The INSPIRE Directive in the Local Administration: How Do We Organize in Barcelona Provincial Council to Comply With INSPIRE?

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Geographical Environment

The Province of Barcelona

- The most populated province in Catalonia region
- 311 municipalities
  247 municipalities < 20.000 inhabitants (about 80%)
- 5.710.903 inhabitants (74% of Catalonia region)
- 7.726,36 km²

Barcelona Provincial council (Diputació de Barcelona)

- Aim: To provide economic and technical support to the small-sized municipalities in the province
- GIS Department goals:
  - To help municipalities to achieve **efficient and reliable government management and planning**
  - To provide **technical support** by creating, maintaining and evolving a customised GIS system and **its SDI platform**

Our goal is to comply with INSPIRE in 21/10/2020

How Do We Organize?

We work step by step

Step 1: Select Local Administration INSPIRE themes

ANNEX I

1. Coordinate ref. systems
2. Geographical grid systems
3. Geographical names
4. Administrative units
5. Addresses
6. Cadastral parcels
7. Transport networks
8. Hydrography
9. Protected sites

ANNEX II

1. Elevation
2. Land cover
3. Orthoimagery
4. Geology

ANNEX III

1. Statistical units
2. Buildings
3. Soil
4. Land use
5. Human health and safety
6. Utility and governmental services
7. Environmental monitoring facilities
8. Production and industrial facilities
9. Agricultural and aquaculture facilities
10. Population distribution — demography
11. Area management/restriction/regulation zones and reporting units
12. Natural risk zones
13. Atmospheric conditions
14. Meteorological geographical features
15. Oceanographic geographical features
16. Sea regions
17. Bio-geographical regions
18. Habitats and biotopes
19. Species distribution
20. Energy resources
21. Mineral resources

Step 2: Contact all departments involved. Designate partners

Step 3: Identify geographical information to transform

Geographical Information	Data Model	Department	INSPIRE THEME		
Direcciones (portales y deseminados)	CA	Cartography	I	5	Addresses
Direcciones (ejes de calles)	CA	Cartography	I	7	Transport networks
Inventario de caminos	XC	Cartography	I	7	Transport networks
Inventario patrimonio cultural	PC	Cultural Heritage	I	9	Protected sites (cultural)
Planeamiento urbanístico y catálogo de masías	PU	Urban planning	III	4	Land use
Delimitación urbanizaciones	UR	Urban planning	III	4	Land use
Mapas de ruido	MS	Environment	III	5	Human health and safety
Inventario centros docencia	SE	Education	III	6	Utility and governmental services
Inventario equipamientos deportivos	SE	Sports	III	6	Utility and governmental services)
Inventario equipamientos municipales	SE	Utility and Service Networks	III	6	Utility and governmental services
Censos actividades (equipamientos)	AC	Activities	III	6	Utility and governmental services
Transición energética en equip. municipales	SE	Environment	III	6	Utility and governmental services
Red alumbrado público	XL	Utility and Service Networks	III	6	Utility and governmental services
Red alcantarillado	XS	Utility and Service Networks	III	6	Utility and governmental services
Red agua potable	XA	Utility and Service Networks	III	6	Utility and governmental services
Censos actividades	AC	Activities	III	8	Production and industrial facilities
Protección civil	DP	Activities	III	12	Natural risk zones

