



In situ

Copernicus and INSPIRE

Creation of pan-European datasets:
Hydrography and Buildings

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Copernicus uses geospatial information

Copernicus Services need access to **openly available, up-to-date** and **harmonised** geospatial information across **Europe** for production and validation purposes.





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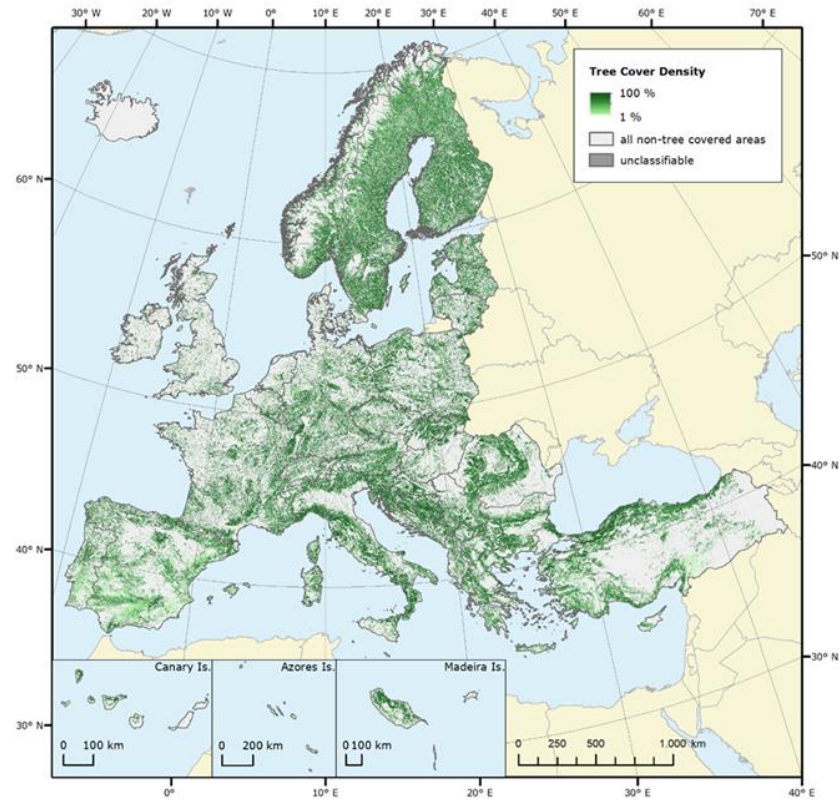
Copernicus and INSPIRE – proof of concept

Copernicus can benefit from the Member States' implementation of INSPIRE.

The EEA has made an effort to verify how feasible it is to prepare INSPIRE data for use by Copernicus.

'Administrative Units' was chosen as a (simple) test case in 2018

In 2019, 'Hydrography' and 'Buildings' are now under testing

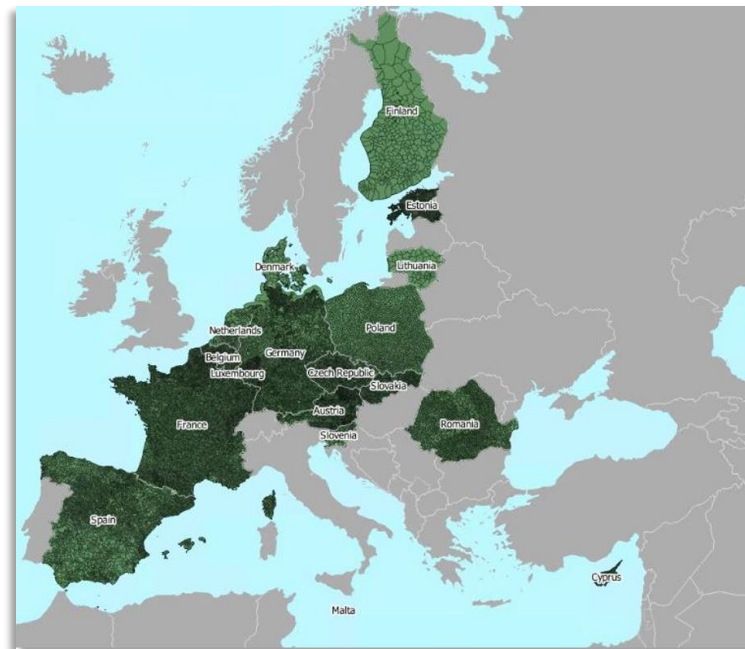




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Main conclusions of the AU test

- An **up-to-date** [pan-European] AU dataset, based on **authoritative** data including traceability, and in an **automated** and rather quickly manner.
- Only 20 countries available at the time of the test (Spring 2018)
- Simple schema!
- Challenges:
 - Access (download service, authentication)
 - Content (missing features, scale, schema versions)
 - Update (automatically?)



