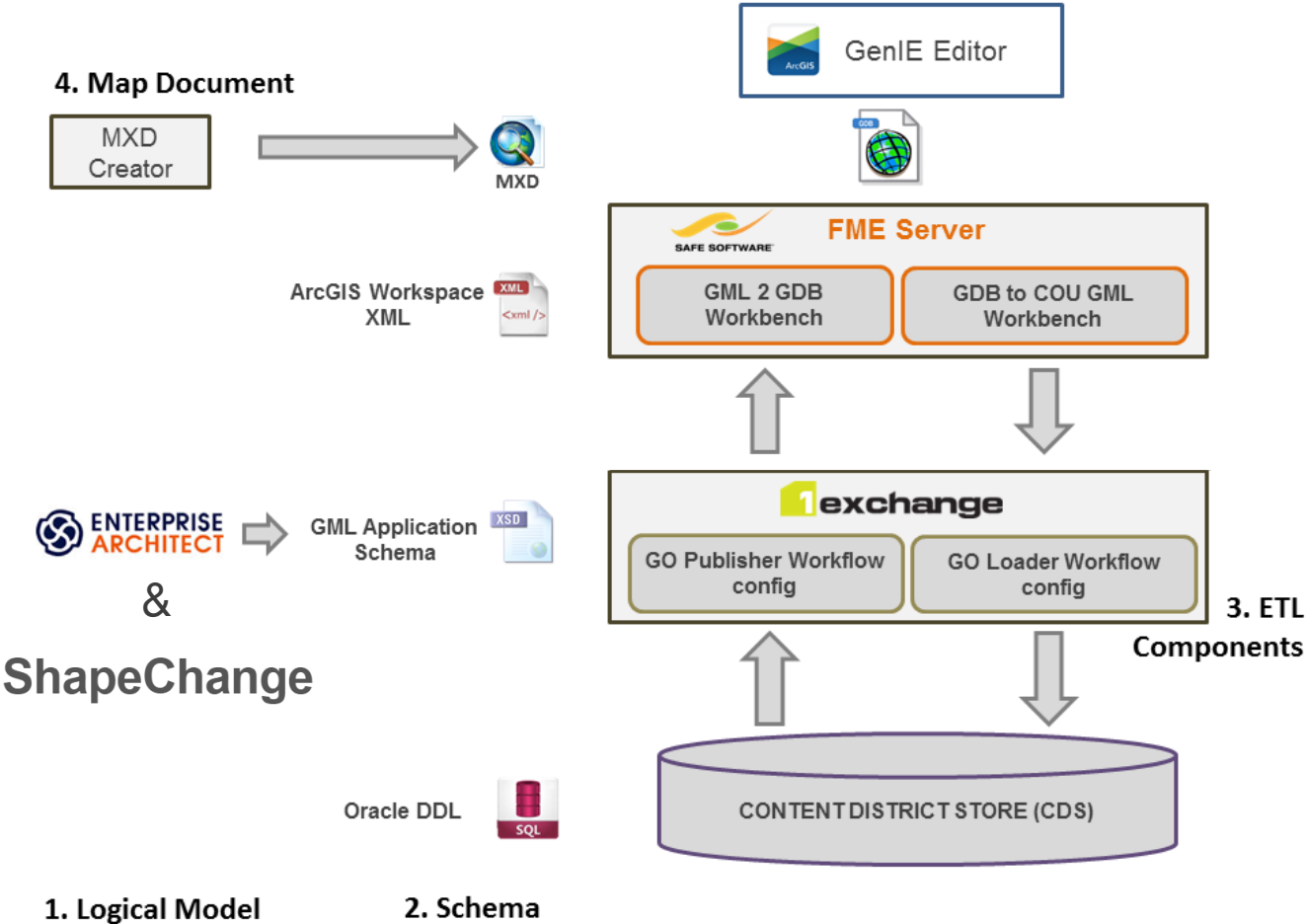


Single data model for all
small scale content
stores

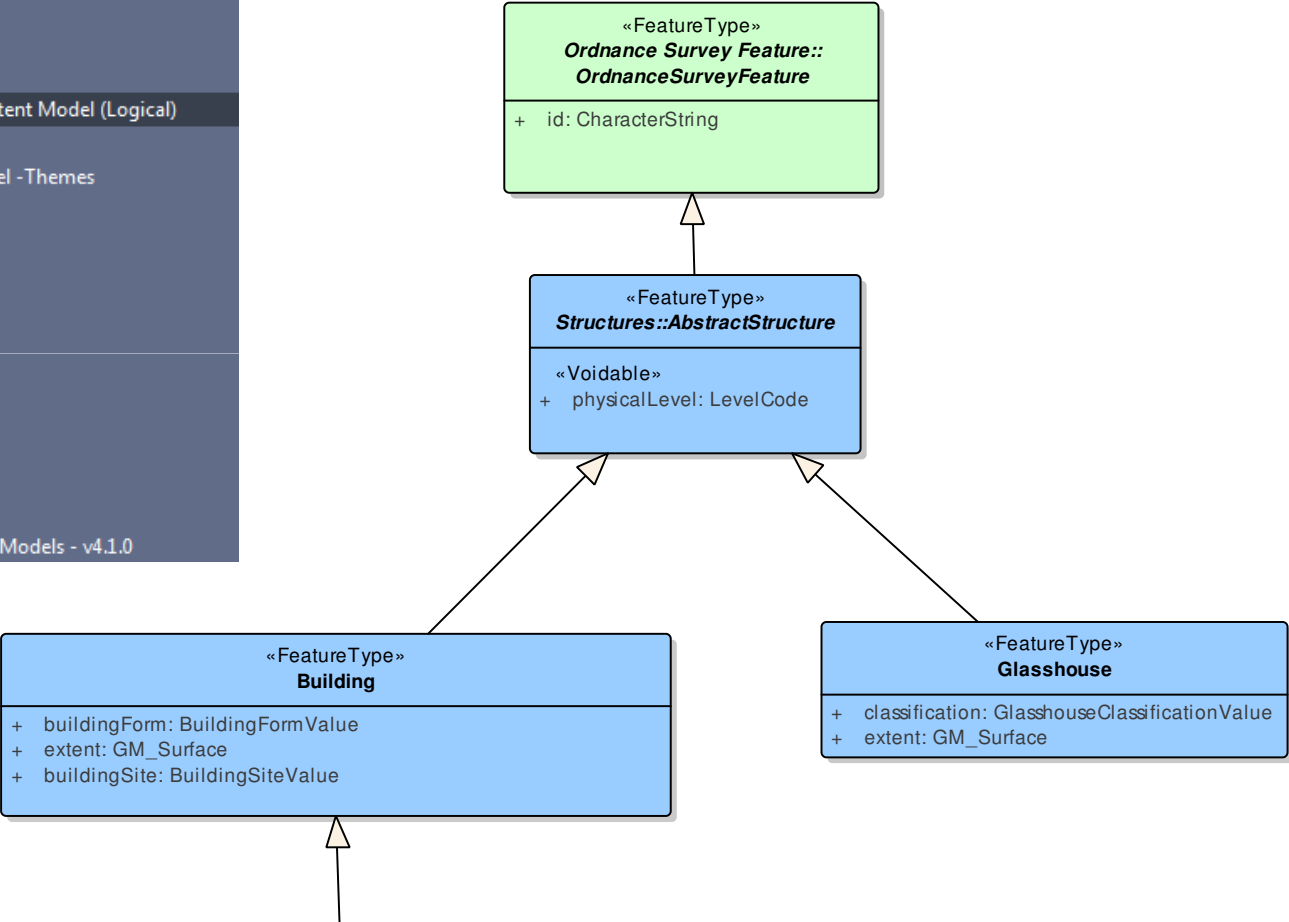
