Webinar:
INSPIRE good practices – Alternative Encodings

Thorsten Reitz, wetransform GmbH

wetransform

Agenda

- General methodology for alternative encodings
- The GeoJSON Encoding
  - Structure
  - Model Transformation Rules
  - The GeoJSON Encoding
  - An Example for the Addresses Theme with GN elements
  - An Example for the Environmental Monitoring Facilities Theme with O&M elements
- Usability of the GeoJSON Encoding
  - Test methodology
  - CanIUse results
  - Planned enhancements
- Discussion and Questions

Alternative Encodings

Approach & Structure

A Quick Clarification

Default Encoding	Additional Encoding	OR	Alternative Encoding
The default encoding is part of all data specifications	Does not have to satisfy all IR requirements for a data set		Shall satisfy all IR requirements for a data set
Data that complies to default encoding is INSPIRE compliant	Data owner does ***not*** need to prove compliance		Data owner needs to prove compliance
Central Tooling is available, e.g. the INSPIRE Validator	Central tooling is not required		Central tooling is not available (yet)

General Requirements for Encodings

The Implementing Rules on interoperability of spatial data sets and services (Commission Regulation (EU) No 1089/2010, Article 7) lays down the following requirements for encoding rules:

*Every encoding rule used to encode spatial data shall conform to EN ISO 19118. In particular, it shall specify **schema conversion rules** for all spatial object types and all attributes and association roles and the output data structure used.*

Every encoding rule used to encode spatial data shall be made available.

Additional rules:

- Spatial Reference Systems
- Character Encoding (UTF-8)

Recommendation:

- Encoding rules should be based on international, preferably open, standards

An Approach to defining the Alternative Encoding

Why?

- Why do we create this encoding?
- Which problems need to be solved?
- Which themes and use cases are covered?

What?

- What model transformation rules need to be applied to match the conceptual model to the capabilities of the format's logical model?

How?

- How can this encoding be implemented?
- How can we validate that all IR require-ments are addressed?

Structure of the Alternative Encoding

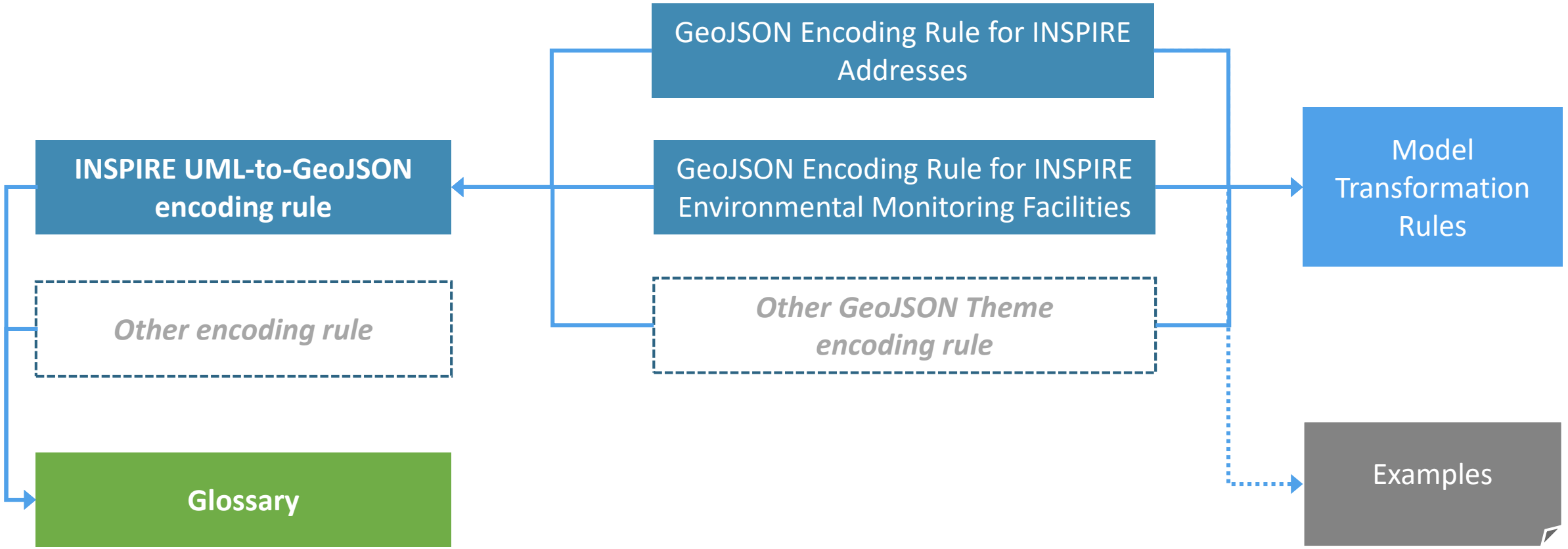
- Background
- Scope
  - Use Cases
  - INSPIRE Themes
  - Cross-cutting INSPIRE requirements
- Terms & Definitions
- Normative References
- Schema Conversion Rules
- Instance Conversion Rules

