INSPIRE Data validation:
the eENVplus experience

Extension of the INSPIRE DS:
the GeoSmartCity experience

NRC EIS meeting

Copenhaghen Nov 26th, 2015

Outline

- INSPIRE data Validation: The eENVplus experience
- The eENVplus Validation Service
- Focus on Protected Sites
- INSPIRE data usability beyond formal conformance
- INSPIRE Data Specification extension
- INSPIRE codelists extension

INSPIRE DATA VALIDATION: the eENVplus experience

60 datasets

15 application schemas

GML files

WFS GetFeature requests

More than 500 emails

Skype calls

Re-usable web service for validation of GML files .....

OGC eENVplus Validation Service

on-line validation tool for INSPIRE and AQD datasets.

The Validation Service

eENVplus Validation Service

The **eENVplus Validation Service** provides **Executable Test Suites (ETS)** implementing the Abstract Test Suites **(ATS)** which are included in the **Annex A** of the **INSPIRE Data Specifications** and contain a set of tests to be applied on a dataset to evaluate whether it fulfils the INSPIRE requirements.

ATS

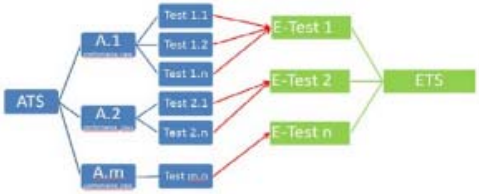
Annex A - Part 1: includes tests aiming at assessing the conformity of GML datasets to "COMMISSION REGULATION (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial datasets and services" and its successive amendment "COMMISSION REGULATION (EU) No 1253/2013 of 21 October 2013".

Annex A - Part 2: includes tests aiming at assessing conformity of GML datasets to relevant INSPIRE Data Specifications - Technical Guidelines (TG) requirements.

The requirements to be tested are grouped in several **Conformance Classes**.
Each of these classes covers a specific aspect: for example A.1 conformance class contains tests related to the requirements on the application schema, A.2 conformance class contains tests related to the requirements on the reference systems, etc ...
In order to be **conformant** to a specific Conformance Class, a dataset has **to pass all tests defined for that Conformance Class**.
If a dataset is not yet conformant with all requirements of the Data Specification, **conformity to individual Conformance Classes can be claimed**.

ETS

In order to execute abstract tests associated to Conformance Classes, an **Executable Test Suite(ETS)**, containing a physical implementation of the abstract tests, has to be derived from the ATS.
For those tests that cannot be automated the ETS contains guidelines to manual execution.
A single executable test can cover different abstract tests.



Tests included in the **ATS** vary according to the different data themes.
Select the **INSPIRE Theme** from the underlying dropdown list to display the **ATS** included in the Annex A of the relevant **INSPIRE Data Specifications** and have access to the associated **ETS**.

INSPIRE conformance and ATS concepts

+

automated validation

+

guidelines to manual validation

+

Schematron library

currently available: **PS** (v3.0, v4.0), **LC** vector v4.0. Upcoming: **NZ** v4.0

Re-use of the eENVplus Validation Service

CDDA in conformity with INSPIRE

The eENVplus Validation Service and Protected Sites theme-specific schematron file have been used within conformance testing process of GML datasets obtained from the transformation of CDDA European data sets in conformity with the INSPIRE PS.

the EAGLE project

The eENVplus Validation Service and Land Cover theme-specific schematron have been used for the validation of the datasets produced in the project.