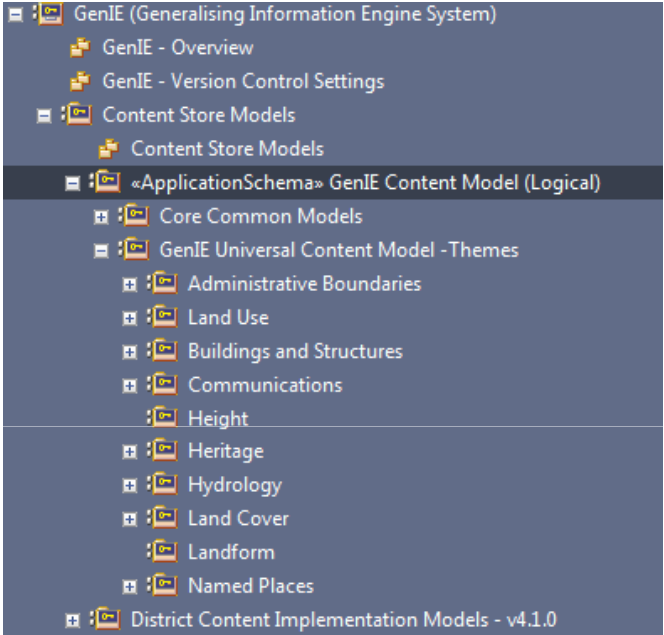
UK Government set OS an Open Data Mandate to make 4 new products available by March 2015