The analysis was completed by the CORDA Team (Georama) spring 2018

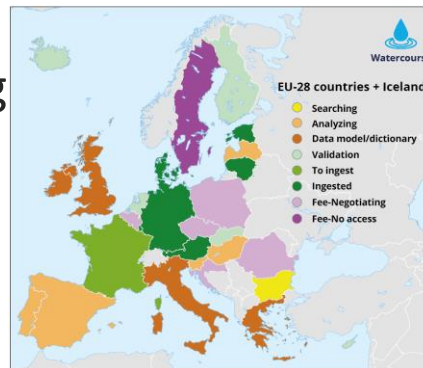


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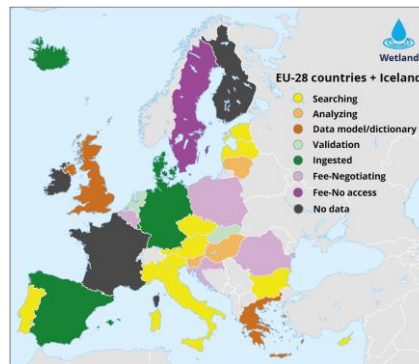
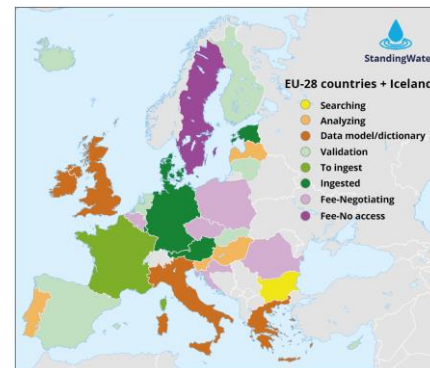
HY Multi-country dataset

- Objective: **Multi-country** [pan-European] **dataset** with the following features:
 - Watercourse
 - LandWaterBoundary
 - Wetland
 - StandingWater
- CEMS requirements:
 - Some attributes of special interest (name, persistence, stream order)
 - 1:25000, accuracy 5 m
 - Connectivity, logical consistency
 - Watercourse linear continuity
- Ongoing effort (status as of June 2019)

