The European Location Framework (ELF)

Interoperability solutions for European Public Administrations and the INSPIRE Directive

Presentation to: **INSPIRE – Geospatial World Forum, Lisbon**

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ELF EUROPEAN LOCATION FRAMEWORK

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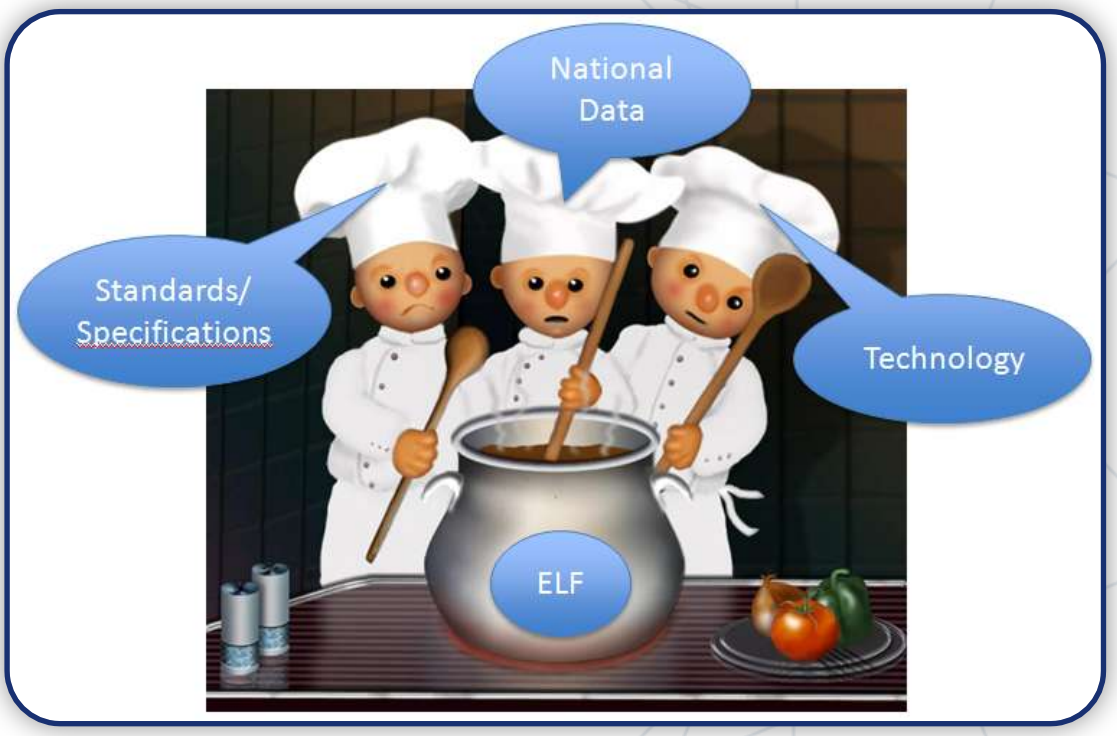
ELF Data: Objectives

To provide ELF data specifications based on **INSPIRE specifications**

To provide data maintenance and **processing specifications** for the **geo-tools**

To provide **product and service specifications** for the ELF services



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Main challenges to face in providing ELF data

- To provide **national authoritative reference** data
- To provide **cross-border harmonised data** at European level
- to **meet users needs (European)**
- To insure **sustainable maintenance** and updates of the data (quality insurance)
- To adopt a **standard** dedicated to data exchange and **used by the geoprocessing tools**.