SEMI AUTOMATING SCHEMA DEVELOPMENT: GENIE

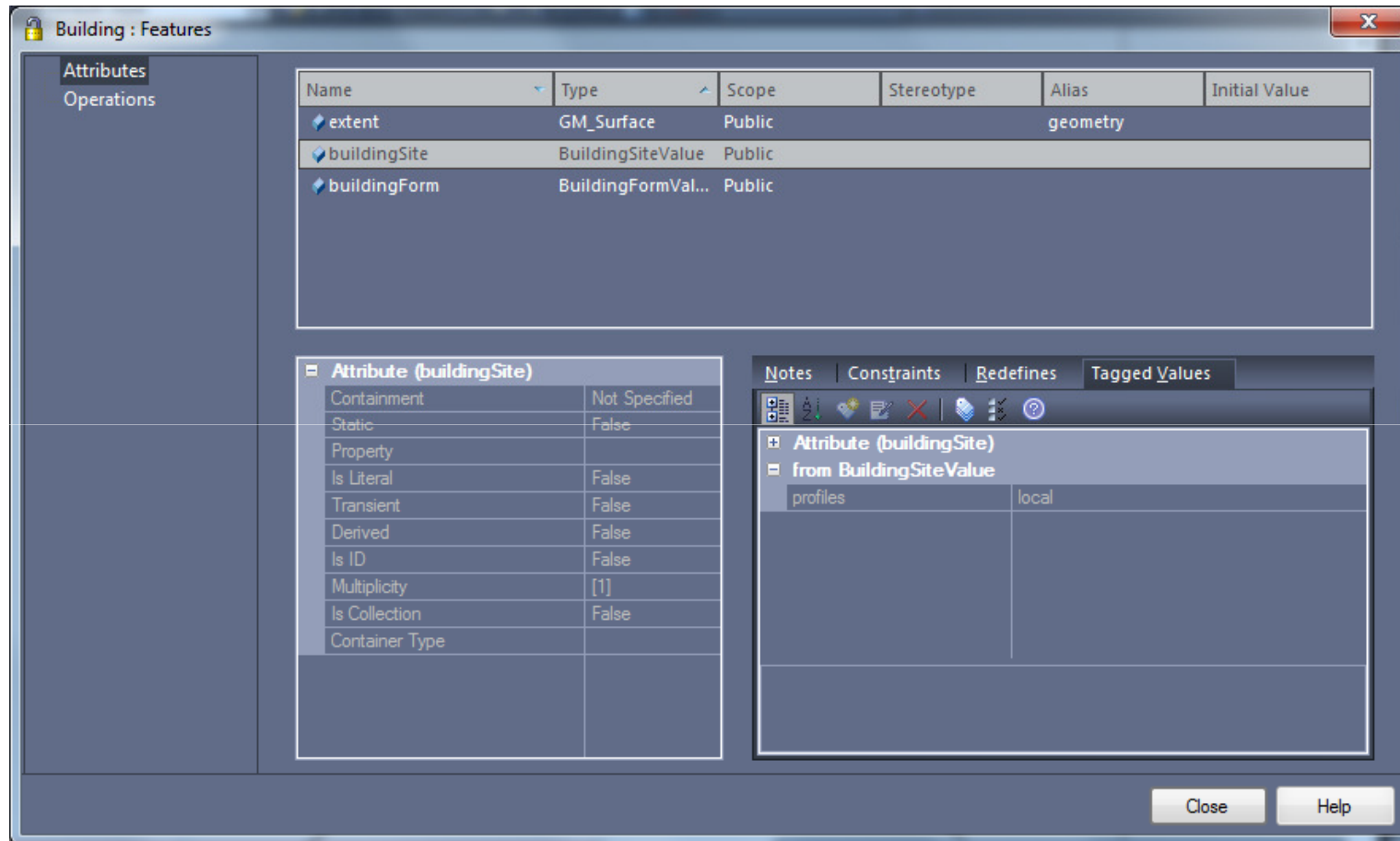
Testing and Continuous Integration



1. ENSURING CONSISTENCY BETWEEN CONTENT STORES USING PROFILING AND FLATTING RULES



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The screenshot shows the 'Building : Features' dialog box. It contains a table of features and two sub-tables for attribute details.

Name	Type	Scope	Stereotype	Alias	Initial Value
extent	GM_Surface	Public		geometry	
buildingSite	BuildingSiteValue	Public			
buildingForm	BuildingFormVal...	Public			

Attribute (extent)	
Containment	Not Specified
Static	False
Property	
Is Literal	False
Transient	False
Derived	False
Is ID	False
Multiplicity	[1]
Is Collection	False
Container Type	

Attribute (extent)	
profiles	local_district

II. TEST SCENARIOS FOR TDD OF IMPLEMENTATION SCHEMA

Test-driven development (TDD) is a software **development** process that relies on the repetition of a very short **development** cycle: first the developer writes an (initially failing) automated **test** case that defines a desired improvement or new function, then produces the minimum amount of code to pass that **test**, and ...

[Test-driven development - Wikipedia, the free encyclopedia](https://en.wikipedia.org/wiki/Test-driven_development)
en.wikipedia.org/wiki/Test-driven_development

TDD of implementation schema requires two inputs:

1. Logical Model describing data structure
2. Encoding Rules for implementation schema
 - Logical → DDL
 - Logical → GML
 - Logical → GDB

II. TEST SCENARIOS FOR TDD OF IMPLEMENTATION SCHEMA

Feature: InsertAdministrativeBoundaryIntoSchema
To confirm the AdministrativeBoundary table is correct
Insert valid and invalid data
And confirm expected number of fields
And check default values are create on insert

- Background: Test Domain Values for AdministrativeBoundary
 - Given the following domain values are defined for "AdministrativeLevel"

value
International
Country
Region
County
District
Civil Parish
- Scenario: Count fields in database and confirm the expected number
 - Given I have a CDS database connection using the connection file located under "DATABASECONNECTIONCDS"
 - When I count the number of fields in the table "ADMINISTRATIVEBOUNDARY_LN"
 - Then I confirm that number of fields is "3"
- Scenario: Confirm the field types and length
 - Given I have a CDS database connection using the connection file located under "DATABASECONNECTIONCDS"
 - Then the table "ADMINISTRATIVEBOUNDARY_LN" should have the fields