- Optional: ATS/ETS, Examples
- Optional: Model Transformations (for Simplification, Flattening)

The GeoJSON Alternative Encoding

Structure, General Encoding Rules, and INSPIRE Themes

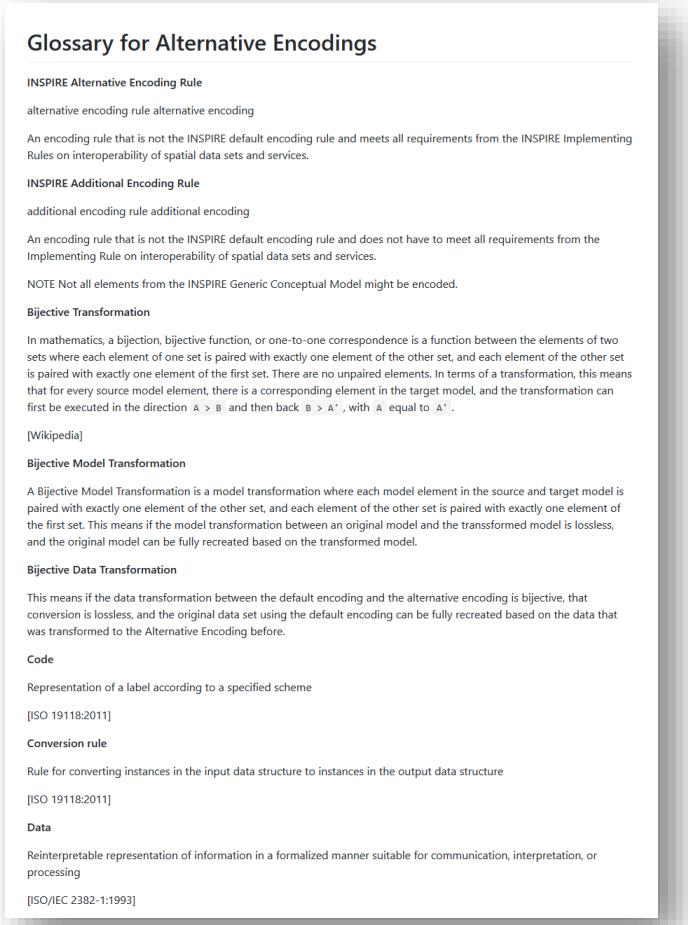
The components of the GeoJSON Encoding Rule



INSPIRE UML-to-GeoJSON encoding rule

1. Preface
2. Introduction
3. Scope
    1. Use Cases
    2. Themes
    3. Technical Issues
    4. Technical Limitations
4. Cross-cutting INSPIRE requirements
5. Normative References
6. Terms and Definitions
7. Schema Conversion Rules
    1. Types
    2. Properties
    3. Associations
8. Instance Encoding Rules
    1. Requirements and Recommendations
    2. Mapping from Conceptual Model to GeoJSON Logical Model
    3. Alternative Coordinate Reference Systems
    4. Identifiers
9. INSPIRE Theme Encoding Rules

Glossary



Glossary for Alternative Encodings

INSPIRE Alternative Encoding Rule

alternative encoding rule alternative encoding

An encoding rule that is not the INSPIRE default encoding rule and meets all requirements from the INSPIRE Implementing Rules on interoperability of spatial data sets and services.