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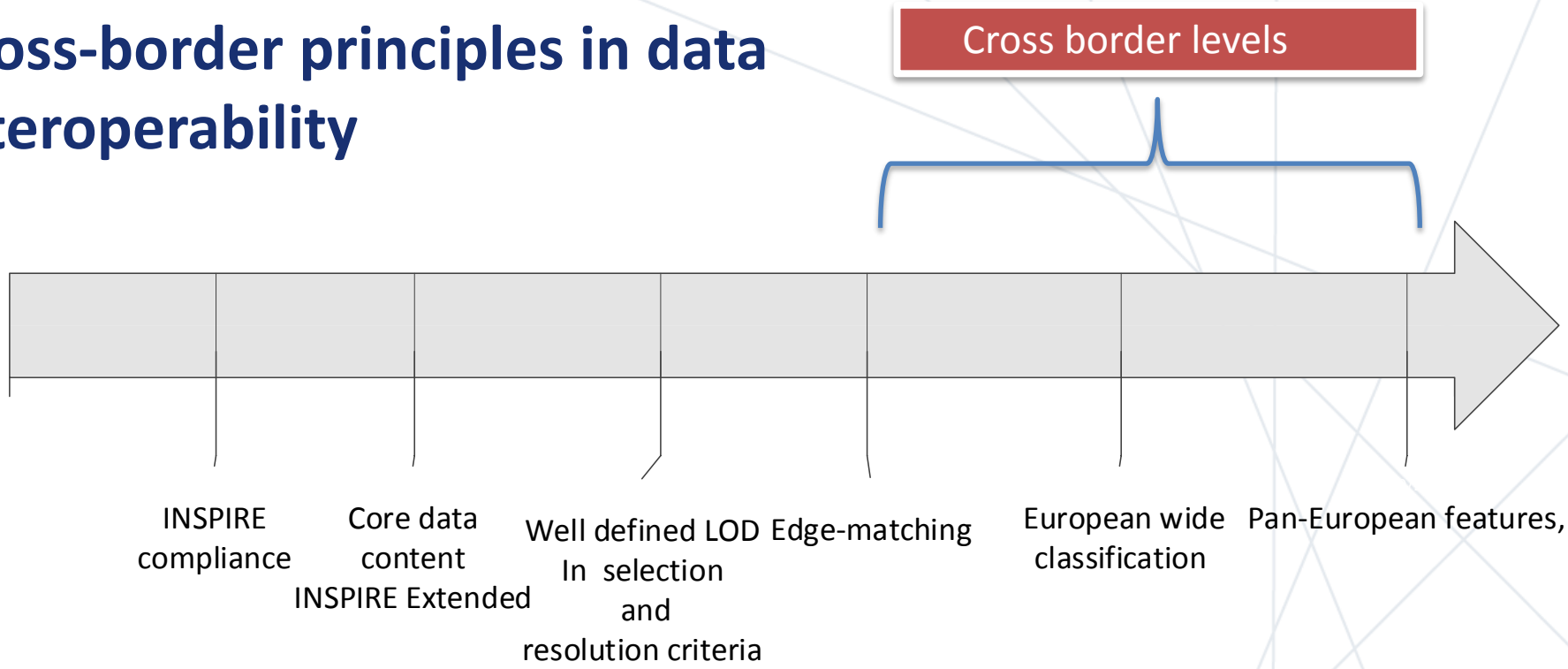
Cross-border principles in data interoperability



- This graduated scale indicates a step by step approach to achieve the highest degree of interoperability.
- All these steps are finally described in the ELF data specifications