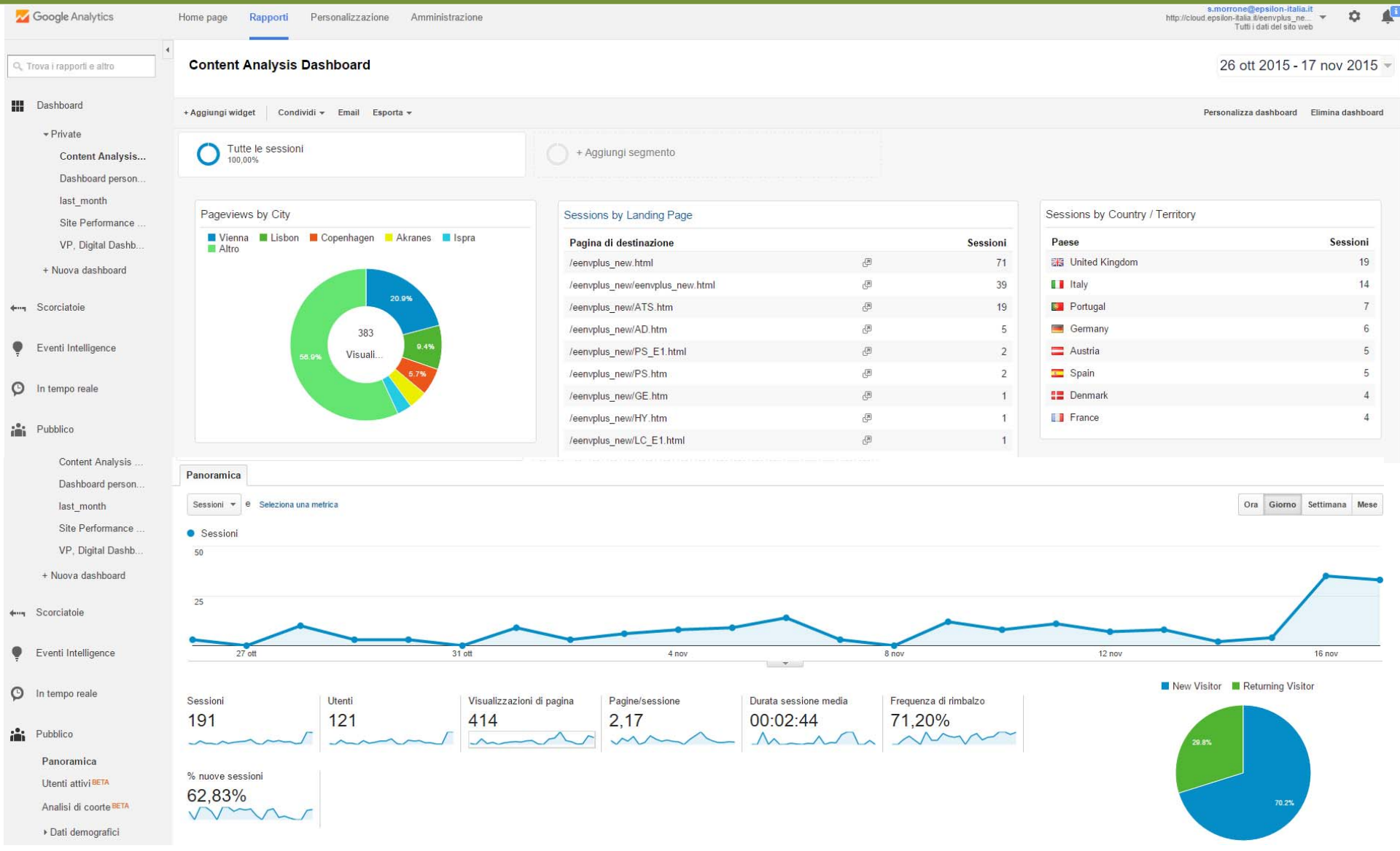
GeoSmartCity

The eENVplus Validation Service has been used for the validation of the datasets produced in the project. Also for validation of dataset against INSPIRE extended schemas.

LIFE+IMAGINE

The eENVplus Validation Service and LC theme-specific schematron have been used for the validation of the datasets. The NZ theme-specific schematron file is being developed.

The Validation Service : few statistics



Focus on Protected Sites

eENVplus Validation Service

The ATS table below contains a detailed list of the abstract tests included in the **ATS** for the **Protected Sites** and relevant **Executable Tests (ET)** provided by the **eENVplus Validation Service**.
Abstract tests marked by "*" make use of schematron files developed by eENVplus team.
Click links in the list of **Available Executable Tests of the GML Data Validation ETS** to access the relevant **Executable Tests** or **Click** the arrow icon to go back to the HOME page

ATS	Conformance classes	Abstract Tests	Related ET
Part 1 (normative)	A.1 Application Schema Conformance Class	A.1.1 Schema element denomination test	E.1
		A.1.2 Value type test	E.1
		A.1.3 Value test *	E.1
		A.1.4 Attributes/Associations completeness test	E.1
		A.1.5 Abstract spatial object test	E.1
		A.1.6 Constraints test *	E.1
		A.1.7 Geometry representation test*	E.1
	A.2 Reference Systems Conformance Class	A.2.1 Datum test *	E.1
		A.2.2 Coordinate reference system test *	E.1
		A.2.3 View service CRS test	E.2
		A.2.4 Temporal reference system test	E.2
		A.2.5 Units of measurements test	E.2
	A.3 Data Consistency Conformance Class	A.3.1 Unique identifier persistency test	E.3
		A.3.2 Version consistency test	E.3
		A.3.3 Update frequency test	E.3
	A.4 Metadata IR Conformance Class	A.4.1 Metadata for interoperability test	E.4
	A.5 Information Accessibility Conformance Class	A.5.1 Code list publication test	E.5
		A.5.2 CRS publication test *	E.1
		A.5.3 CRS identification test *	E.1
	A.6 Data Delivery Conformance Class	A.6.1 Encoding compliance test	E.1
	A.7 Portrayal Conformance Class	A.7.1 Layer designation test	E.6
Part 2 (informative)	A.8 Technical Guideline Conformance Class	A.8.1 Multiplicity test	E.1
		A.8.2 CRS http URI test	E.7
		A.8.3 Metadata encoding schema validation test	E.8
		A.8.4 Metadata occurrence test	E.8
		A.8.5 Metadata consistency test	E.8
		A.8.6 Encoding schema validation test	E.1
		A.8.7 Style test	E.9