INSPIRE Additional Encoding Rule

additional encoding rule additional encoding

An encoding rule that is not the INSPIRE default encoding rule and does not have to meet all requirements from the Implementing Rule on interoperability of spatial data sets and services.

NOTE Not all elements from the INSPIRE Generic Conceptual Model might be encoded.

Bijective Transformation

In mathematics, a bijection, bijective function, or one-to-one correspondence is a function between the elements of two sets where each element of one set is paired with exactly one element of the other set, and each element of the other set is paired with exactly one element of the first set. There are no unpaired elements. In terms of a transformation, this means that for every source model element, there is a corresponding element in the target model, and the transformation can first be executed in the direction `A > B` and then back `B > A'`, with `A` equal to `A'`.

[Wikipedia]

Bijective Model Transformation

A Bijective Model Transformation is a model transformation where each model element in the source and target model is paired with exactly one element of the other set, and each element of the other set is paired with exactly one element of the first set. This means if the model transformation between an original model and the transsformed model is lossless, and the original model can be fully recreated based on the transformed model.

Bijective Data Transformation

This means if the data transformation between the default encoding and the alternative encoding is bijective, that conversion is lossless, and the original data set using the default encoding can be fully recreated based on the data that was transformed to the Alternative Encoding before.

Code

Representation of a label according to a specified scheme

[ISO 19118:2011]

Conversion rule

Rule for converting instances in the input data structure to instances in the output data structure

[ISO 19118:2011]

Data

Reinterpretable representation of information in a formalized manner suitable for communication, interpretation, or processing

[ISO/IEC 2382-1:1993]

INSPIRE default encoding rule

default encoding rule default encoding

encoding rule that is specified in [D2.7, Annex B (normative) Default encoding rule]

NOTE The INSPIRE default encoding rule is the encoding rule specified in ISO 19136 Annex E with the extensions in GML 3.3 together with the additional rules stated in [D2.7, Annex B].

Encoding process

Encoding

Conversion of data into a series of codes

[ISO 19118:2011]

Encoding rule

Encoding

Identifiable collection of conversion rules that define the encoding for a particular data structure

NOTE The term `Encoding` is used as a synonym for both Encoding Rule and Encoding Process and should therefore not be used in the alternative encoding specifications.

[ISO 19118:2011]

Information

Knowledge concerning objects, such as facts, events, things, processes, or ideas, including concepts, that within a certain context has a particular meaning

[ISO/IEC 2382-1:1993]

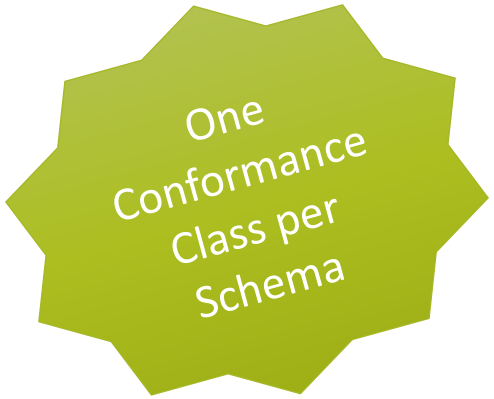
Format

Language construct that specifies the representation, in character form, of data objects in a record, file, message, storage device, or transmission channel

[ISO 19145:2013; ISO/IEC 2382-15:1999]