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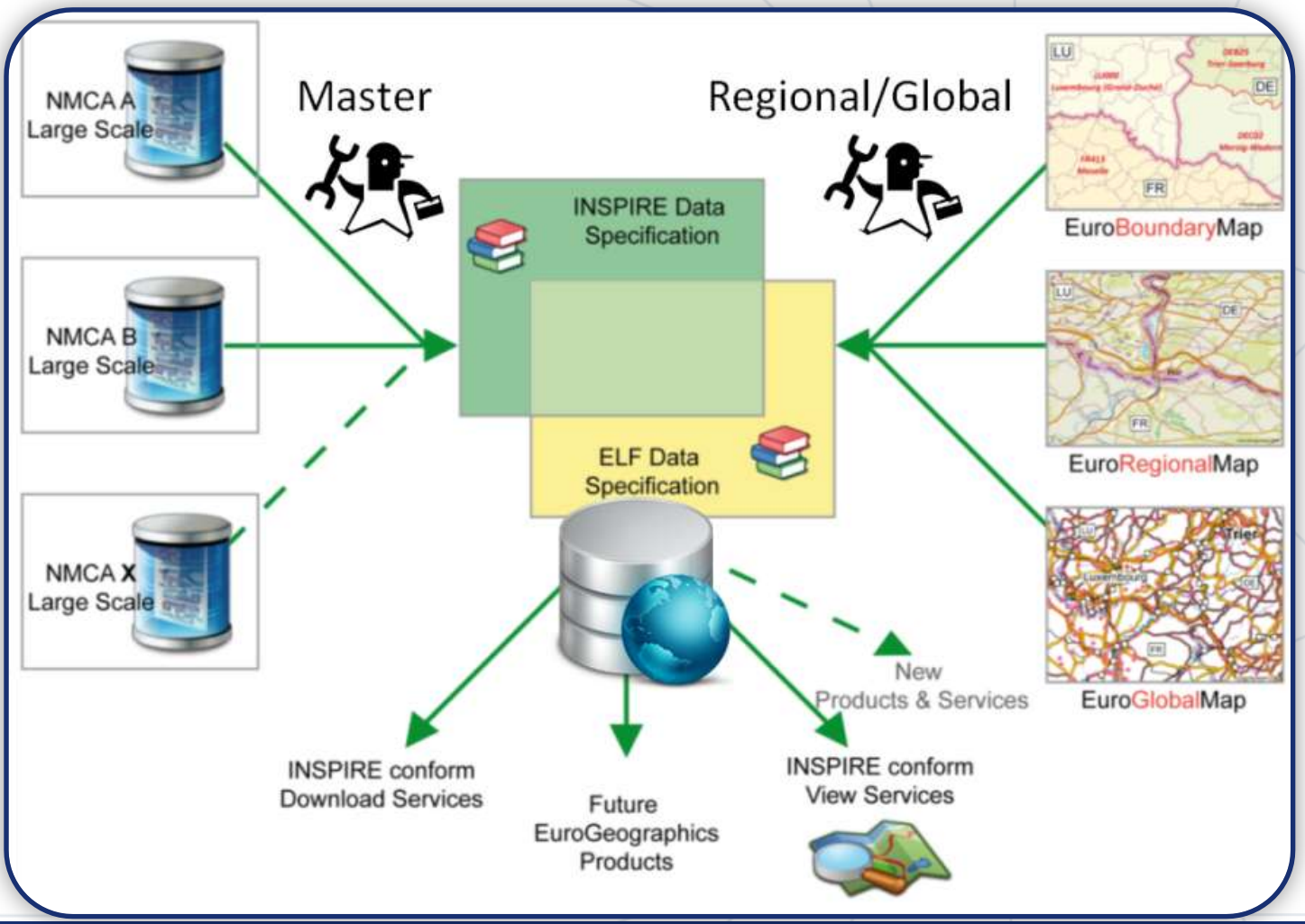
ELF: INSPIRE and more



Data Content by themes and Level of Detail

MASTER LoD0	Master LoD1/2	REGIONAL	GLOBAL
Cadastral Parcels (CP)	Administrative Units (AU)	Administrative Units (AU): AU & NUTS	Administrative Units (AU)
Addresses (AD)	Hydrography (HY)	Hydrography (HY): HY & SR	Hydrography (HY): HY & SR
	Sea Regions (SR)		
	Transport Networks (TN)	Transport Networks (TN)	Transport Networks (TN)
Geographical Names (GN)	Geographical Names (GN)	Geographical Names (GN): GN & POP	Geographical Names (GN): GN & POP
Elevation (EL)	Elevation (EL)	Elevation (EL)	Elevation (EL)
	Land Cover (LC)	Land Cover (LC): POP & VEG	Land Cover (LC): POP
Buildings (BU)	Buildings (BU)	Buildings (BU)	
	Protected Sites (PS)	Protected Sites (PS)	
		Miscellaneous (MISC)	

