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INSPIRE · Infrastructure for Spatial Information in Europe

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# Supporting INSPIRE implementation: the Thematic Clusters for topographic and cadastral reference data

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ELF EUROPEAN LOCATION FRAMEWORK

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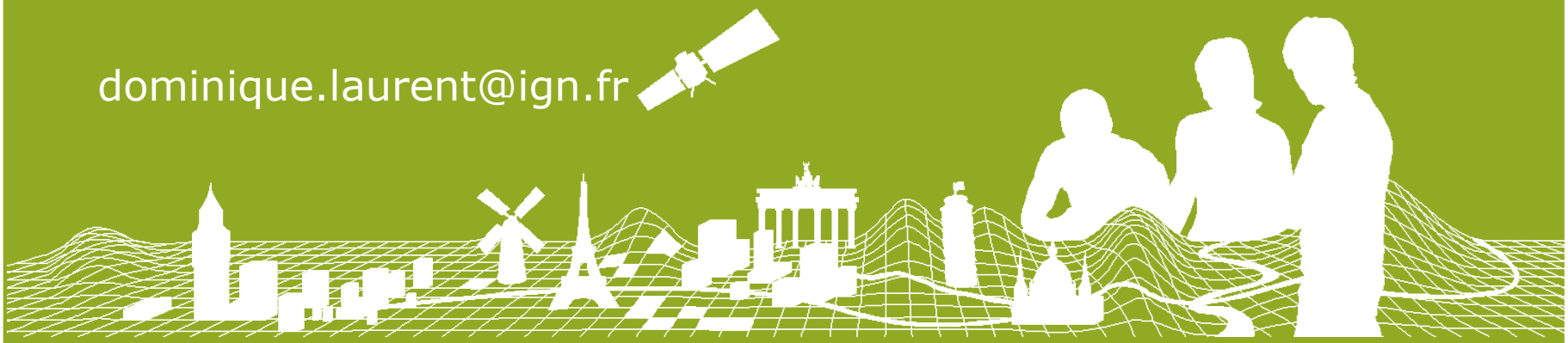