Field	type	Length	Nullable
ID	VARCHAR2	38	N
CLASSIFICATION	VARCHAR2	15	N
 - And the table "ADMINISTRATIVEBOUNDARY_LN_LT" should have the fields

Field	Type	Length	Nullable
GEOMETRY	SDO_GEOMETRY	-	N
- Scenario: Confirm Geometry and Srid have the correct types - Geometry of specific type and Spatial Reference
 - Given I have a CDS database connection using the connection file located under "DATABASECONNECTIONCDS"
 - Then the "VERSIONED" table "ADMINISTRATIVEBOUNDARY_LN" should have a Geometry Type of "LINE" and a Spatial Reference of "27700"
- Scenario: Confirm Table is Versioned
 - Given I have a CDS database connection using the connection file located under "DATABASECONNECTIONCDS"
 - Then the table "ADMINISTRATIVEBOUNDARY_LN" is versioned
- Scenario: Insert Valid Record into Table (ADMINISTRATIVEBOUNDARY_LN)
 - Given I have a CDS database connection using the connection file located under "DATABASECONNECTIONCDS"
 - And if the feature identified in table "ADMINISTRATIVEBOUNDARY_LN" and field "ID" with value "{B699A005-78D9-2682-E040-A40A282C5663}"
 - When I create a feature to insert into the target table "ADMINISTRATIVEBOUNDARY_LN"
 - And the feature has the following fields

FieldName	FieldValue	SimpleFieldTypeDescriptor
ID	{B699A005-78D9-2682-E040-A40A282C5663}	String
GEOMETRY	geometry	Geometry
CLASSIFICATION	Country	String
 - And the feature has "line" geometry

III. SEMI-AUTOMATED GENERATION OF SCHEMA

GO Loader to automatically generate DDL from GML

GO Loader 1.7.4

File Tools Help

Home About Get Started Examples Application schemas Transformations Output Targets

XML Schema
Feature Catalogue
Ontology
ArcGIS Workspace
SQL DDL
JSON Schema
UML model

ShapeChange

Processing application schemas for geographic information

Generate GML application schemas, HTML feature catalogues and other representations

Get Started

```
«Field»  
+ classifi  
+ name1_text: esiFieldTypeString  
+ name1_language: LanguageCode  
+ name2_text: esiFieldTypeString  
+ name2_language: LanguageCode  
+ name3_text: esiFieldTypeString  
+ name3_language: LanguageCode  
+ name4_text: esiFieldTypeString  
+ name4_language: LanguageCode
```

Building
«Field»
+ id: esiFieldTypeGUID

Glasshouse
«Field»
+ id: esiFieldTypeGUID

ElectricityTransmissionLine
«Field»
+ id: esiFieldTypeGUID

in EA

OS OPEN DATA PRODUCTS

OS Open Map – Local (Beta)



OS OpenMap backdrop map
Released in Beta, this is the most detailed street-level open data vector mapping product available.

[Learn more](#)

OS Open Names (Beta)

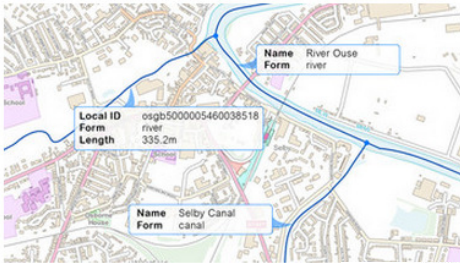


OS Open Names over OS VectorMap District
Definitive place names, roads numbers, and postcodes in Great Britain.

[Learn more](#)



OS Open Rivers (Beta)



OS Open Rivers - attribution
A high-level view of the water network with generalised geometry and network connectivity.