Step 4: Mapping table between INSPIRE and our attributes

INSPIRE - Application Schema 'ElectricityNetwork' (version 3.0)					DIBA - FANALS Table (SIT_XLE1MV1_111P)	
Class	**Attribute (Class)**	**Attribute (Class) | Type**	**Voidable?**	**Multiplicity**	**DIBA ATTRIBUTE**	**Remarks**
Appurtenance	appurtenanceType	AppurtenanceTypeValue (ElectricityAppurtenanceTypeValue)	yes	1	Fixed to 'streetLight'	Check the values on the 'Codelist matching table' sheet
	specificAppurtenanceType	SpecificAppurtenanceTypeValue	yes	[0..1]		
	geometry	GM_Point		1	Oracle SDO_Geometry (POINT)	
	spokeEnd	Link	yes	[0..*]		
	spokeStart	Link	yes	[0..*]		
	inspireId (Identifier)	localId CharacterString		1	MUN_INE + "." + "XL"+ "." + ID_XL	
		namespace CharacterString		1	"SPA.DB.US"	
		version CharacterString	yes	[0...1]		
	beginLifespanVersion	DateTime	yes	1	DATA_REV	
	endLifespanVersion	DateTime	yes	[0...1]		
	inNetwork	Network	yes	[0..*]	link to the UtilityNetwork element with the same MUN_INE	
	currentStatus	ConditionOfFacilityValue	yes	1	ESTAT	See the possible values on the 'Codelist matching table' sheet
	validFrom	DateTime	yes	1		
	validTo	DateTime	yes	[0...1]		
	verticalPosition	VerticalPositionValue	yes	1	TIPUS_SUP	See the possible values on the 'Codelist matching table' sheet
	utilityFacilityReference	ActivityComplex	yes	[0...1]		
	governmentalServiceReference	GovernmentalService	yes	[0...1]		

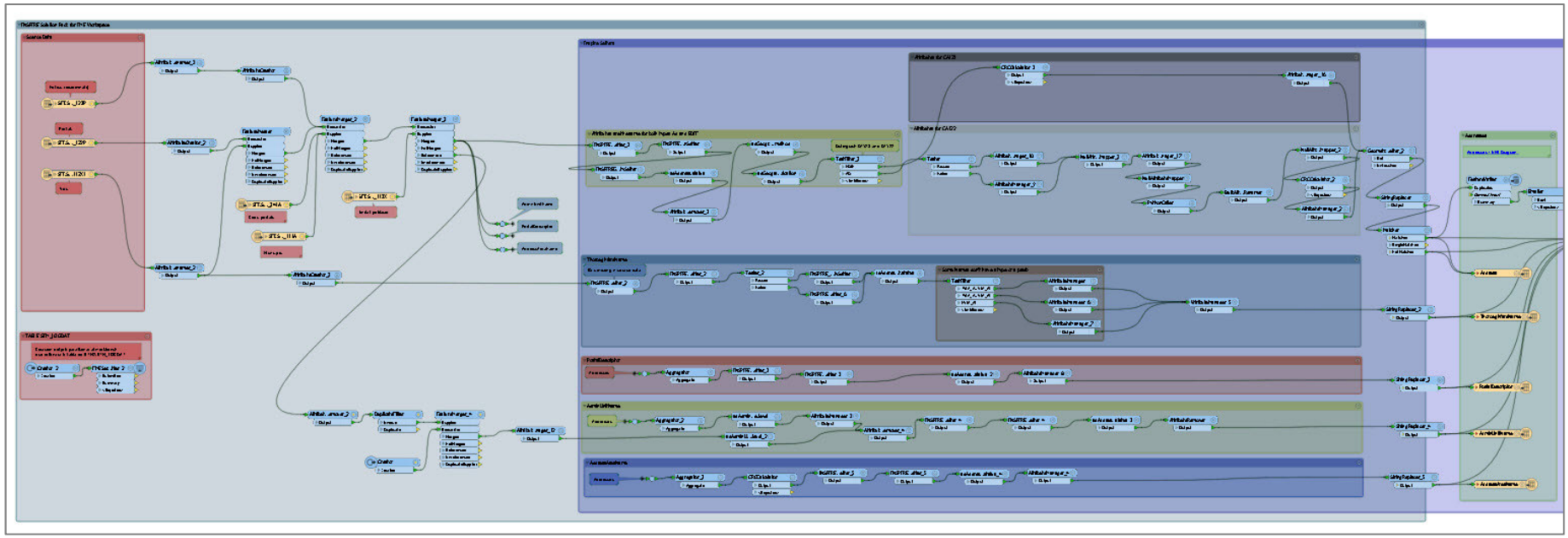
Step 4: .... also with code lists

INSPIRE VerticalPositionValue CODELIST	Field TIPUS_SUP of FANALS TABLE (SIT_XLE1MV1_111L)
onGroundSurface	columna bacul columna artistica balisa
suspendedOrElevated	braç repisa adossat encastat
underground	-

