

# How INSPIRE has influenced the redesign of French topographic database

**INSPIRE KEN WORKSHOP**  
**EXTENSION OF INSPIRE DATA SPECIFICATIONS**



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# Plan

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- Source data
- Transformation choices and issues
- Conclusions



# GENERAL CONTEXT



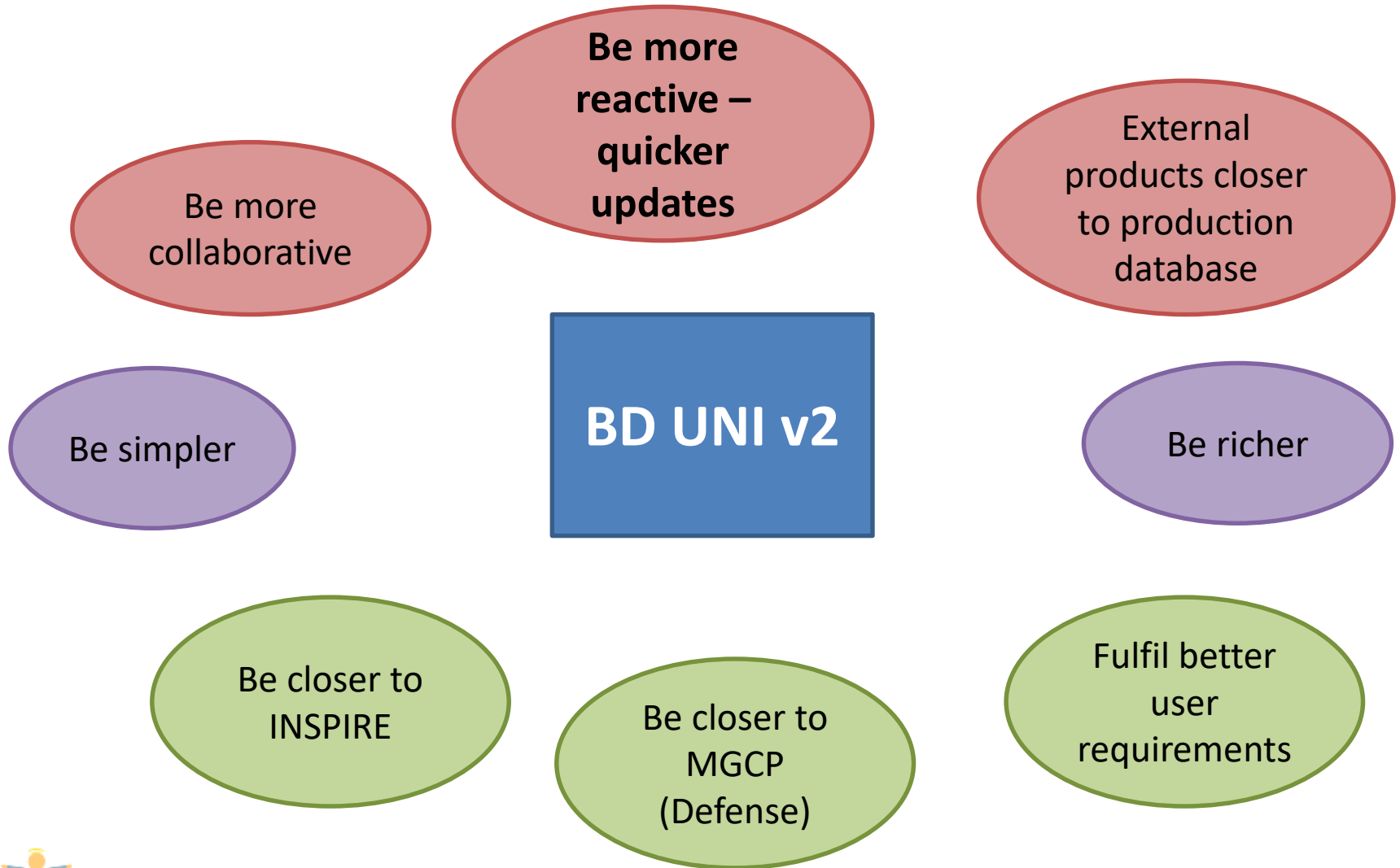
# Context

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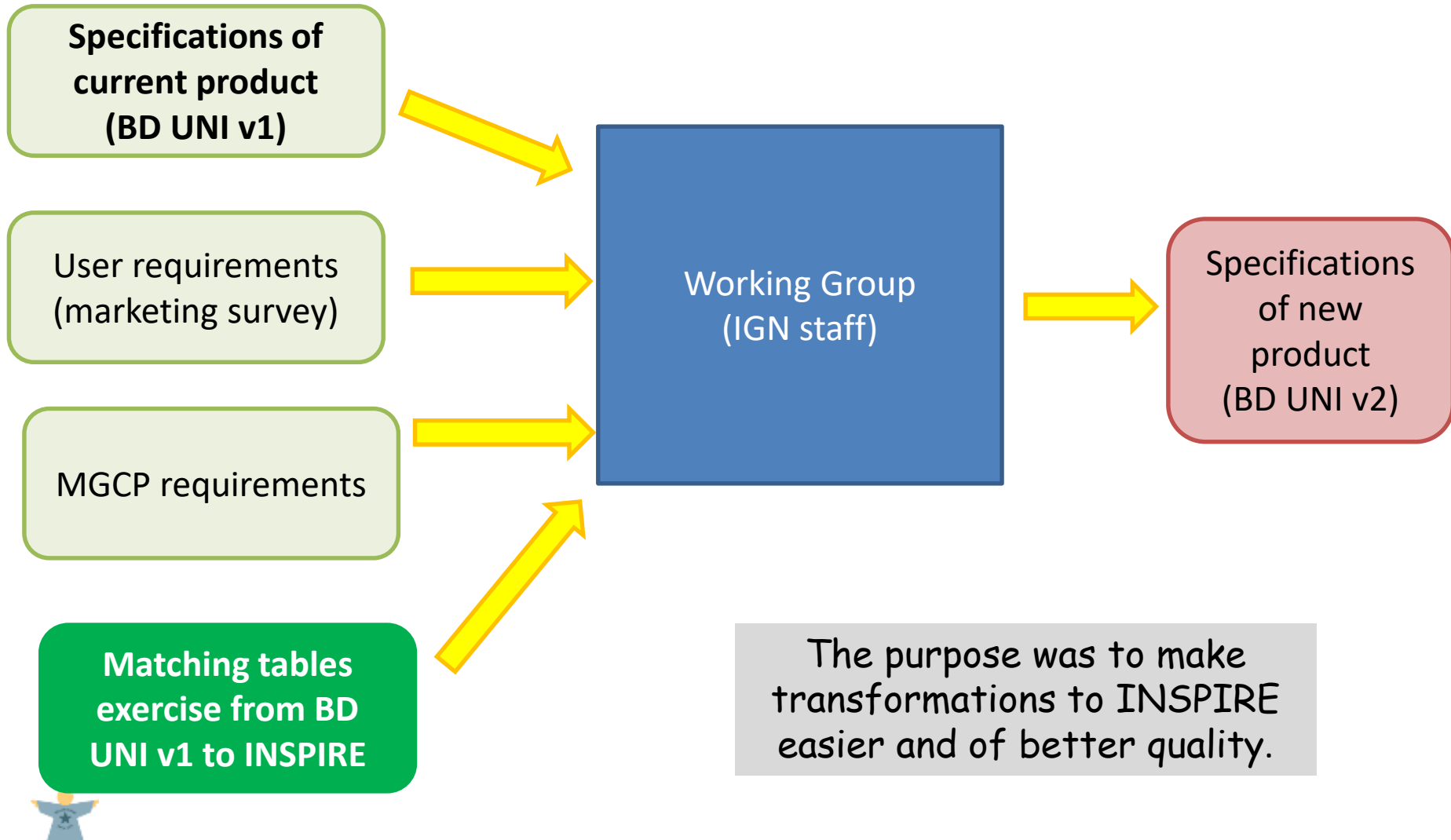
- **BD UNI v1:**
  - Current (internal) production database
  - Large scale topographic data base (around 10K)
  - IGN main data
  
- **BD UNI v2 project:**
  - Redesign of **data specification** and of **data production process**
    - For various reasons
  - Specification work took place in 2016



# Objectives



# Methodology



# Concerned INSPIRE themes

- Considered for BD UNI v2: AU, GN, TN, BU
- Themes AD, LC and HY have been considered
  - in other dedicated products
  - with external stakeholders
  - with different methodologies
- Theme US poorly considered for INSPIRE
  - IGN not referent data producer for electric lines
  - No big issues regarding governmental services



# INSPIRE INFLUENCE

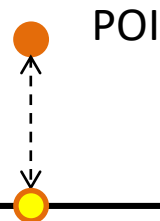




# Avoid wrong transformations

## ■ Railway Station example

- In BD UNI v1, a **point** of interest (outside the network)
- In INSPIRE, it may be a RailwayStationArea or a RailwayStation**Node**
- Matching table:
  - Correspondence between our POI and INSPIRE nodes
    - Key feature type in railway network
  - But does not fit with the INSPIRE definition