ISN.15.062

# Examples of implementation topics

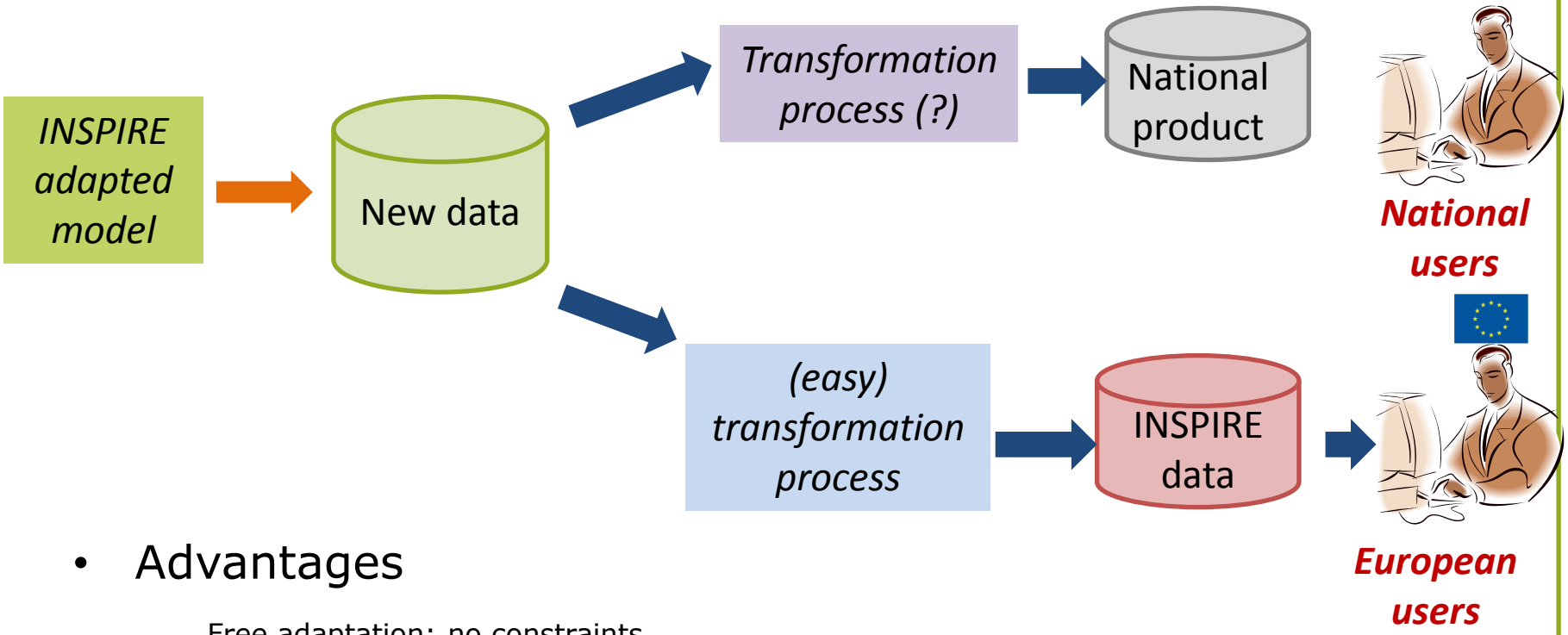
# Extension of INSPIRE schemas

# Context

- When developing new products, data producers generally want to be “close to” INSPIRE