Available Executable Tests of the GML Data Validation ETS
E.1- Automated Validation : A.1: all tests - A.2.1: Datum test, A.2.2: Coordinate Reference System test - A.5.2: CRS publication test, A.5.3: CRS identification test - A.6.1: Encoding compliance test - A.8.1: Multiplicity test, A.8.6 Encoding schema validation test
E.2- Guideline to Manual Validation : A.2.3: View service CRS test, A.2.4:Temporal reference system test, A.2.5:Units of measurements test
E.3- Guideline to Manual Validation : A.3: all tests
E.4- Guideline to Manual Validation : A.4: all tests
E.5- Guideline to Manual Validation : A.5.1: Code list publication test
E.6- Guideline to Manual Validation : A.7: all tests
E.7- Guideline to Manual Validation : A.8.2: CRS http URI test
E.8- Guideline to Manual Validation : A.8.3: Metadata encoding schema validation test, A.8.4: Metadata occurrence test, A.8.5: Metadata consistency test
E.9- Guideline to Manual Validation : A.8.7: Style test

Focus on Protected Sites

eENVplus Validation Service

Protected Sites - E.1 Automated Validation

A.1: all tests - A.2.1 Datum test, A.2.2 Coordinate Reference System test - A.5.2 CRS publication test, A.5.3 CRS identification test - A.6.1 Encoding compliance test - A.8.1 Multiplicity test, A.8.6 Encoding schema validation test

The **E.1 Automated Validation Test** is based on the use of the free testing facility **GML 3.2 (ISO 19136:2007) Conformance Test Suite**, developed by OGC, which verifies the conformance of GML data with respect to **ISO 19136:2007(GML 3.2.1)** and to supplementary data constraints specified by means of Schematron rules.

More specifically the **E.1** provides **Automated Validation** by means of :

- the OGC GML 3.2 Test Suite used 'as is' for the tests related to INSPIRE requirements on
  - application schema structure - **A.1.1, A.1.2, A.1.4, A.1.5, A.8.1**
  - dataset encoding [1] - **A.6.1 , A.8.6**.
- Schematron rules developed by eENVplus team for the tests that cannot be expressed using the XML Schema grammar :
  - the obligation to use only the allowed code list/enumeration value - **A.1.3**
  - the verification of the constraints specified in the target application schema(s)- **A.1.6**
  - the verification of IR requirements related to geometry representation - **A.1.7** [2]
  - the verification of the requirements related to CRS - **A.2.1, A.2.2, A.5.2 and A.5.3**

The tests verified by means of Schematron rules will be executed only if the user selects the Protected Sites Schematron file from the dropdown list when required .

GML dataset files to be tested by means of **E.1** can be uploaded from local or web resource as well as by means of WFS (GetFeature request).

Should **eENVplus E.1 Test** execute with no failures, after having specified PS Schematron file,

1. Conformance to **A.1 - Application Schema Conformance Class** can be claimed
2. Coordinate Reference System tests - **A.2.1**, **A.2.2** , **A.5.2**, **A.5.3** - are successfully passed.
   Be aware that to automate this test an implementation choice is made to allow only identifiers referring to EPSG codes listed in **Table 3** of PS Data Specification - Section 6.[3]
3. Conformance to **A.6 - Data Delivery Conformance Class** can be claimed
   The use of GML-encoded files assures the required dataset encoding conformance to EN ISO 19118
4. Tests **A.8.1**, **A.8.6** are successfully passed.

A.1 Application Schema Conformance Class	A.1.1 Schema element denomination test
	A.1.2 Value type test
	A.1.3 Value test *
	A.1.4 Attributes/associations completeness test
	A.1.5 Abstract spatial object test
	A.1.6 Constraints test *
	A.1.7 Geometry representation test *
A.2 Reference Systems Conformance Class	A.2.1 Datum test *
	A.2.2 Coordinate reference system test *
A.5 Information Accessibility Conformance Class	A.5.2 CRS publication test *
	A.5.3 CRS identification test *
A.6 Data Delivery Conformance Class	A.6.1 Encoding compliance test
A.8 Technical Guideline Conformance Class	A.8.1 Multiplicity test
	A.8.6 Encoding schema validation test

Abstract tests covered by E.1

Login to execute the E.1 Automated Validation Test

(1) click this link to learn more on dataset encoding tests

(2) Article 12 "The value domain of spatial properties defined in this Regulation shall be restricted to the Simple Feature spatial schema."