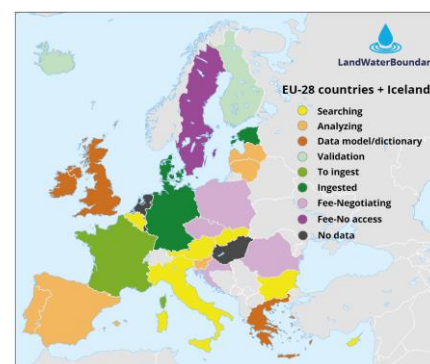
Watercourse



StandingWater



Wetland



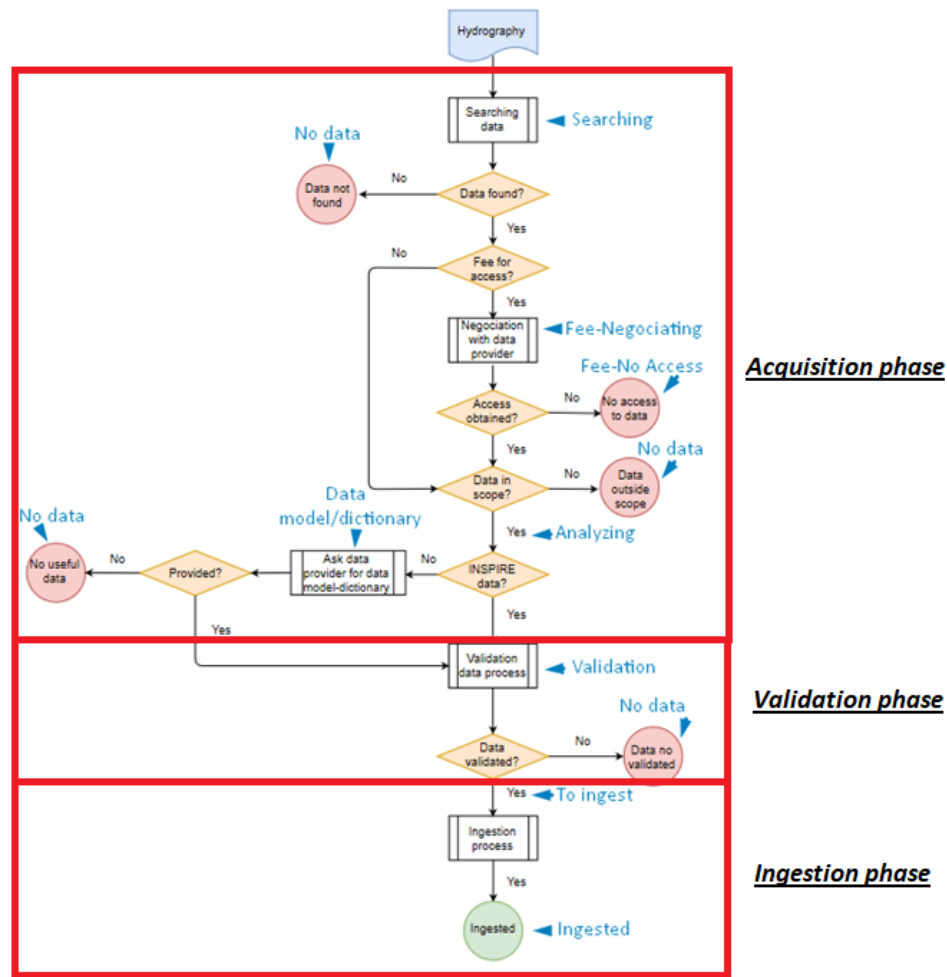
LandWaterBoundary



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Common Methodology

- **Three phases:**
 - Acquisition
 - Validation
 - Ingestion
- **Data gathering:**
 - 1) INSPIRE Geoportal
 - 2) CORDA platform
 - 3) National/Regional platforms
 - 4) General search on internet
- Regional search after national search for some countries
 - AT, BE, FR, DE, IT, PT, UK
- **Different scenarios** depending on **INSPIRE (non-)compliance**