INSPIRE ConditionOfFacilityValue CODELIST	Field ESTAT of FANALS TABLE (SIT_XLE1MV1_141P)
disused	-
functional	bon estat mal estat altres
projected	-
underConstruction	-
decommissioned	fora de servei

Step 5: Review equivalences with departmental partners

Step 6: Design and implement transformation processes

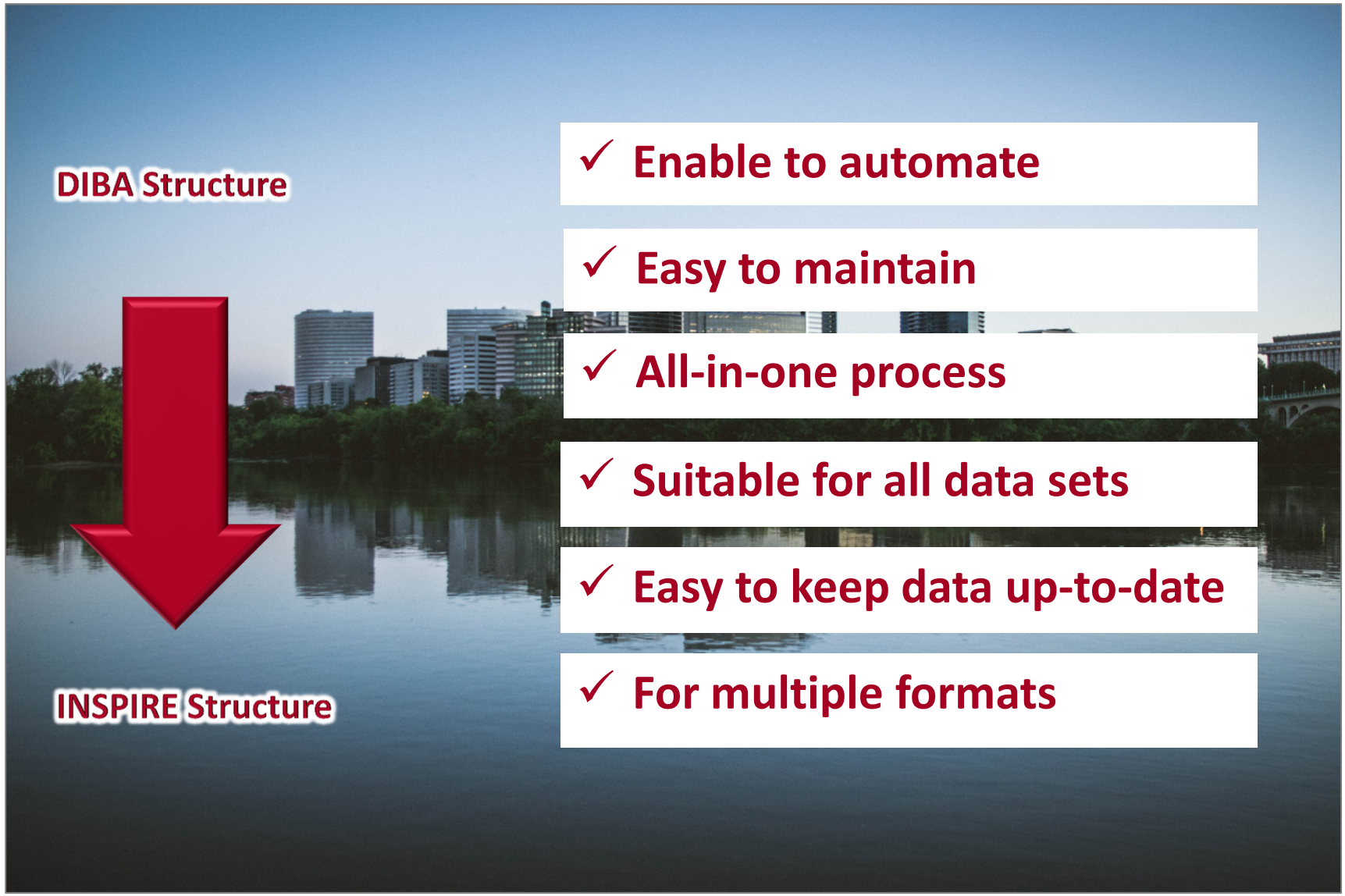


Geographical information transformed from our database:

- I.5 Addresses
- III.8 Production and industrial facilities
- III.6 Utility and governmental services
  - Street lighting network
  - Municipal facilities and services
- III. 12 Natural risk zones

How Do We Transform & Publish Our Data Sets?