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Well defined LoD in selection and resolution criteria

LoD	Scale range	Thematic scope
Master Level 0	Larger than 5k	Cadastral Parcels, Buildings, Addresses
Master Level 1	5k – < 25k	ELF Topo
Master Level 2	25k – < 100k	ELF Topo generalised (1:50K)
Regional	100k – 500k	ELF Regional themes
Global	> 500k	ELF Global themes

Master 0/1: prioritize the existing most detailed LoDs of NMCAs without trying any harmonization between national criteria

Master 2: **Generic Rules** :common resolution and selection criteria based on what are the most commonly applied criteria among NMCAs.

Regional/global: **mature level**

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Cross-border : Edge-matching componant

Use of

- Connecting features
- Agreed international boundaries

Advantages

- Recording edge matching cases
- No need of the neigbouring data

EM processing guidelines and specifications

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ELF International Boundaries

Level of detail	Scale	Type of data	Realisation
Treaty level	cadastre scale	high precision coordinates of boundary points and lines	**SBE project** → long-term
Master data level	(1:10') to 1:50'	large scale boundary lines from national basic cadastral or topographic database	**ELF IB Master**
Regional level	1:100' to 1:250'	agreed state boundaries for use at medium scale	**ELF IB Regional** → EBM/ERM
Global level	1:500' to 1:2 M	generalised version	**ELF IB Global** → EGM