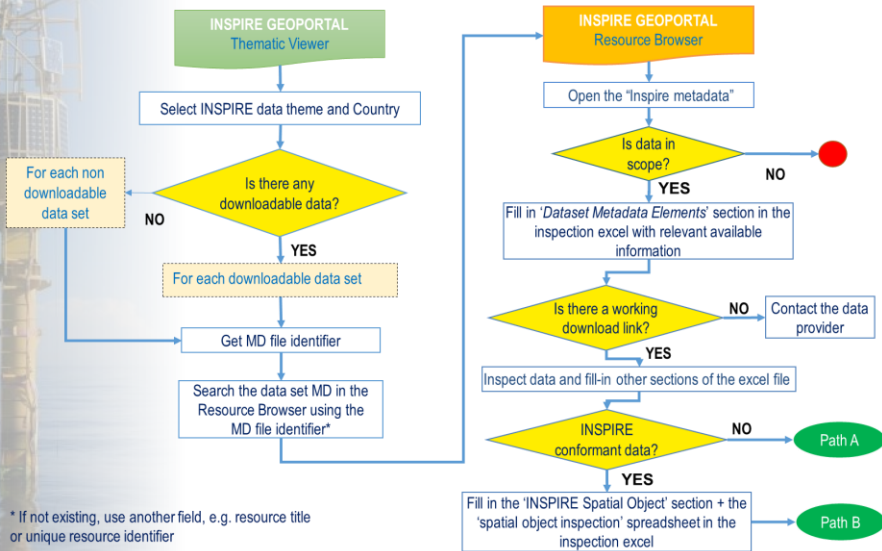




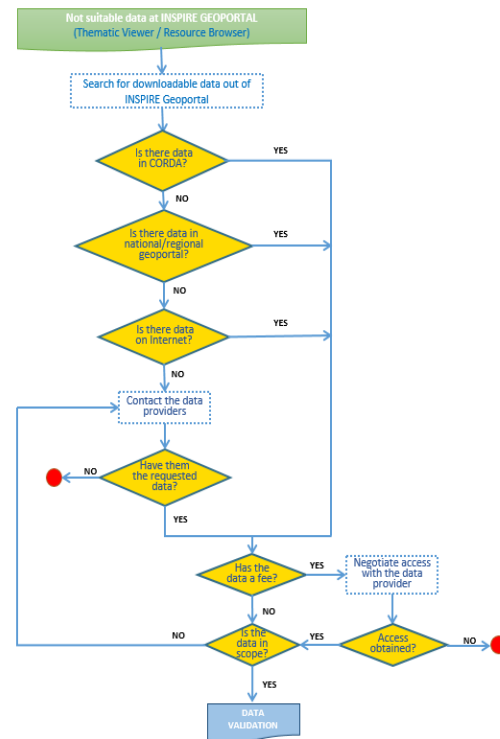
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Common Methodology - Acquisition

1. INSPIRE Geoportal



2. If not in INSPIRE Geoportal



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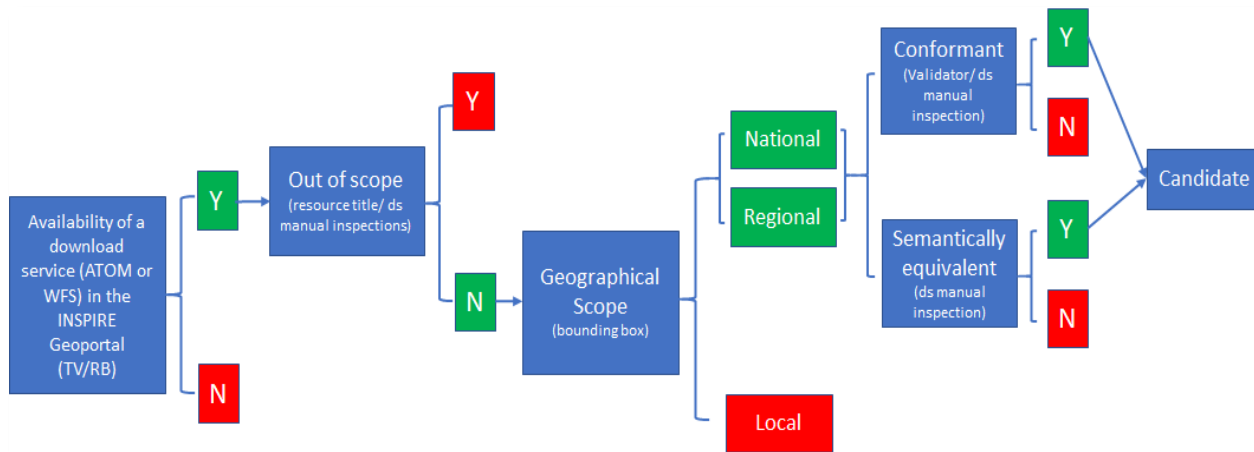




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Common Methodology – Validation and Ingestion

Workflow to mark a dataset candidate for ingestion (validation)



Additional elements checked before ingestion:

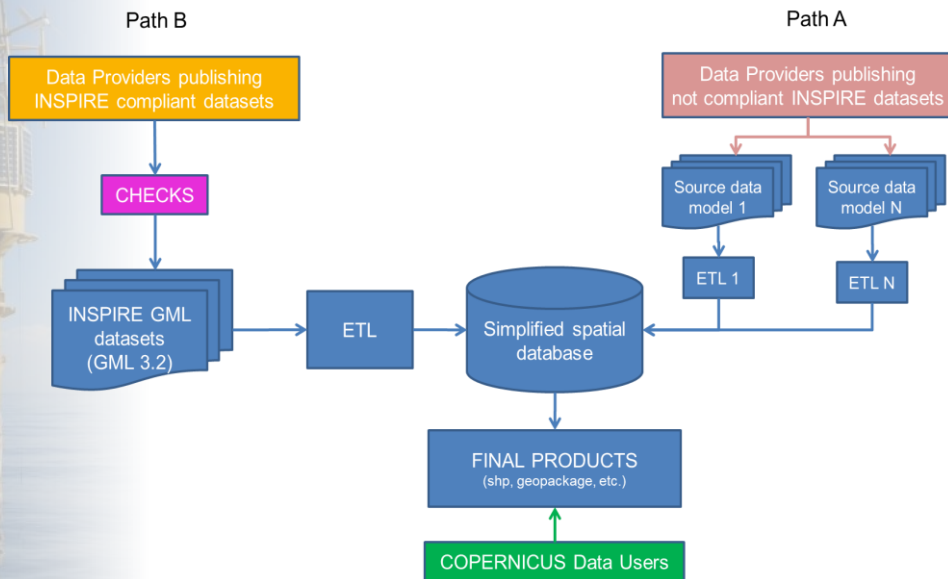
- Spatial resolution
- Temporal reference
- Existence of target feature types
- CRS
- Data sharing conditions