[Learn more](#)



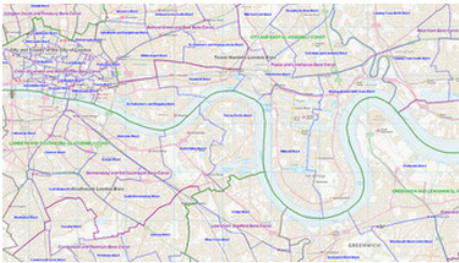
OS Open Roads (Beta)



OS Open Roads over OS Open Map – Local
A high-level view of Britain's road network with generalised geometry and network connectivity.

[Learn more](#)

Boundary-Line



Boundary-Line over OS VectorMap District
The full hierarchy of British administrative and electoral boundaries, as shown on Election Maps.

[Learn more](#)

OS Street View



OS Street View
A generalised and simplified street level raster map, ideal for city-centre plans.

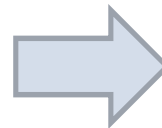
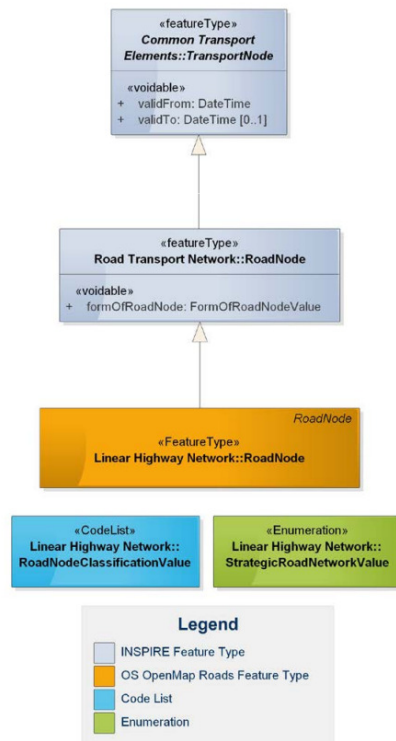
[Learn more](#)



<http://www.ordnancesurvey.co.uk/business-and-government/products/opendata-products-grid.html>

OS OPEN DATA PRODUCT DEVELOPMENT

- Trained Technical Product Management teams to focus on spending more time on defining the logical model
- Set up documentation templates to automatically generate feature catalogue for technical specification and automatically generate schema (GML)



RoadNode

RoadNode features are added at the start and end of every RoadLink feature. Where roads connect at the same level a single RoadNode feature is captured.

The following table identifies the attribution the RoadNode feature can carry and their descriptions, including the data type and multiplicity.

«FeatureType» RoadNode		
Definition: A point representing either the start/end of a highway or connectivity between two or more RoadLink features.		
Attribute: formOfRoadNode «voidable»		
Definition: Description of the function of a road node in the road transport network.		
Type: FormOfRoadNodeValue	Length: 20	Multiplicity: [1]
Attribute: geometry		
Definition: The location of the node.		
Type: GM_Point		Multiplicity: [1]

BENEFITS OF MODEL DRIVEN APPROACH

Implementation schema can be automatically derived from the logical model using consistent encoding rules (i.e. flattening rules)

- Removes need for expensive resources to perform basic schema development– use their skill for tuning, software development etc.
- Removes manual interpretation of logical model – resulting in inconsistencies
- Significantly reduces development time

Automation results in:

- Consistency
- Repeatability
- Re-usable toolset

Was able to train non-modelling staff to use the tools to develop schema and related resources (technical specification, tests)

Automated Test framework essential for ensuring that implementation schema reflected logical model

BENEFITS OF MODEL DRIVEN APPROACH

Product Development – Open Data Mandate to develop 3 new products by March 2015!

- Two small product development teams responsible for creating beta products re-using GenIE architecture
- No requirement to use scare IS resources – as product development consultants able to re-use tools to automatically generate schemas from logical models

Quote: Lucy Diamond (Product Development Consultant)

Wow – its only taken me a couple of hours to create the product schema (GML) and database schema (DDL).

We thought this would take several days!!

.....Damn - I've now got to concentrate on the generalisation and data quality rules as thought this would be much harder

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