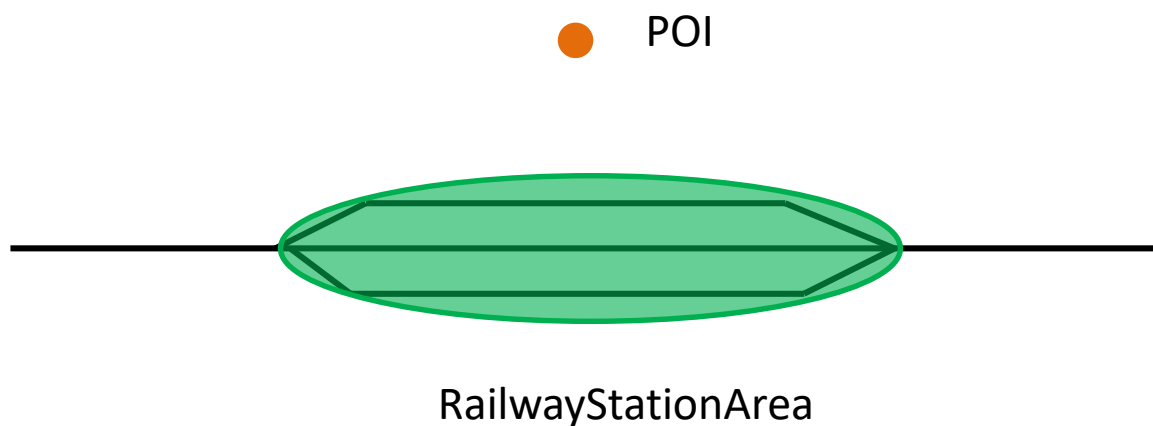
RailwayStationNode



# Avoid wrong transformations

## ■ Railway Station example

- In BD UNI v2, decision to capture railway stations as areas
- => correct matching with INSPIRE RailwayStationArea



# Avoid loss of information

## ■ Case 1: VerticalPosition

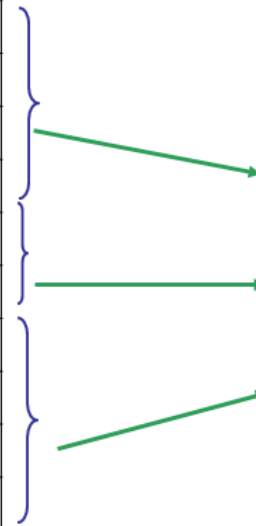
- BD UNI richer than INSPIRE
- But we have what INSPIRE expects
- Not an issue
- No change

### BD UNI

Classe : <u>Tronçon de route</u>
Attr : Position par rapport au sol
4
3
2
1
0
Gué ou radier
- 1
- 2
- 3
- 4