- Data producers may have more data than in INSPIRE data models

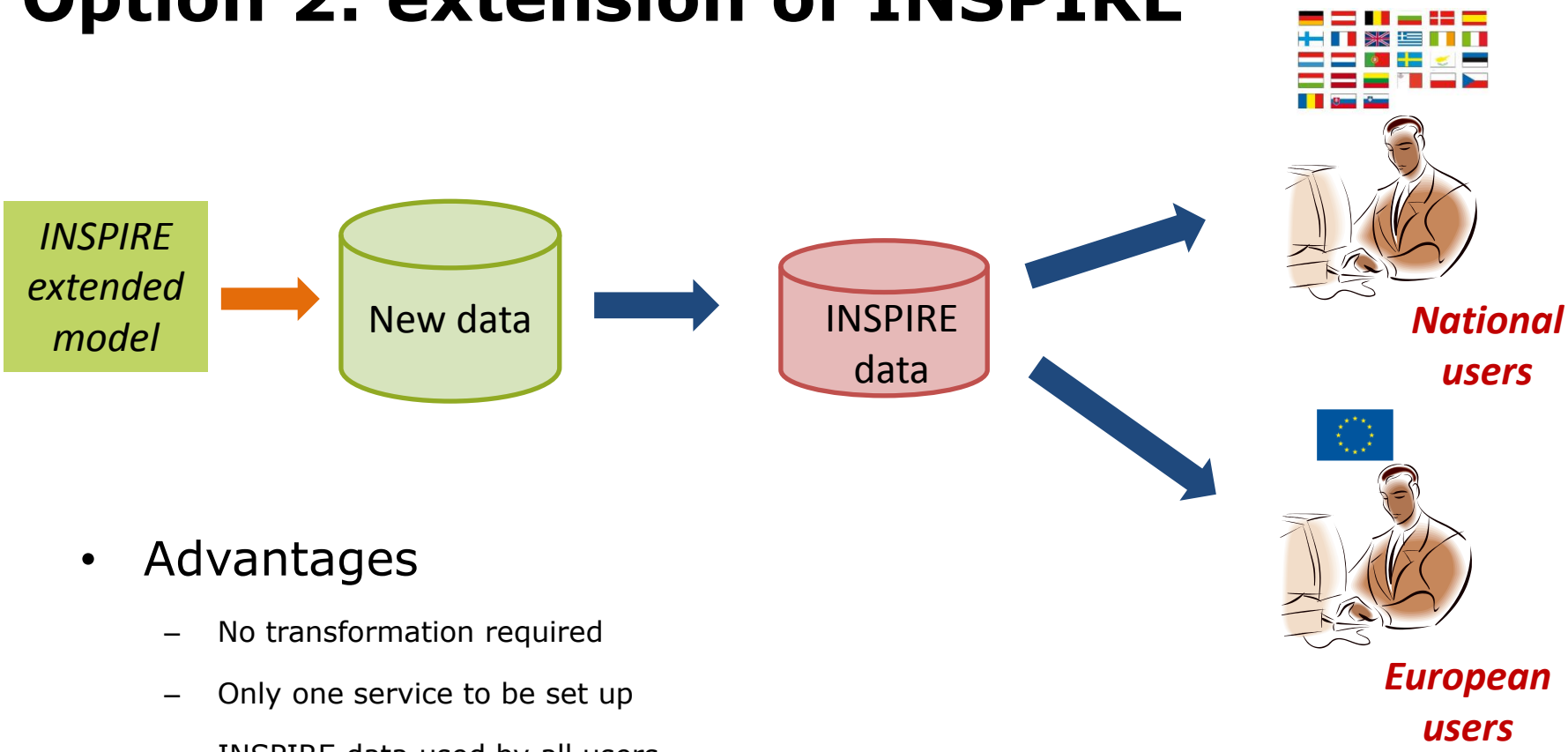
# Option 1: free adaptation of INSPIRE




- Advantages
  - Free adaptation; no constraints
- Drawbacks
  - 2 services to be set up
  - INSPIRE data used only for pan-European or X-border applications

Interoperability poorly achieved

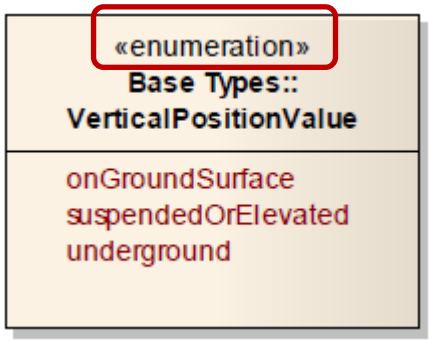
# Option 2: extension of INSPIRE




- Advantages
  - No transformation required
  - Only one service to be set up
  - INSPIRE data used by all users
- Drawbacks
  - Constraints on extended model

# Extension of INSPIRE: brakes

- Code lists and enumerations
  - Context:
    - **Enumerations and some INSPIRE code list are not extensible**
    - General case for Annex I themes
    - => issue for making extended INSPIRE schemas
  - Example 1: VerticalPosition




INSPIRE model

*Potential request for change Enumeration -> hierarchical code list (extension « narrower »)*

*More generally, review extensibility of Annex I code lists*

| « code list » VerticalPositionValue |
|---|
| onGroundSurface |
| suspendedOrElevated |
| 1 |
| 2 |
| 3 |
| … |
| underground |
| -1 |
| -2 |
| -3 |
| …. |

# Extension of INSPIRE: brakes

- Example 2: ServiceTypeValue
  - INSPIRE
    - Restricted scope (theme US)
      - restricted to management of environmental issues;
        - » Education
        - » Health
        - » Security
        - » …
      - **Culture and sport facilities excluded**
    - Code list only "narrower" extensible
  - But
    - more information in some existing data
    - user requirements (ex: POI for Eurostat)

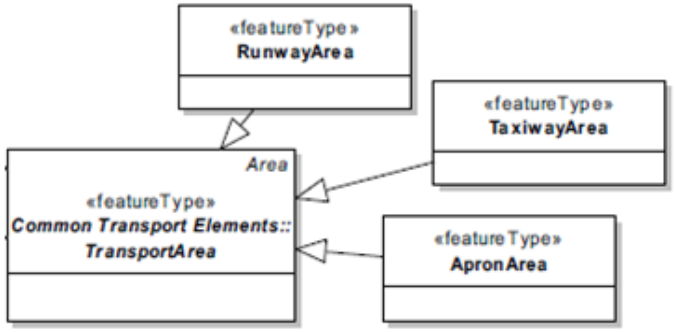
Eurostat POI

| Feature | Importance |
|---|---|
| Hospitals[1] | Mandatory |
| Primary Schools (ISCED[2] 1) | Mandatory |
| Secondary schools | High |
| Universities | High |
| Emergency medical services | High |
| Disposal sites and landfills | High |
| Police stations | Medium |
| Embassies | Low |
| Government buildings | Low |
| Libraries | Low |
| Sport stadiums and facilities | Low |
| Cinemas | Low |
| Concert halls | Low |
| Cultural centres | Low |
| Museums | Low |
| Operas | Low |
| Other event facilities | Low |
| Postal offices | Low |
| Recreation facilities | Low |
| Theatres | Low |
| ……*Excluded from INSPIRE* | |

# Extension of INSPIRE: brakes

- Validation
  - Data producers are unsure about validity of data according to INSPIRE extended schema
  - In theory, extending INSPIRE data models according to Generic Conceptual Model is fine
  - But, in practice:
    - will validation tools validate data against extended schema?
      - May depend on tools?
    - who will ensure that rules of GCM have been respected?