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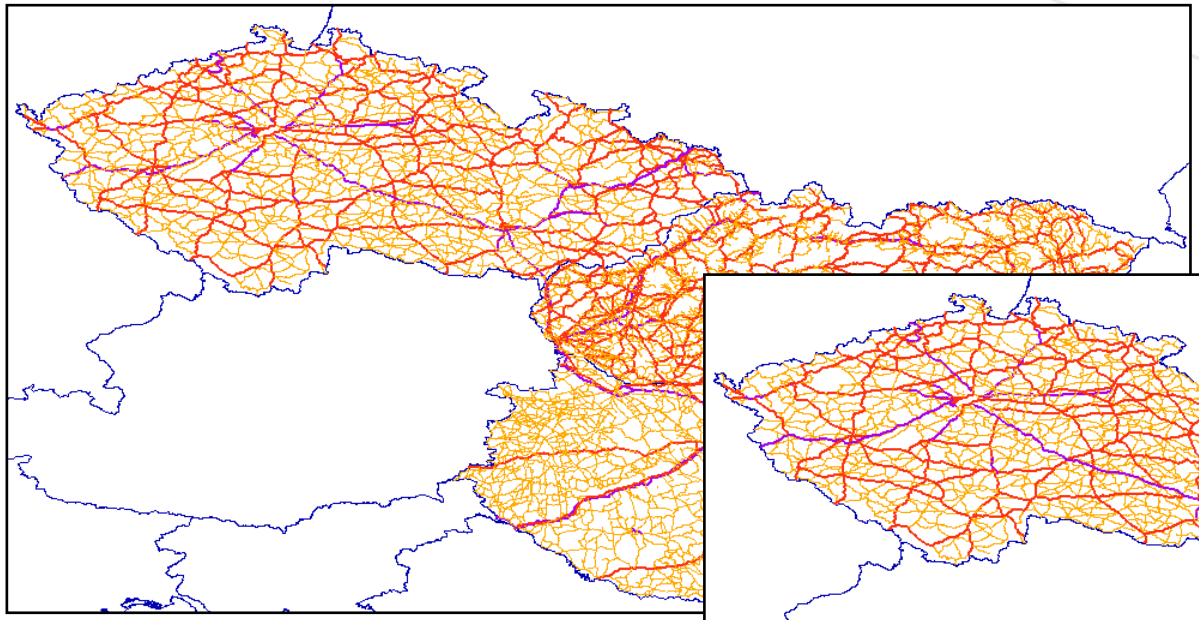
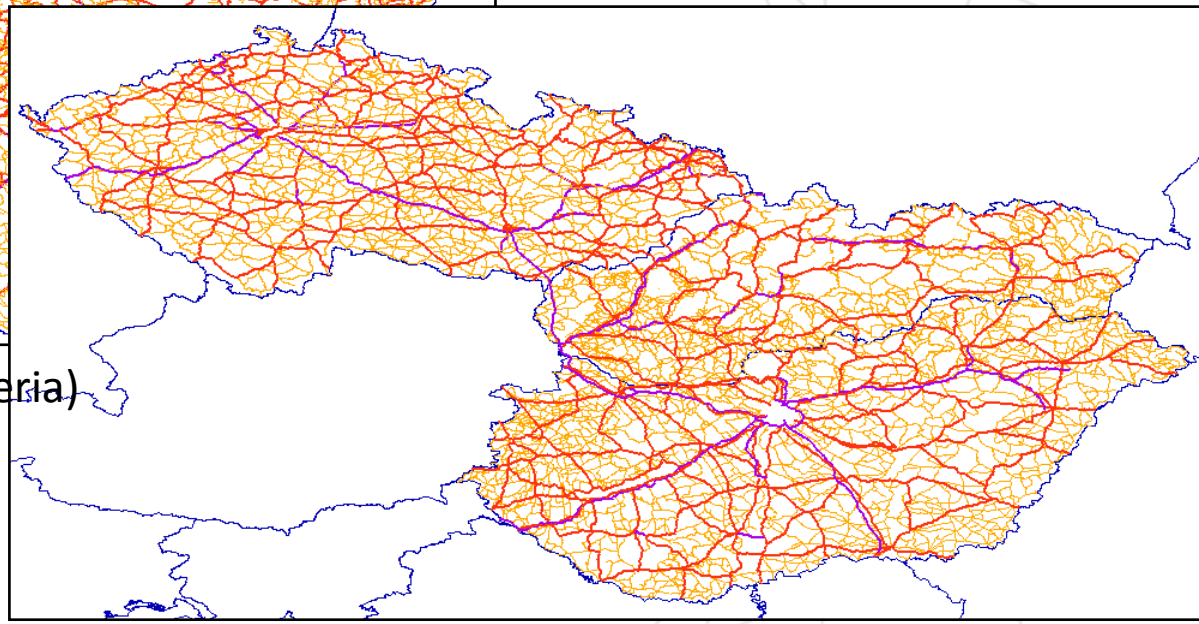
Cross border : European wide classification



Roads classification (national criteria)



Roads classification for mapping purpose: European harmonisation

Cross border: Pan-European features

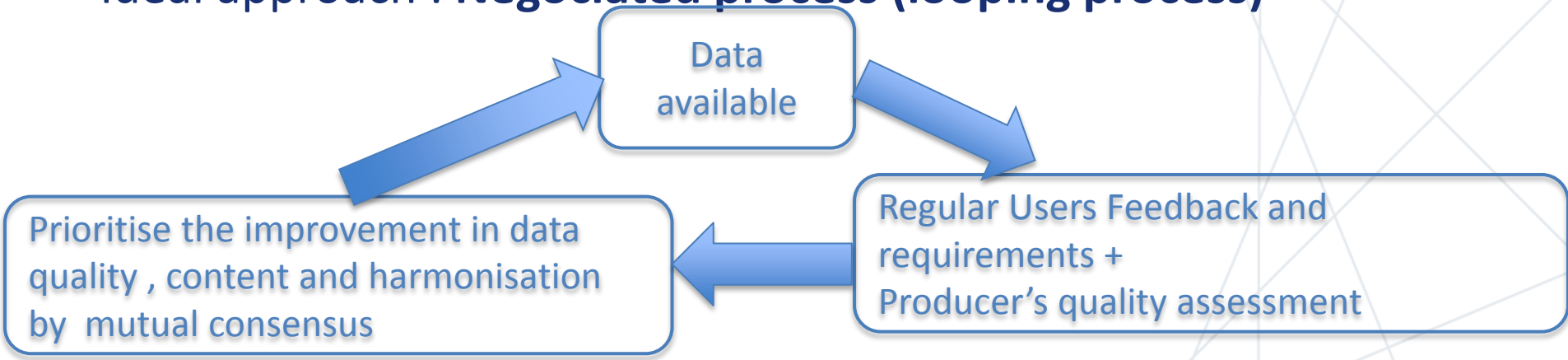
Definition: located on the international boundaries -> duplication