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Common Methodology – Validation and Ingestion

Ingestion process



- All validated datasets are ingested into a PostGIS database with a data structure based on a simplified HY model.
- The added value of INSPIRE conformant datasets: only one ETL process is applied to all source datasets.
- Source datasets not conformant with INSPIRE require an ad-hoc ETL process each.



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Hydrography – Feature type analysis

Watercourse feature type 59%

Country	Discovered in INSPIRE Geoportal	Discovered in National Geoportals / CORDA	INSPIRE structure ¹ (Y/N)
Austria	Y	-	Y
Cyprus	-	Y	N
Denmark	Y	-	Y
Estonia	Y	-	Y
Finland	Y	-	Y
France	-	Y	Y
Germany	Y	-	Y
Greece	-	Y	N
Hungary	-	Y	N
Ireland	-	Y	N
Iceland	Y	-	Y
Italy	-	Y	N
Latvia	-	Y	N
Lithuania	Y	-	Y
Luxembourg	Y	-	Y
Malta	Y	-	Y
Netherlands	-	Y	Y
Portugal	-	Y	N
Slovakia	Y	-	Y
Slovenia	-	Y	N
Spain	Y	-	Y
United Kingdom	-	Y	N

StandingWater feature type 68%

Country	Discovered in INSPIRE Geoportal	Discovered in National Geoportals	INSPIRE structure ¹ (Y/N)
Austria	Y	-	Y
Cyprus	-	Y	N
Denmark	Y	-	Y
Estonia	Y	-	Y
Finland	Y	-	Y
France	-	Y	Y
Germany	Y	-	Y
Hungary	-	Y	N
Ireland	-	Y	N
Italy	-	Y	N
Latvia	-	Y	N
Lithuania	Y	-	Y
Luxembourg	Y	-	Y
Malta	Y	-	Y
Netherlands	-	Y	Y
Portugal	-	Y	N
Slovakia	Y	-	Y
Slovenia	-	-	Y
Spain	Y	-	Y

Wetland feature type 69%

Country	Discovered in INSPIRE Geoportal	Discovered in National Geoportals	INSPIRE structure ¹ (Y/N)
Denmark	Y	-	Y
Germany	Y	-	Y
Greece	-	Y	N
Hungary	-	Y	N
Iceland	Y	-	Y
Luxembourg	Y	-	Y
Lithuania	-	Y	Y
Malta	Y	-	Y
Netherlands	-	Y	Y
Slovakia	Y	-	Y
Slovenia	-	Y	N
Spain	Y	-	Y
United Kingdom	-	Y	N

LandWaterBoundary feature type 53%

Country	Discovered in INSPIRE Geoportal	Discovered in National Geoportals	INSPIRE structure ¹ (Y/N)
Denmark	Y		Y
Estonia	Y		Y
France		Y	Y
Finland	Y		Y
Germany	Y		Y
Greece		Y	N
Ireland		Y	N
Iceland	Y		Y
Latvia		Y	N
Lithuania		Y	N
Malta	Y		Y
Portugal		Y	N
Slovenia		Y	N
Spain	Y		Y
United Kingdom		Y	N

¹ "INSPIRE structure" means data conformant to INSPIRE or data semantically equivalent to INSPIRE (i.e. having the same attributes and properties required by the simplified data model for HY).