GeoJSON Encoding Rule for INSPIRE ADS/EMS

1. Preface
2. Normative References
3. **Conformance Class Core**
    1. Model Transformation
    2. Model Mapping
4. Examples (Informative)
5. ATS/ETS (Informative)



Catalogue of Model Transformation Rules

MT001: Flattening of nested structures

MT002: Extract Primitive Arrays

MT003: Association/Aggregation to Composition with Hard Typing

MT004: Association/Aggregation to Composition with Soft Typing

MT005: Simple Geographic Name

MT006: Property Composition to Association

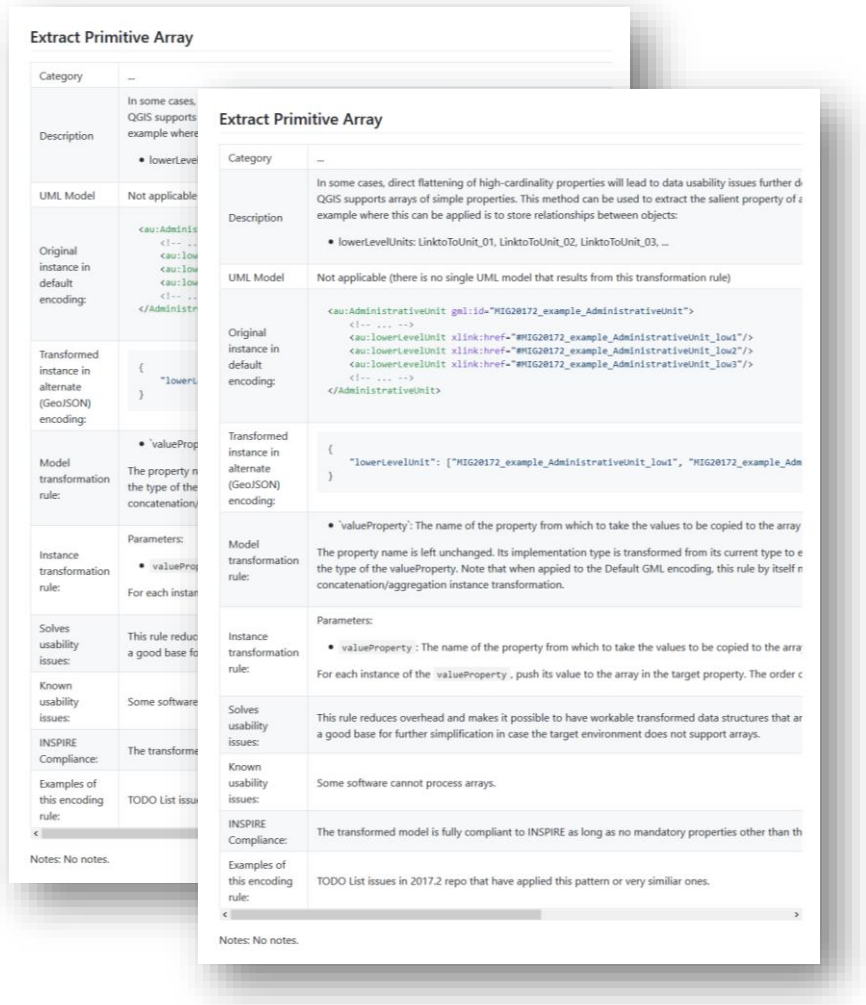
MT007: Simple Citation

MT008: Simple Codelist Reference

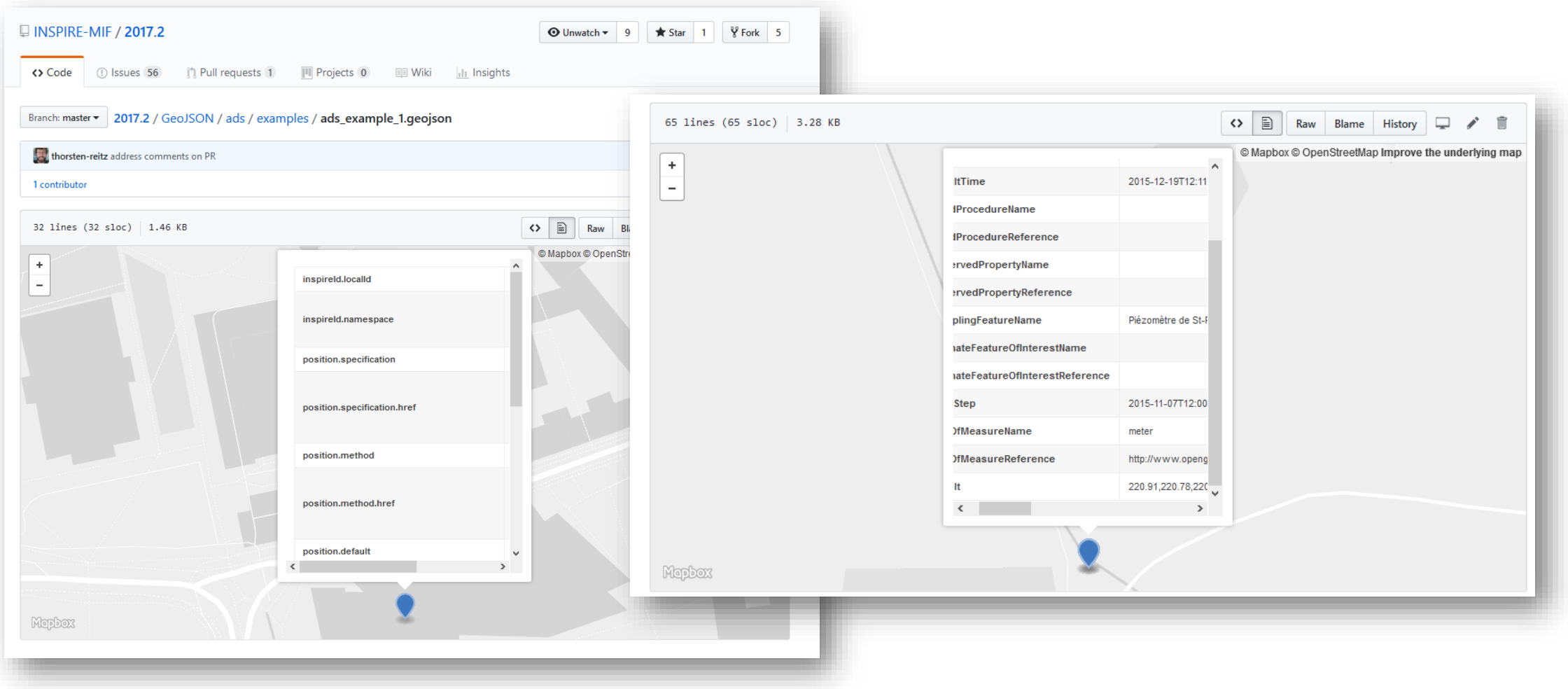
MT009: Simple Period

Model Transformation Rule Structure

- Category
- Description
- UML Representation (if applicable)
- Original Instance in Default Encoding
- Transformed Instance in Default/Alternative Encoding
- Model Transformation Rule
- Instance Transformation Rule
- Solves Usability Issues
- Known Usability Issues
- INSPIRE compliance
- Known Examples



Examples


INSPIRE-MIF / 2017.2
Unwatch 9
Star 1
Fork 5
Code
Issues 56
Pull requests 1
Projects 0
Wiki
Insights
Branch: master
2017.2 / GeoJSON / ads / examples / ads_example_1.geojson
thorsten-reitz address comments on PR
1 contributor
32 lines (32 sloc) 1.46 KB
Raw
inspireId.localId
inspireId.namespace
position.specification
position.specification.href
position.method
position.method.href
position.default
Mapbox
65 lines (65 sloc) 3.28 KB
Raw
Blame
History
© Mapbox © OpenStreetMap Improve the underlying map
2015-12-19T12:11
2015-11-07T12:00
meter
Mapbox

Next Steps & Timeline

- Editorial Changes and Fixes
- Addressing/Closing open issues from GitHub Repo
- Addressing changes and requests from community
- Acceptance & Release 1.0

Usability of the GeoJSON Encoding

Testing, Results, Open issues

Testing Methodology

- Definition of test cases
- Provision of test data sets
- Manual testing with each software
- Documentation in JSON Format
- Generation of readable documentation

caniuse

Which GML and GeoJSON features can I use in which software?