Task: **single feature** combining national attribute/property values whenever different

Attributes	Values	
F_CODE	BH502	
FCsubtype	Watercourse	
HOC	Natural	
HydroID	E.EG.WATRCRS.000009	unique value (European Uid)
HYP	Perennial/Permanent	
ICC	DE#FR	Combined ICC Values (the feature belongs to two countries)
LDV	inDirection	
LEN	2.598898	
LOC	Fictious axis through water area	
NAMA1	Rhein	Name (in German) put into alphabetic order according to NLN attribute value
NAMA2	Le Rhin	Name (in French) put into alphabetic order according to NLN1 and NLN2 attribute value
NAMN1	Rhein	
NAMN2	Le Rhin	
NHI	2000000000000000000#A---0000	Combined national values (DE#FR)
NLN1	GER	
NLN2	FRE	

Meeting Users needs : Users must participate in the data harmonisation process

- Identifying user needs from the beginning
- Prioritise the sectors that the reference data will serve (not too restrictive) and identify the customers to engage dialogue
- Ideal approach : **Negociated process (looping process)**



- Cons: Time consuming (years) Pros: Sustainable data maintenance

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Data Maintenance & Processing

Data Maintenance & Processing

- Update (UIDs)
- Data Aggregation (Edgematching)
- Data Quality

Generalisation

- Master ▶ Regional
- Regional ▶ Global

Visualisation

- Map for Europe (ELF Basemap)

Using INSPIRE/ELF GML standard

Providing guidelines for geo-processing + specifications for tools implementation

1. Transformation (mapping tables)
2. Data quality and reporting (check list, validation rules)
3. Edge-matching
4. Generalisation
   - Master level 1 to Master level 2 (generic rules, to be customise
   - Regional to global (mostly automatised)
5. Change detection (external ID),
   - defining lifecycle rules, populating automatically life cycle information par comparison of two releases of a same dataset

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Geo- processing tools

Tools	Tool developers	Used Software
Data quality Validation	ESRI	ArcGIS
	1Spatial	1Spatial Cloud
	Delft University	prepair and pprepair
Change Detection	IGNF	C++ libraries
Edge-Matching	ESRI	ArcGIS
	1Spatial	Local installation of 1integrate with ELF Edge Matching Rules
	Delft University	prepair and pprepair
Generalization (Regional-Global)	IGNF	C++ programming based on IGN-F internal libraries
Generalization (master LoD1-master LoD2) Generic level	1Spatial	Local installation of 1Generalise with specific Flowline
	Delft University	tGAP builder (prototype implemented in Python)
	KadasterNL	ESRI ArcGIS
Transformation	Snowflake	GO Loader and GO Publisher

Lessons learnt after implementation and testing

1. The ELF/INSPIRE data schema is a little bit too advanced to be easily transformed into most of the GIS software and tools. (Oracle, PostgreSQL, Geodatabase)
   - Tools provider set up their own transformation solutions from INSPIRE/ELF GML into internal flattened data format, which could lead to different interpretation.
   - Geo-processing tools are currently restricted to simple features
   - Basemap application requires simple features

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Lessons learnt after implementation and testing

2. GML file size may be time consuming for transformation process when working on pan-European coverage or on a national coverage, (slow down processes).