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Hydrography – Feature type analysis

Datasets with fees at national level

Country	Spatial object			
	Watercourse	StandingWater	LandWaterBoundary	Wetland
Belgium	X	X		X
Croatia	X	X	X	X
Czechia	X	X		X
France	X	X	X	
Ireland**	X	X	X	X
Poland	X	X	X	X
Romania	X	X	X	X
Sweden**	X	X	X	X

- If a fee is required to access and use the data, data provider is contacted
- First – sample to confirm suitability
- If suitable, an agreement is pursued following Copernicus data policy (not always achieved)

No data

Country	Spatial object			
	Watercourse	StandingWater	LandWaterBoundary	Wetland
Finland				No data
France				No data
Hungary			No data	
Ireland				No data
Luxembourg			No data	
Netherlands			No data	
Sweden	Fee-No access	Fee-No access	Fee-No access	Fee-No access

- These are the countries where no data was found / accessed for CEMS requirements...
- ...or no agreement was possible



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Hydrography – Feature type analysis

Geographic Scale

Country	Scale			
	<u>Watercourse</u>	<u>StandingWater</u>	<u>Wetland</u>	<u>LandWaterBoundary</u>
Austria	50 000	50 000	-	-
Cyprus	50 000	50 000	-	-
Denmark	1 000	1 000	1 000	1 000
Estonia	10 000	10 000	-	10 000
Finland	10 000	10 000	-	10 000
France	50 000	50 000	-	50 000
Germany	250 000	250 000	250 000	250 000
Greece	NOT PROVIDED	NOT PROVIDED	NOT PROVIDED	NOT PROVIDED
Italy	250 000	-	-	-
Latvia	50 000	50 000	-	50 000
Lithuania	10 000	10 000	NOT PROVIDED	NOT PROVIDED
Luxembourg	NOT PROVIDED	NOT PROVIDED	NOT PROVIDED	NOT PROVIDED
Malta	NOT PROVIDED	NOT PROVIDED	NOT PROVIDED	NOT PROVIDED
Netherlands	25 000	25 000	1000	-
Portugal	25 000	25 000	-	25 000
Slovakia	10 000	10 000	10 000	-
Spain	5 000	5 000	5 000	-
United Kingdom	50 000	NOT PROVIDED	NOT PROVIDED	NOT PROVIDED
Ireland	50 000	50 000	-	50 000

- As reported in the metadata element
- Very wide variety, between 1:1K (DK) to 1:250:000 (IT)
- Scale info not always provided

Coordinate Reference System

Country	EPSG			
	<u>Watercourse</u>	<u>StandingWater</u>	<u>Wetland</u>	<u>LandWaterBoundary</u>
Austria	31287	31287	-	-
Cyprus	-	-	-	-
Denmark	3044	3044	3044	3044
Estonia	4258-3301	4258-3301	-	4258-3301
Finland	3067 – 3035 – 4326 - 3857	3067 – 3035 – 4326 - 3857	-	3067 – 3035 – 4326 - 3857
France	4258-3857-3035-4326	4258-3857-3035-4326	-	4258-3857-3035-4326
Germany	4258	4258	4258	4258
Greece	-	-	-	-
Italy	-	-	-	-
Latvia	-	-	-	-
Lithuania	4258	4258	-	-
Luxembourg	3035	3035	3035	-
Malta	3045	3045	3045	3045
Netherlands	-	-	4258	-
Portugal	-	-	-	-
Slovakia	4258	4258	4258	-
Spain	4258	4258	4258	-
United Kingdom	x	-	-	-
Ireland	29902-5731	29902-5731	-	29902-5731

- Wide variety of CRSs provided, many in EPSG:4258 (ETRS89 lat lon), required by CEMS

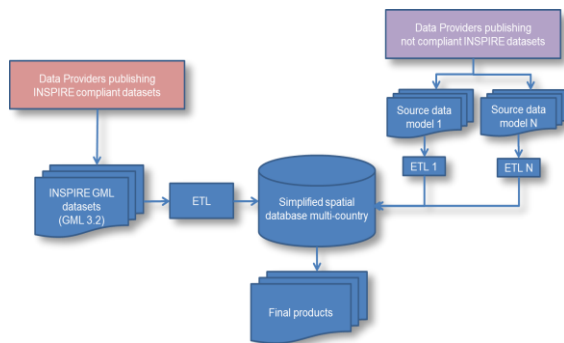


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Hydrography – Multi country database