Documentation of GeoJSON Tests

This document describes the tests being performed to assess usability of INSPIRE data in GeoJSON encoding.

GeoJSON is being discussed as an alternative encoding for INSPIRE data. To determine what features of GeoJSON to use in that alternative encoding, we have specified this test suite for client applications.

GeoJSON support

Load data from file

Test if the client can load and display data from a .geojson file

Test IDs:

- geojson_file_load
- geojson_file_display

Download data from WFS

Test if client can load and display geojson data from a WFS

Test IDs:

- geojson_WFS_load
- geojson_WFS_display

Edit / create features

Test if client can edit/create geojson features

Test IDs:

- geojson_features_edit
- geojson_features_create

File Size

Test if the client handle big file sizes

Test IDs:

- geojson_size_200m_load
- geojson_size_200m_display
- geojson_size_1000m_load
- geojson_size_1000m_display
- geojson_size_2000m_load
- geojson_size_2000m_display
- geojson_size_3000m_load
- geojson_size_3000m_display

Geometry

GeoJSON allows quite a wide variety of Geometry types. In this set of tests, we verify that clients can read the geometry and then style and and process it.

Points

Can the software load and display Point geometries without any issues?

Test IDs:

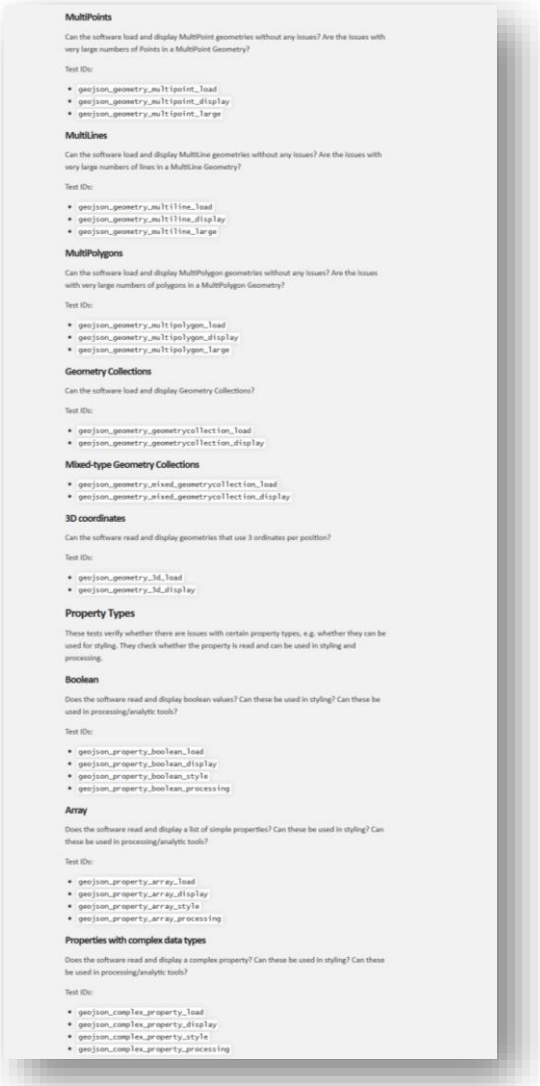
- geojson_geometry_point_load
- geojson_geometry_point_display

LineStrings

Can the software load and display LineString geometries without any issues?