(3) The INSPIRE Technical Guidelines in Section 6 propose "to use the http URIs provided by the Open Geospatial Consortium as coordinate reference system identifiers. These are based on and redirect to the definition in the EPSG Geodetic Parameter Registry (http://www.epsg-registry.org/)". Moreover, **TG Requirement 2** states that "The identifiers listed in Table 3 shall be used for referring to the coordinate reference systems used in a data set."

INSPIRE data usability: beyond a formal conformance

Issues with :

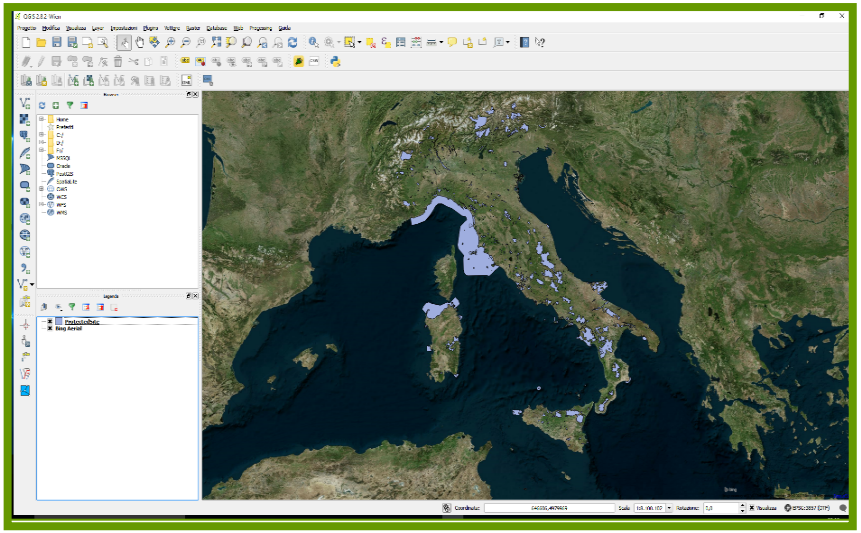
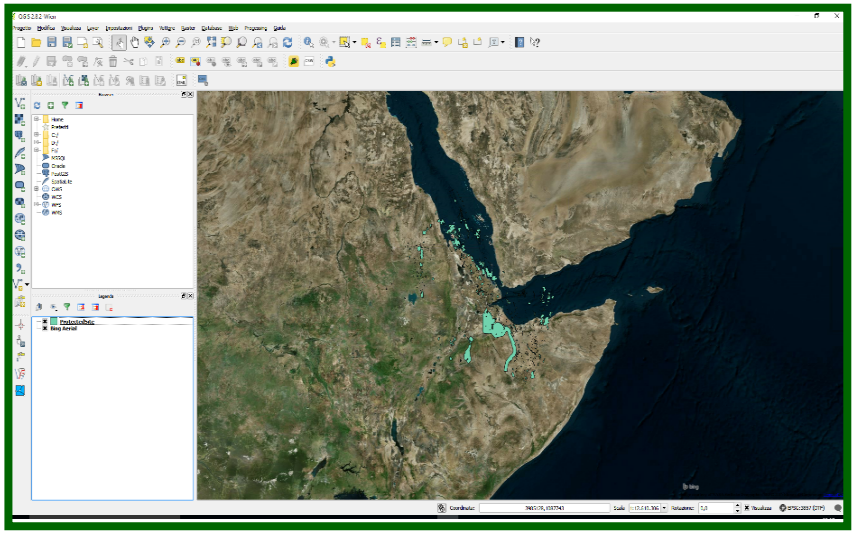
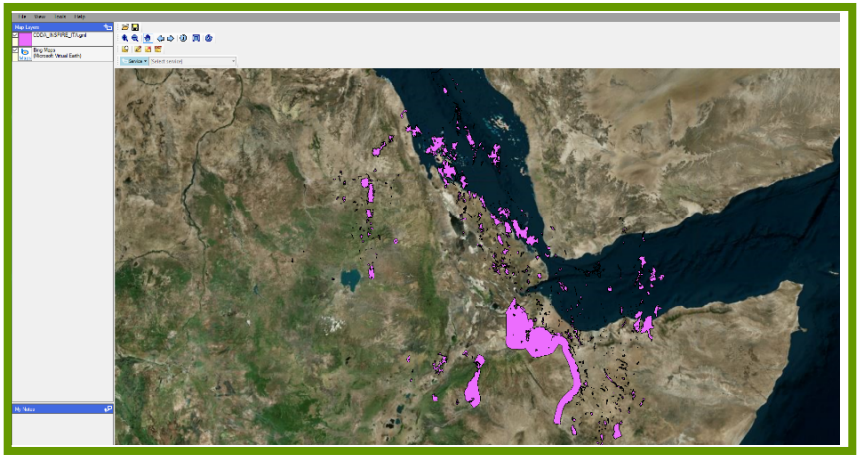
Coordinate Reference System identifiers:

- Implementation proposed by the Technical Guidelines (see A.8.2 CRS http URI test:) require the use of EPSG identifiers in the form of http URIs. Currently some GIS software tools do not correctly handle EPSG identifiers, above all in the form of http URIs and therefore use the default (Lon Lat) order causing incorrect display of GML files in GIS maps

Geometry representation:

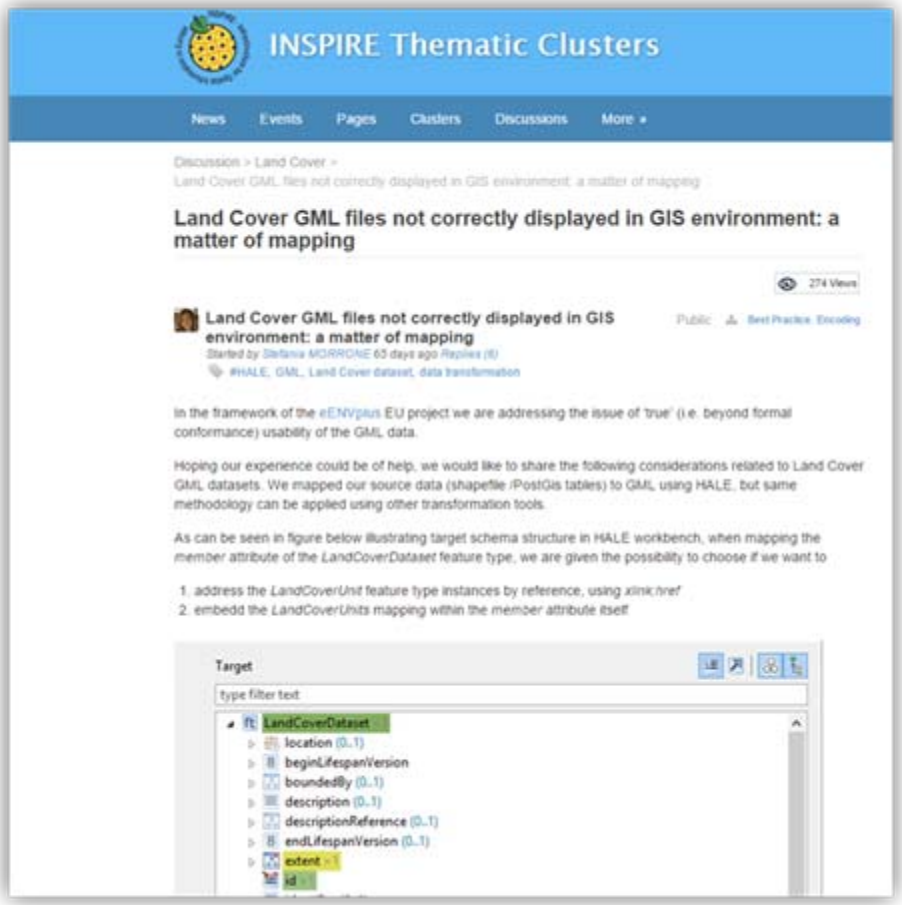
- The specification allow 2.5-dimensional geometries, but when third coordinate is provided in the GML file, some GIS tools are not able to handle it and a set of triangles is displayed is the map.

A practical example from EEA: the PS dataset “CDDA_INSPIRE_ITA.gml”