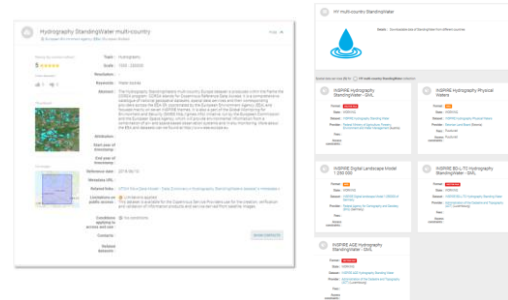
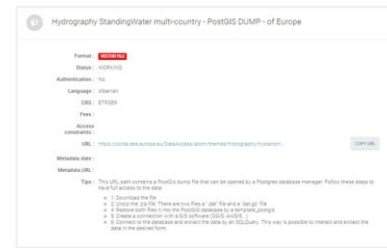
Quality checks on ingested datasets

- Semantic content
- Completeness
- Geometry types
- CRS
- Position



Data publication and update

- PostGIS Dump in CORDA (so far) with simplified HY model
- One database per feature (two tables: national, regional)
- One metadata file per feature / database
- A document with data dictionary and data model per feature
- Data collections (per feature and country) pointing at the original datasets
- Update by inspecting every 2 weeks the harvesting status in INSPIRE Geoportal





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B U Multi-country dataset

- Objective: **Multi-country** [pan-European] **building dataset**
- Features of interest (CLMS, CEMS, CSS):
 - AbstractConstruction.dateOfConstruction
 - AbstractBuilding.currentUse
 - AbstractBuilding.numberOfFloorsAboveGround
- Few datasets at the INSPIRE geoportal, very few harmonised
- More datasets with fees (than HY)
- Huge datasets, difficult to download
 - 14 days and 9K GetFeature requests to download the whole FR dataset
- Scale 1:1K, 5K, 10K, diversity of CRS

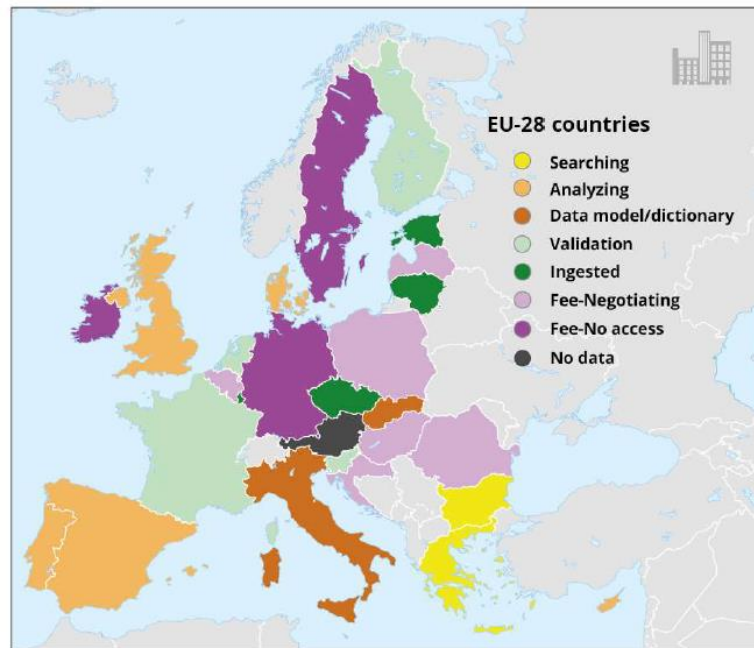


Figure 9: Summary Map of the status of the data by country in the process of the creation of the multi-country dataset.



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Preliminary conclusions

- Feasible to find the most **up-to-date and official** data in many cases.
- **Not always INSPIRE-compliant!**
- **Huge size of datasets** is an obstacle for downloading and processing
 - Limitation in number of features per operation, lack of information of total number of features (gethits), no SortBy functionality, internet connection loss
- Additional burden to **understand the model** used and process data if not INSPIRE compliant.
- Obstacles created more due to the **existence of fees** than unclear licensing
 - Authentication issues overcome after contacting providers
- Difficult to identify if there are **missing features** in these datasets
- **Multi-country database** in CORDA helps future (Copernicus) users to access all the data in the same structure across Europe





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Preliminary recommendations for INSPIRE providers

- Improve the **documentation on quality** in the metadata (DQ elements, abstract, lineage)
- Provide information on the **organisation of the datasets** (e.g. in the abstract)
- Use **standard licenses (CC)**, **waive or reduce fees** when possible/feasible
- Provide **alternative options** for download, especially when limiting the number of downloadable features in WFS
- If dataset not yet INSPIRE compliant, provide information on its **data model and data dictionary** to facilitate usability





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Thank you for your
attention

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