# Extension of INSPIRE: brakes




- Example
  - INSPIRE context
    - Data specifications (TN) : Runways must be represented as areas
    - Generic Conceptual Model : "Extending an INSPIRE data specification would imply at a minimum that:
      - the extension does not change anything in the INSPIRE data specification but normatively references it with all its requirements
      - **the extension does not add a requirement that breaks any requirement of the INSPIRE data Specification** »
  - Existing data (ERM – 250K)
    - Runways are (logically) represented by lines
    - => extension includes additional feature type « RunwayLine »
  - Is it correct to extend INSPIRE schema in this way?

# Topics for discussions

- Have you tried to extend INSPIRE schemas?
  - For which purposes?
  - Which issues ? Solutions?

- Is INSPIRE influencing design of new products? How?
  - Formal extension of INSPIRE schemas?
  - Adaptation of INSPIRE schemas?
    - Principles, purpose, …?

- What MIG should do?
  - facilitate extensions of INSPIRE data models?
  - …?

# Examples of implementation topics

# Flattening of logical model?

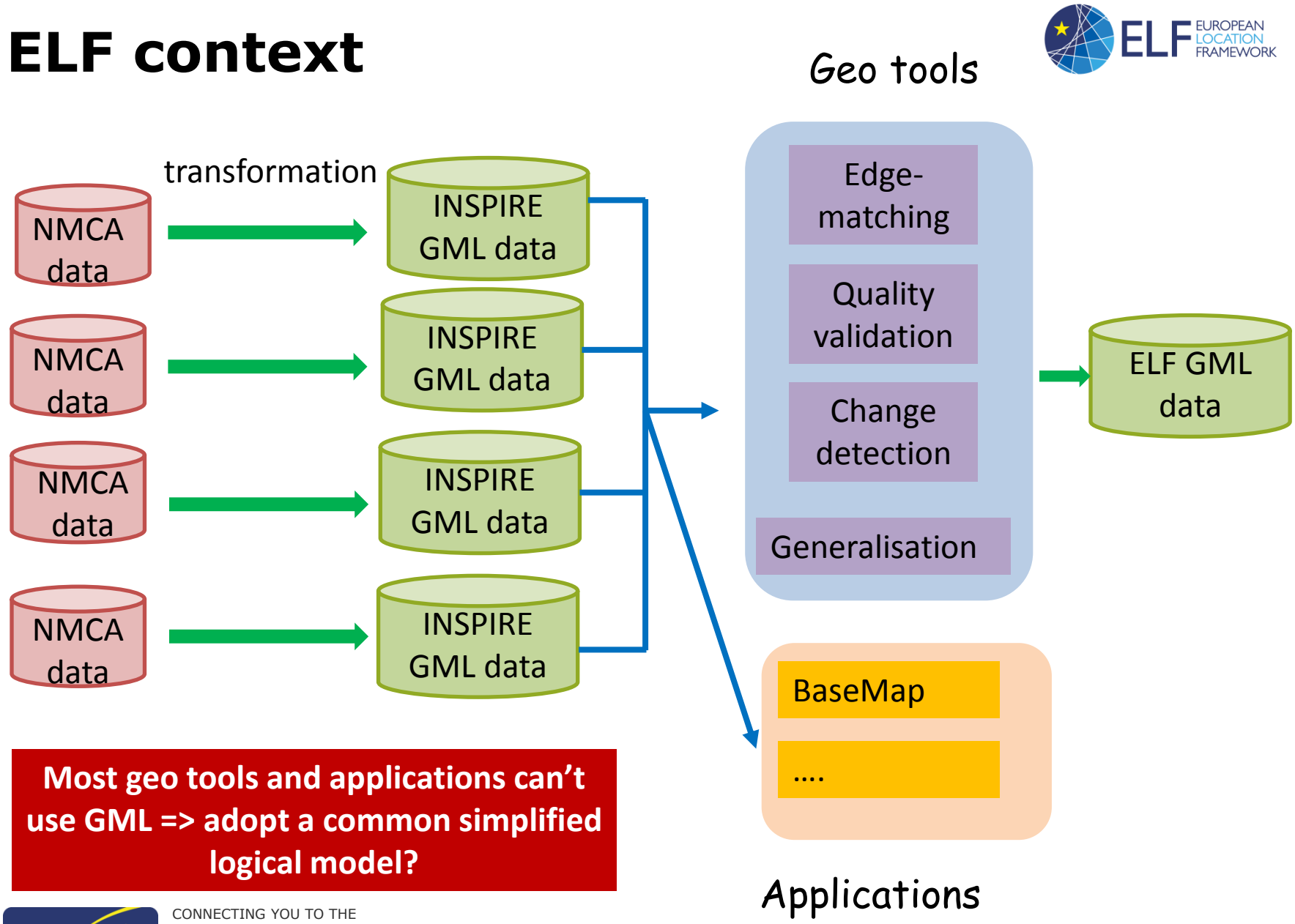
# General context

- INSPIRE models use complex modelling patterns
  - Complex attributes (data types)
  - Undefined multiplicity  [1..*] or [0..*]
  - Generic geometry (GM_Object, GM_Primitive)
  - Linear referencing (TN)
  - …
- that can be handled by GML but not by classical GIS formats

# Issues

- GML is an exchange format not a working one
  - Huge volume of data
  - But due to complexity of INSPIRE models, no easy export to other (working) GIS formats
- Lack of client applications for INSPIRE data
  - Several surveys done by data producers => poor results
    - INSPIRE data not accepted at all
    - INSPIRE data accepted but lack of information, difficult to handle, …

# ELF context




**Most geo tools and applications can't use GML => adopt a common simplified logical model?**

# ELF investigation

- To "simplify" the complex INSPIRE modelling patterns, several options are generally possible:
  - Multiple values of attribute

| Options | Example |
|---|---|
| A) Copies of the property are added to the class so that the class has as many properties as the maximum cardinality | property[1..2] → property_1 and property_2 |
| B) Concatenation of the values into one property | property[1..4] → property='value_1:value_2:value_3:value_4' |
| C) Link to additional table | property[1..*] → additional table with attributes: UID and property |