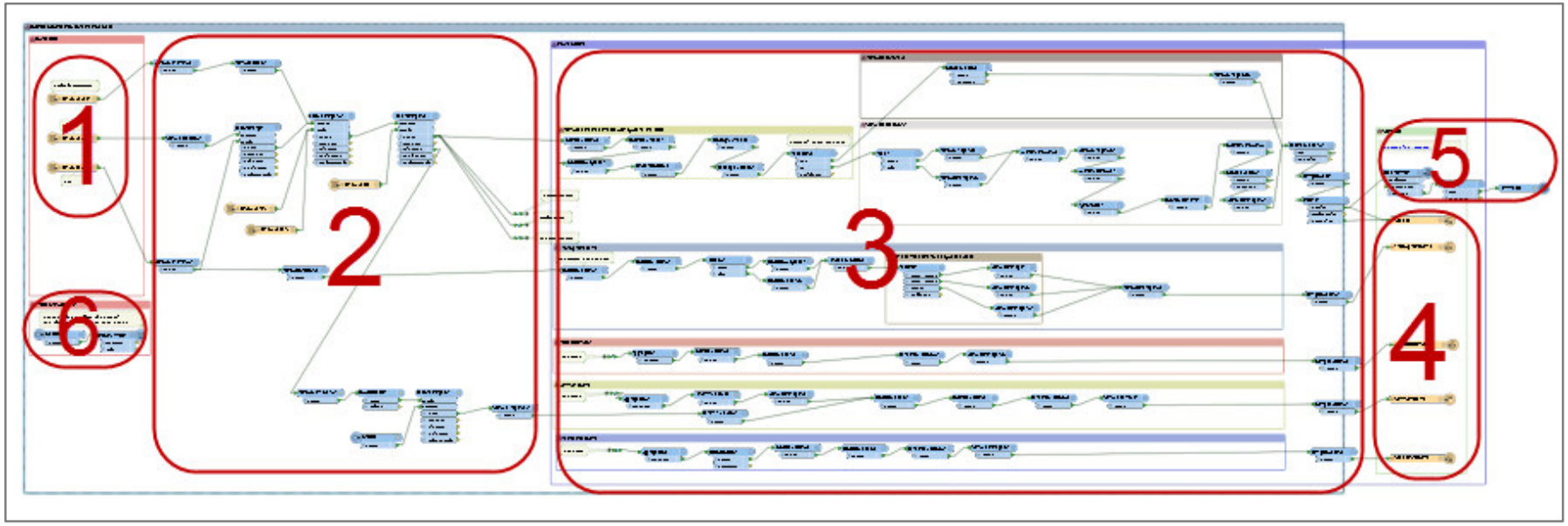
Transformation process for all DIBA INSPIRE data sets



Step 1. Data sets Mapping Table.xml

Application Schema 'Addresses' (version 3.0)						Application Schema <provide nam	
Type	Attribute Association role Constraint	Values / Enumerations	Multiplicity	Voidable / Non-Voida		Attribute Association role Constraint	Attribute / Association role / Constraint documentation
ThoroughfareName Value							
	name	GeographicalNam	1		agafar atribut de 112X1 o de 123P	NOM_VIA o NEDIF_AJ	
	nameParts	PartOfName	0..*	voidable	posar el nom INE en parts	TVIA_INE + NVIA_INE	
Address							
	inspireId	Identifier	1		crear atribut concatenant (únic 122P/123P)	SPA.DB.AD.<ID>	
	alternativeIdentifier	CharacterString	0..1	voidable			
	position	GeographicPositio	1..*		atribut geometria (122P o 123P)	GEOM	
	status	StatusValue* current*	0..1	voidable	void: unpopulated		
	locator	AddressLocator	1..*		copy	PORTAL o NEDIF_AJ	
	validFrom	DateTime	1	voidable	void: unkown		
	validTo	DateTime	0..1	voidable	void: unkown		
	beginLifespanVersi	DateTime	1	voidable	void: unpopulated		
	endLifespanVersion	DateTime	0..1	voidable	void: unpopulated		
LocatorDesignator							
	designator	CharacterString	1		llista d'atributs: EIN, CEIN, etc.	EIN CEIN ESN CESN KM BLOC	
	type	LocatorDesignator	1		cada atribut de "designator"		