Test IDs:

- geojson_geometry_linestring_load
- geojson_geometry_linestring_display



MultiPoints

Can the software load and display MultiPoint geometries without any issues? Are the issues with very large numbers of Points in a MultiPoint Geometry?

Test IDs:

- geojson_geometry_multipoint_load
- geojson_geometry_multipoint_display
- geojson_geometry_multipoint_large

MultiLines

Can the software load and display MultiLine geometries without any issues? Are the issues with very large numbers of lines in a MultiLine Geometry?

Test IDs:

- geojson_geometry_multiline_load
- geojson_geometry_multiline_display
- geojson_geometry_multiline_large

MultiPolygons

Can the software load and display MultiPolygon geometries without any issues? Are the issues with very large numbers of polygons in a MultiPolygon Geometry?

Test IDs:

- geojson_geometry_multipolygon_load
- geojson_geometry_multipolygon_display
- geojson_geometry_multipolygon_large

Geometry Collections

Can the software load and display Geometry Collections?

Test IDs:

- geojson_geometry_geometrycollection_load
- geojson_geometry_geometrycollection_display

Mixed-type Geometry Collections

- geojson_geometry_mixed_geometrycollection_load
- geojson_geometry_mixed_geometrycollection_display

3D coordinates

Can the software read and display geometries that use 3 ordinates per position?

Test IDs:

- geojson_geometry_3d_load
- geojson_geometry_3d_display

Property Types

These tests verify whether there are issues with certain property types, e.g. whether they can be used for styling. They check whether the property is read and can be used in styling and processing.

Boolean

Does the software read and display boolean values? Can these be used in styling? Can these be used in processing/analytic tools?

Test IDs:

- geojson_property_boolean_load
- geojson_property_boolean_display
- geojson_property_boolean_style
- geojson_property_boolean_processing

Array

Does the software read and display a list of simple properties? Can these be used in styling? Can these be used in processing/analytic tools?

Test IDs:

- geojson_property_array_load
- geojson_property_array_display
- geojson_property_array_style
- geojson_property_array_processing

Properties with complex data types

Does the software read and display a complex property? Can these be used in styling? Can these be used in processing/analytic tools?

Test IDs:

- geojson_complex_property_load
- geojson_complex_property_display
- geojson_complex_property_style
- geojson_complex_property_processing

Can the Encoding be used?

gml_file_load

QGIS	ArcGIS Online	hale studio	OpenLayers	FME Desktop	Leaflet
2.18.24-Las Palmas					
3.4.4-Madeira	December 2018 update	3.4.1	5.3.0	2018.1	1.4.0

gml_file_display

QGIS	ArcGIS Online	hale studio	OpenLayers	FME Desktop	Leaflet
2.18.24-Las Palmas					
3.4.4-Madeira	December 2018 update	3.4.1	5.3.0	2018.1	1.4.0

gml_WFS2_load

QGIS	ArcGIS Online	hale studio	OpenLayers	FME Desktop	Leaflet
2.18.24-Las Palmas					
3.4.4-Madeira	December 2018 update	3.4.1	5.3.0	2018.1	1.4.0

gml_WFS2_display

QGIS	ArcGIS Online	hale studio	OpenLayers	FME Desktop	Leaflet
2.18.24-Las Palmas					
3.4.4-Madeira	December 2018 update	3.4.1	5.3.0	2018.1	1.4.0

Required Enhancements (for GeoJSON/GML/…)

To be discussed with vendors in June Meeting

ArcGIS	QGIS	OpenLayers
TBT	Multi-Type Collections	Multiple features in one location can’t be identified
	Better support for arrays in attribute table	

Time for your Contributions ☺!

- Questions & Discussion
- Editorial issues:
  - Create issues and Pull Requests on GitHub
- Implementations:
  - Report any implementations & Experiences
- Add theme-specific Encoding Rules

Questions? Feedback?

+49 6151 155 408

info@wetransform.to

www.wetransform.to

www.linkedin.com/company/wetransform-gmbh
https://twitter.com/tr_xsdi