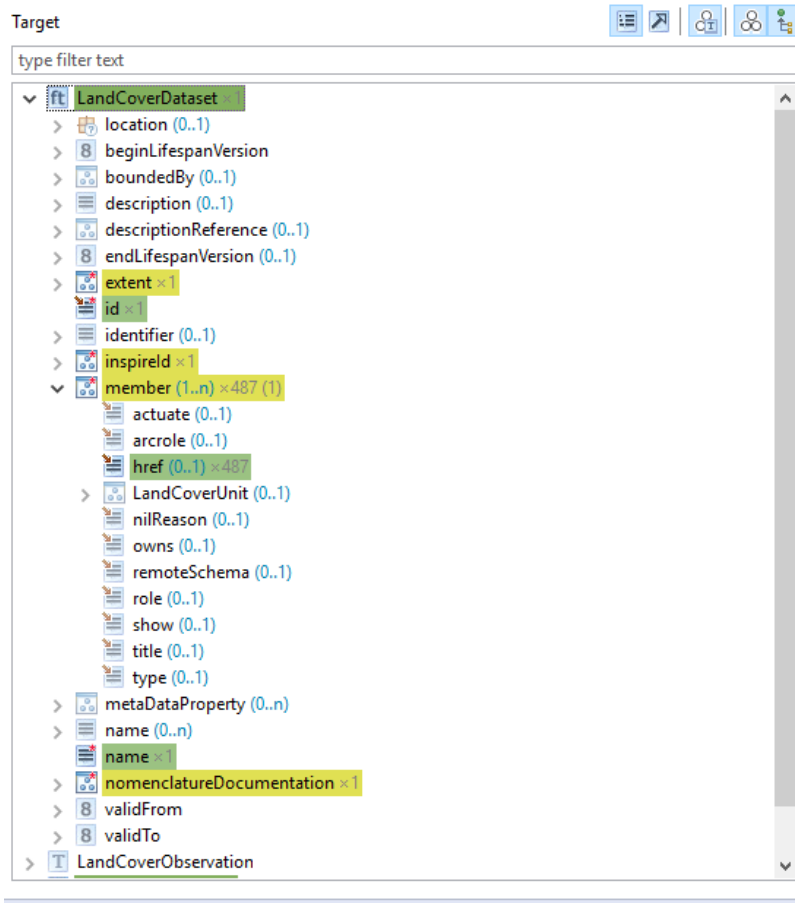
	urn:ogc:def:crs:EPSG::4258	http://www.opengis.net/def/crs/EPSG/0/4258
QGIS		
GAIA		No Data displayed