Step 2. Transformation process



1. Read data set from database (Oracle Spatial Object)
2. Read related data (Oracle Non-Spatial) → Join, Merge
3. Convert attributes and add codelists (FME INSPIRE Solution Pack)
4. Write data to the output file (GML, GeoJSON)
5. Validate the output file
6. Insert logs (for internal statistics)

Step 3. Automate the generation & publishing process (weekly)

- ✓ Generate XML files for the ATOM Feed Service and for each municipality: automatically from CSW metadata service

  AD GML example:
  http://sitmun.diba.cat/opendata/INSPIRE/AD/**SPADBADATOM**.atom.xml
  http://sitmun.diba.cat/opendata/INSPIRE/AD/**SPADBADATOM_08001**.atom.xml

  general

  municipality

- ✓ Generate GML files for all data changed during the week

  AD GML example:
  http://sitmun.diba.cat/opendata/INSPIRE/AD

domingo, 26 de enero de 2020	22:00	26017	SPA DB AD INSPIRE 08299 25831.zip
domingo, 26 de enero de 2020	22:00	25978	SPA DB AD INSPIRE 08299 4258.zip
domingo, 3 de mayo de 2020	21:03	203797	SPA DB AD INSPIRE 08300 25831.zip
domingo, 3 de mayo de 2020	21:03	203610	SPA DB AD INSPIRE 08300 4258.zip
domingo, 9 de febrero de 2020	22:11	121032	SPA DB AD INSPIRE 08302 25831.zip
domingo, 9 de febrero de 2020	22:11	120954	SPA DB AD INSPIRE 08302 4258.zip
domingo, 26 de enero de 2020	22:00	11601	SPA DB AD INSPIRE 08303 25831.zip
domingo, 26 de enero de 2020	22:00	11570	SPA DB AD INSPIRE 08303 4258.zip

Issues considered (6)

1. **CRS**

- ✓ INSPIRE → EPSG:4258 (mandatory)
- ✓ Official in Catalonia → EPSG:25831 (coord. order: lat/lon, X/Y!!)
- ✓ Required by the specific format. Ex: GeoJSON: EPSG:4326

Issues considered

2. **Formats**

- ✓ INSPIRE → GML (mandatory)
- ✓ Alternative encodings → **Flattened**, easier to GIS clients
  - Flattened data can be processed easier by GIS tools (desktop/web)
  - **https://github.com/INSPIRE-MIF/2017.2 (template + encodings)**
- ✓ **GeoJSON** → Some tests for AD, but not in production yet
  - UML-to-GeoJSON Encoding Rule (geojson-encoding-rule.md)
  - GeoJSON Encoding Rule for INSPIRE Addresses (simple-addresses.md)
  - We reported some minor errors on the AD Model Mapping
  - From GeoJSON to QGis directly!!
  - Testing examples (although not finished):

Issues considered


```
{
"type" : "Feature",
"geometry" : {
                "type" : "Point",
                "coordinates" : [ 446495.963959463, 4611428.0070139999 ]
},
"properties" : {
                "id" : "SPA.DB.AD.08046.000199.9.46000585",
                "inspireid_localId" : "08046.000199.9.46000585",
                "inspireid_namespace" : "SPA.DB.AD",
                "position_method" : "byAdministrator",
                "position_method_href" : "http://inspire.ec.europa.eu/codelist/GeometryMethodValue/byAdministrator",
                "position_specification" : "entrace",
                "position_specification_href" : "http://inspire.ec.europa.eu/codelist/GeometrySpecificationValue/entrance",
                "position_default" : "true",
                "locator_designator_buildingIdentifier" : "Can A.Mercader",
                "locator_level" : "accessLevel",
                "locator_level_href" : "http://inspire.ec.europa.eu/codelist/LocatorLevelValue/accessLevel",
                "component.PostalDescriptor" : "08440",
                "component.AddressAreaName" : "Disseminat de Cardedeu",
                "component.AdminUnitName_1" : "Cardedeu",
                "component.AdminUnitName_2" : "Catalunya"
}
}
```