Flatten model

Relational model

# ELF investigation

- The options to be chosen depend on the software (client application)
  - Multiple values of attribute
    - Flattening options : nice for basic GIS
    - Relational option: acceptable for DBMS
  - Generic geometry (GM_Object, GM_Primitive)
    - May be kept in one feature type : PostGre/PosGIS
    - Has to be split into several feature types (point, line, surface): ESRI
  - …

# ELF investigation

- The options to be chosen depend on the use case
  - Content : need to keep whole content?

| Options | Example |
|---|---|
| A) Copies of the property are added to the class so that the class has as many properties as the maximum cardinality | property[1..2] → property_1 and property_2 |
| B) Concatenation of the values into one property | property[1..4] → property='value_1:value_2:value_3:value_4' |
| C) Link to additional table | property[1..*] → additional table with attributes: UID and property |

=> keeping whole potential content of INSPIRE may lead to huge number of "flatten" attributes (e.g. GN)

  - Structure

# ELF investigation

- Examples:

| | Change detection | Generalisation | BaseMap |
|---|---|---|---|
| Content | Whole content | Whole content | Simplified content |
| Flat / Relational | Flat | Flat | Flat |
| TN properties | To be kept as feature types | To be transformed into attributes (at least those used in decision process) | To be transformed into attributes |

⇒ Heterogeneous requirements

⇒ No common simplified logical model in ELF (until now)

# Main findings

- INSPIRE GML data
  - Is interoperable
  - But not (easily) usable by tools
- It looks impossible to have a common logical model adapted to all use cases, to all client applications and keeping all potential INSPIRE data
- A logical model that is usable by tools may be not so “simple” for users (e.g huge number of attributes or of relations)
- Communities may develop their own logical models that might be recognised (i.e. registered) by MIG
  - => several logical models for same conceptual one
  - Lack of interoperability ?

# Topics for discussions

- Have you found client application for INSPIRE data?
- Have you found other means to facilitate use of INSPIRE data?
- What MIG/ARE3NA should do:
  - Propose official "simple" logical model(s)?
    - Which options?
      - limited content acceptable?
      - ….
  - Push software editors to upgrade their tools? Fund open-source tools?
  - Other solutions?