A practical example for the LC datasets

LCUnits: a matter of mapping



Mapping of the 'member' association

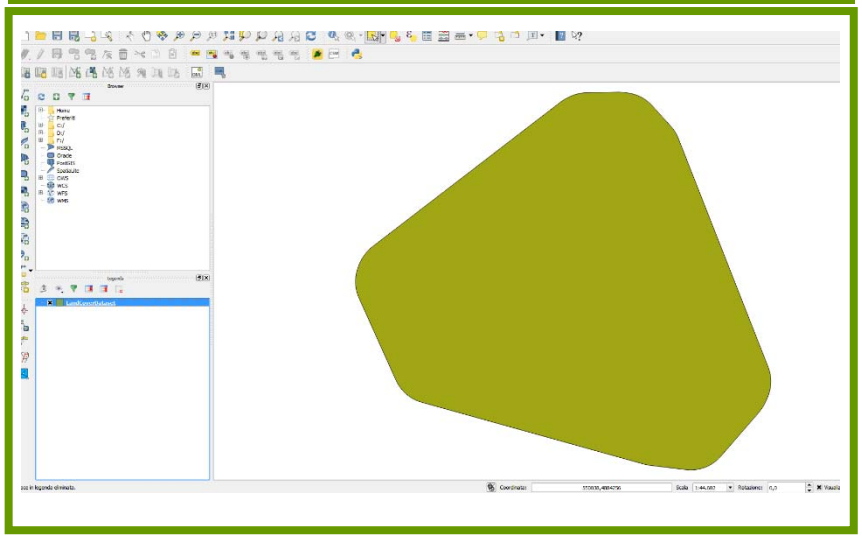


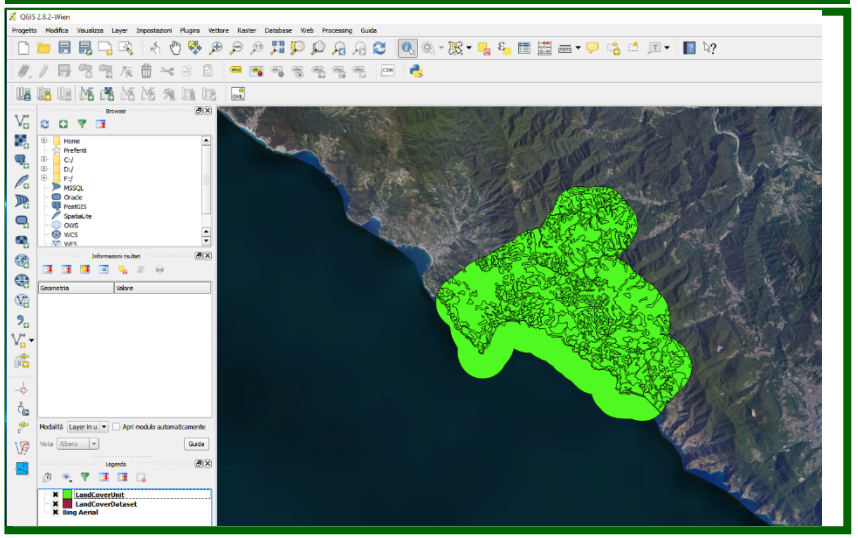
A practical example for the LC datasets

Embedded encoding

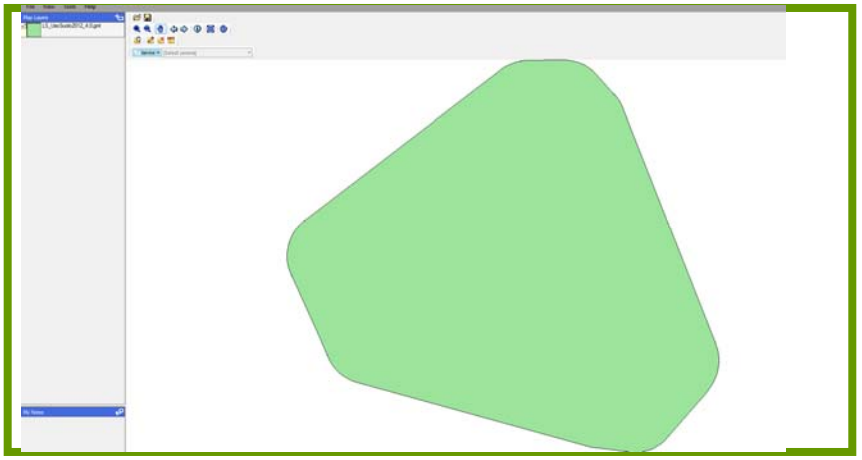
Referenced encoding

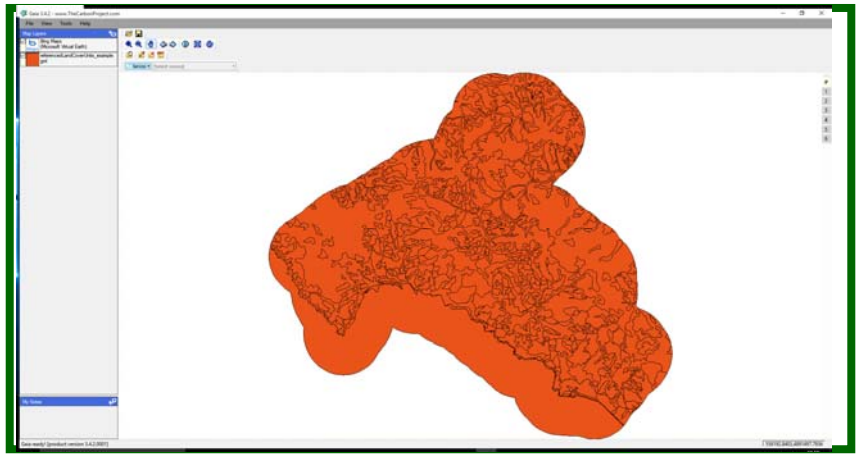
QGIS





GAIA





INSPIRE Data Specification extensions

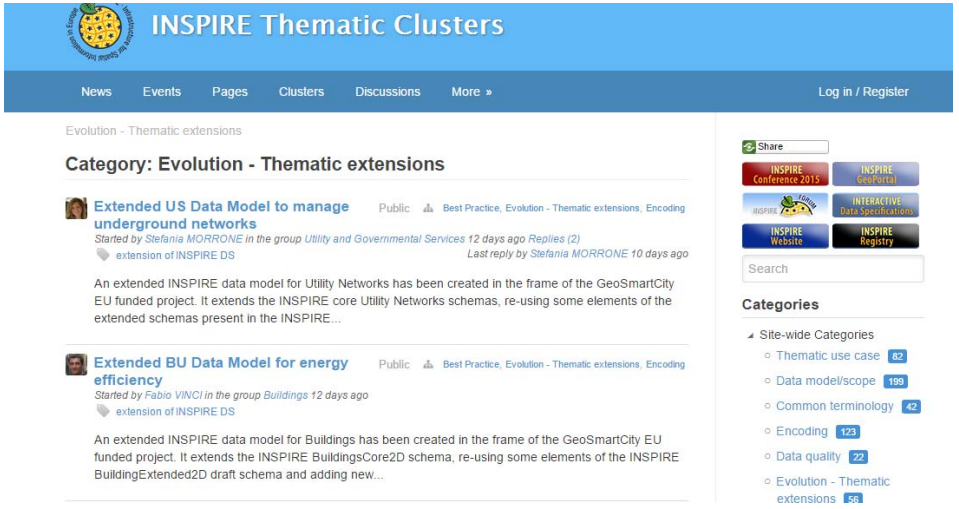
Extended INSPIRE data models have been created in the frame of the GeoSmartCity EU funded project dealing with integrated management of underground utility infrastructures and renewable energy within cities .