Exemple: EuroBoundaryMap dataset

ESRI FGDB (523Mb), 8 Hours in ELF/GML (7660 Mbyte)

3. Not so “easy going” in first implementation

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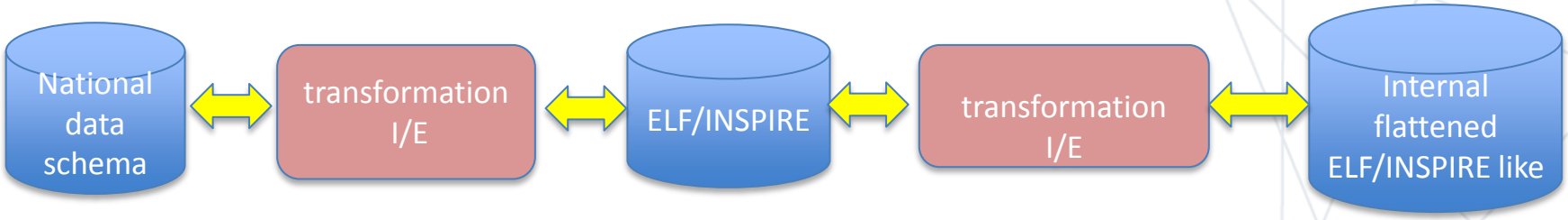
Adoption of INSPIRE/ELF as the standard for data geo-processing: discussion

Scenario 1: ELF/INSPIRE the only valuable standard



Tools provider have to push forward the implementation for properly using INSPIRE/ELF GML

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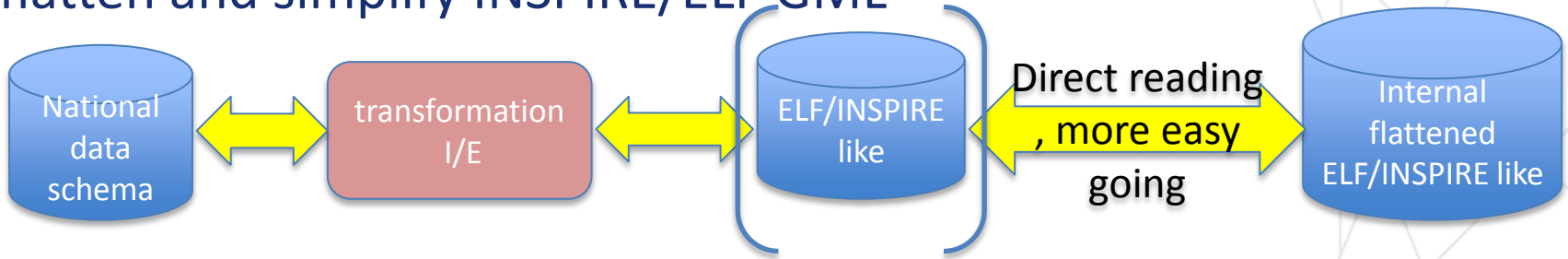
Adoption of INSPIRE/ELF as the standard for data geo-processing: discussion

Scenario 2: (intermediate solution) use a flattened structure (INSPIRE/ELF like) , AND/OR providing common process to flatten and simplify INSPIRE/ELF GML



Issue raised at INSPIRE MIG…

BOTH scenarios would be acceptable?

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Summary

1. Data cross-border interoperability and harmonisation is **composed of several degrees of interoperability** that should be tackled in a step by step approach.
2. **Users** should be **included** from the beginning in the **data harmonisation process** by providing regular feedback
3. **INSPIRE standard** is still a **bit too elaborated to be used** in geo-processing
   - ★ Solutions for improving the implementation using the INSPIRE standard
   - ★ Solutions for symplifying the standard

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From isolated components to integrated, cross-border seamless authoritative reference data …

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Thank you!

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