building name

Issues considered


```
{
"type" : "Feature",
"geometry" : {
                "type" : "Point",
                "coordinates" : [ 446417.65042233, 4609671.6739243204 ]
},
"properties" : {
                "id" : "SPA.DB.AD.08046.000101.540.46000229",
                "inspireid_localId" : "08046.000101.540.46000229",
                "inspireid_namespace" : "SPA.DB.AD",
                "position_method" : "byAdministrator",
                "position_method_href" : "http://inspire.ec.europa.eu/codelist/GeometryMethodValue/byAdministrator",
                "position_specification" : "entrace",
                "position_specification_href" : "http://inspire.ec.europa.eu/codelist/GeometrySpecificationValue/entrance",
                "position_default" : "true",
                "component.ThoroughfareName" : "Av. del Rei En Jaume",
                "locator_designator_addressNumber" : "81-83",
                "locator_level" : "accessLevel",
                "locator_level_href" : "http://inspire.ec.europa.eu/codelist/LocatorLevelValue/accessLevel",
                "component.PostalDescriptor" : "08440",
                "component.AddressAreaName" : "Cardedeu",
                "component.AdminUnitName_1" : "Cardedeu",
                "component.AdminUnitName_2" : "Catalunya“
}
}
```


number

Issues considered

Issues considered

- ✓ **Geopackage** → Looking forward to an encoding rule document!!

Issues considered

3. **Unique identifiers**

- ✓ No official rule in Catalonia yet
- ✓ Meanwhile → Hierarchical with "SPA.DB.AD" as the root

  (SPA: Spain; DB: Diputació de Barcelona; AD: Addresses). Example:

Official code for municipality - **ad:AdminUnitName**

SPA.DB.AD.**08246**

Official code for area - **ad:AddressAreaName**

SPA.DB.AD.**08246.000101**

DIBA code for thoroughfare - **ad:ThoroughfareName**

SPA.DB.AD.**08246.000101.221**

DIBA code for address - **ad:Address**

SPA.DB.AD.**08246.000101.221.244000187**

Geom: The same code as address with a suffix to make it unique - **gml:Point**

SPA.DB.AD.**08246.000101.221.244000187-0**

Official code for postal code - **ad:PostalDescriptor**

SPA.DB.AD.**08552**

Issues considered

4. **GML – AD → AddressRepresentation**

- ✓ Useful to be visualised on the map, but it is not a gml:Feature, it cannot be included in the output GML file (FeatureCollection)
- ✓ Solution: We use **addressIdentifierGeneral** to hold the compound Address

Issues considered

5. **GML – AD → Order of the Address extension components**

- ✓ No specification about order of these components
- ✓ An addressNumberExtension of an Address can be assigned to different addressNumber
- ✓ Example: “18B-20” → It is not possible to know to which element this “B” extension is assigned to (18 or 20?)
- ✓ We cannot use addressNumber to label the compound address as it must be “composed only by numbers”!!

Issues considered

5. **GML – AD → Order of the Address extension components**

- ✓ Solutions
  - A “visual” solution: We force the order when writing to the GML file
  - We add the **addressIdentifierGeneral** element which contains the compound Address

Issues considered

6. **GeoJSON – AD → addressNumber**

- ✓ Compound address → 2 pairs of "addressNumber/addressExtension": "26/A", "28/null"
- ✓ Recommendation from the editors → To use **addressNumber** for compound addresses as it is of type **String**: *"locator_designator_addressNumber": "26A-28"*
- ✓ Reason → The intent behind the GeoJSON encoding is to create a structure that, for most use cases, is fully **flattened** and does not use complex properties, as these have very limited support in a lot of client software

Be INSPIREd & thank you!

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