To match data modelling requirements collected in the pilots' use cases, the INSPIRE core **Buildings2D** and **Utility Networks** schemas have been extended:

1. re-using some elements of the INSPIRE extended schemas contained in the draft repository
2. adding new elements (FeatureTypes, DataTypes, Codelists, Associations)

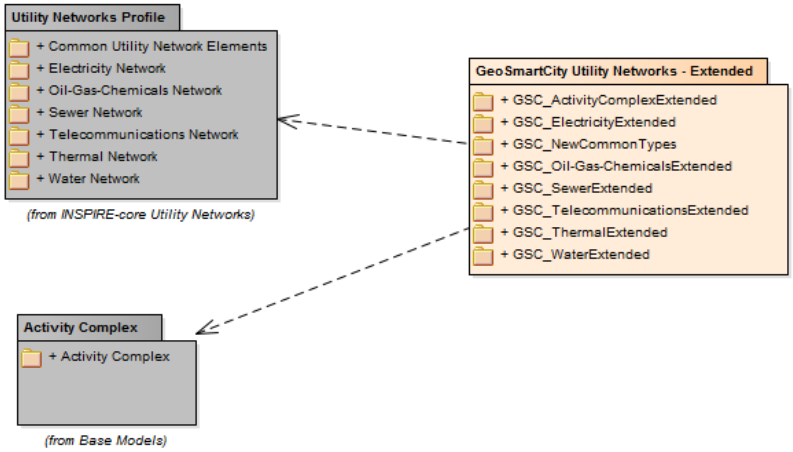
UML models and XSDs available on the Thematic Cluster.

More information about the development of the extended data model in the webinars available in the 'INSPIRE_in_pills' playlist on Epsilon Italia YouTube channel.

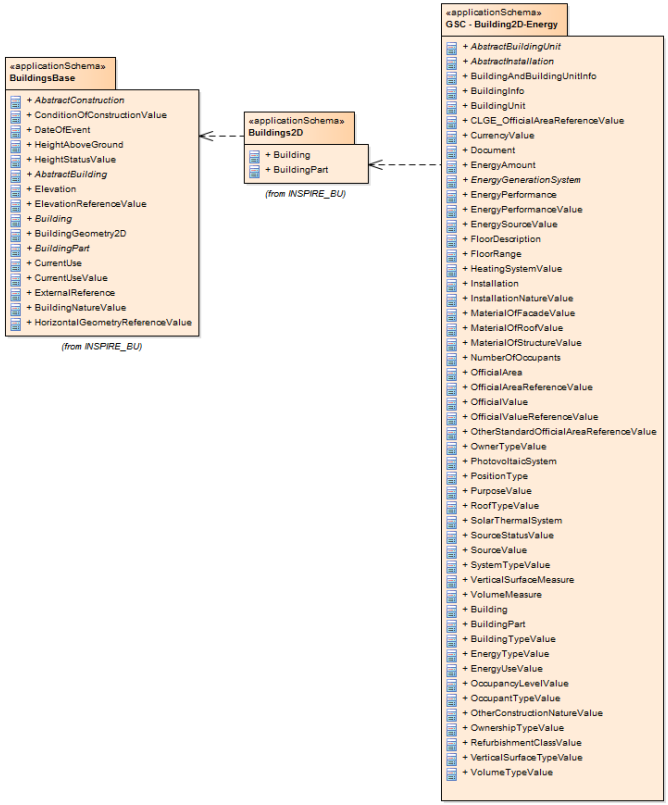


INSPIRE Data Specification extensions

Utility Networks Extended



Building Extended



INSPIRE codelist extensions

In order to manage new codelist values, a GeoSmartCity registry has been created using the Re3gistry software (http://hub.geosmartcity.eu/registry/).

Key question:

TG Recommendation 5 : «The http URIs and labels used for encoding code list values should be taken from the INSPIRE code list registry for INSPIRE-governed code lists and generated according to the relevant rules specified for externally governed code lists.»

Our thinking is that a registry providing an extended register or code list should include the items/values from the register that is being extended, but with their original URIs, and possibly links to their definition in the register that is being extended.

This functionality is not yet supported out of the box by the Re3gistry software (currently we are manually changing URI to address INSPIRE registry when needed)

INSPIRE codelist extensions

In the meanwhile

we created an online Google Drive spreadsheet to be filled by the pilots with their new codelist values.

The spreadsheet follows a data structure that will allow direct upload in the Re3gistry.

In this spreadsheet, for each new codelist value

- one row specifying the value in English must be inserted (mandatory)
- multiple rows containing the codelist value in national languages can be inserted optionally (one row for each language).

Thank you

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