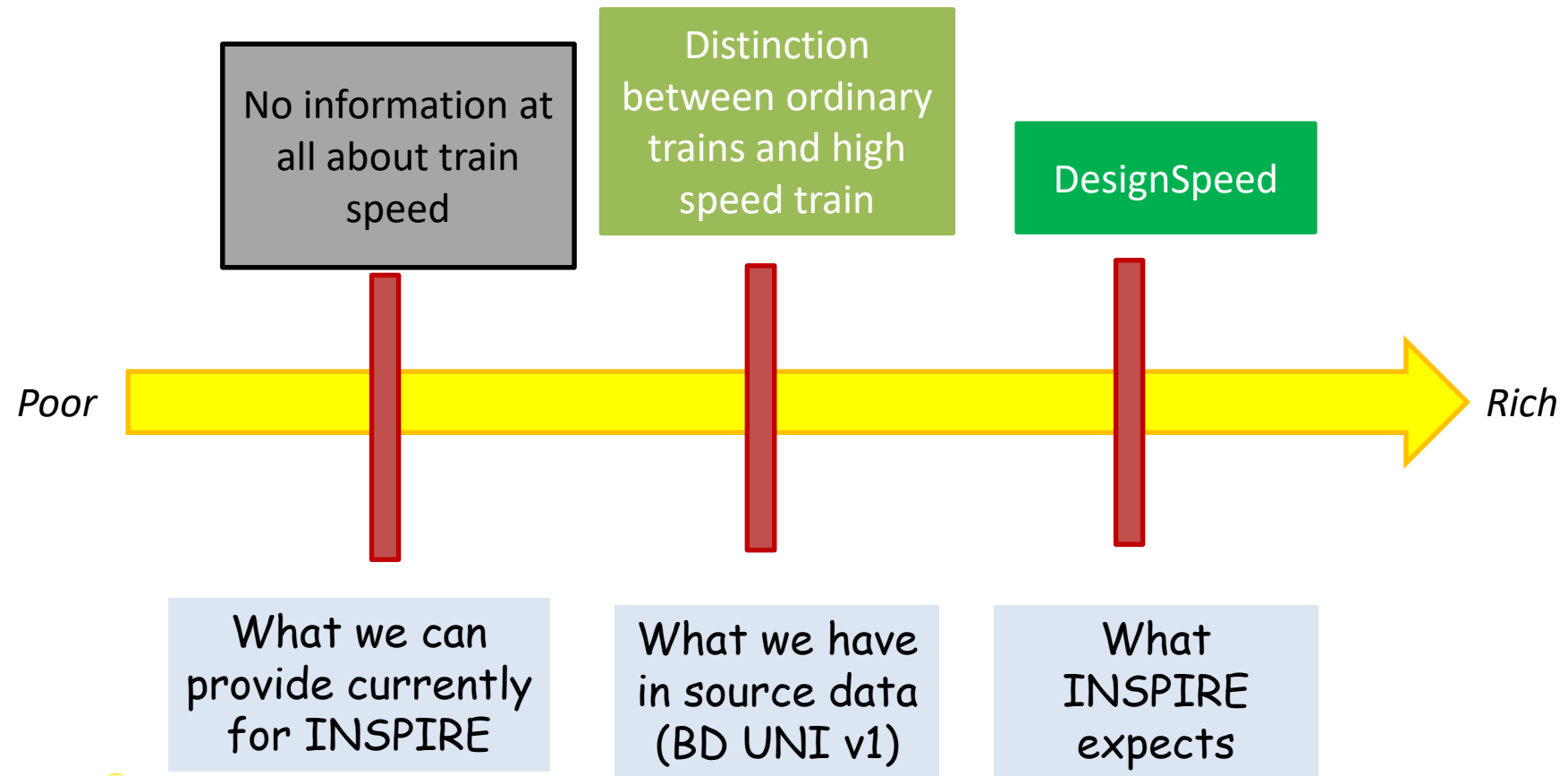
### INSPIRE

Classe : <u>VerticalPosition</u>
Attr : verticalPosition
suspendedOrElevated
onGround
underground



# Avoid loss of information

## ■ Case 2: DesignSpeed



# Avoid loss of information

- **Case 2: DesignSpeed**
  - BD UNI : we make distinction between
    - Train
    - High speed train
  - INSPIRE : DesignSpeed
    - Definition: The specification of the maximum speed to which a railway line is designed for.
  - We know only the minimum speed of high speed train (220 km/h) => it does not fit with INSPIRE definition
  - IGN decision:
    - No matching => lost of valuable information
    - We have included the DesignSpeed information in specification of new product BD UNI v2
    - We expect potential partnership to get this information



# Make transformations easier

## ■ Example: administrative hierarchy

Commune
géometrie
nom
code
...
Code canton
Code arrondissement
Nom arrondissement
Code arrondissement
Nom arrondissement
Code région
Nom région

Attributes of  
« commune »

Attributes of  
the upper AU

- In existing data, IGN provides level 5 (**commune**) and attributes of upper levels are carried by “commune” => it is up to user to build upper levels

In source data, a key feature « Commune » -  
municipality



# Make transformations easier

- **Example: administrative hierarchy**
  - INSPIRE requires a feature type for each level of AU
  - Current matching rules:
    - **Create new features** for upper level AU
    - Get their geometry by merging the geometries of lower level
    - **Provide unique and persistent identifiers**



# Make transformations easier

## ■ Example: administrative hierarchy

IGN has external identifiers for “Commune” ... but not for the upper levels

Decision was to use **thematic identifier** based on SHN ( from EuroBoundaryMap) for all levels of AU => complex transformation because of some specificities (e.g. over-sea territories)

AdministrativeUnits			BDUniGE	
Element	Attribut Lien	Type	Transformation	Classe
identif	localld	string	<pre> case 1 : ARRONDIS : "FR"+ "93" + "13" + "3" + ExtractString(NUMINSEE,3,3) where NUMINSEE like "13%" "FR"+ "11" + "75" + "1" + ExtractString(NUMINSEE,3,3) where NUMINSEE like "75%" "FR"+ "82" + "69" + "1" + ExtractString(NUMINSEE,3,3) where NUMINSEE like "69%" Case 2 : COMMUNE if (dataset name contains "FR" or dataset name contains "20" ), "FR"+ INSEEEREG + INSEEDEP + INSEEARD + ExtractString(NUMINSEE,3,3) if not (dataset name contains "FR" or dataset name contains "20" ), "FR"+ INSEEEREG + INSEEDEP + INSEEARD + ExtractString(NUMINSEE,4,2) Case 3 : ARRONDISSEMENT if (dataset name contains "FR" or dataset name contains "20" ), "FR"+ INSEEEREG + INSEEDEP + INSEEARD + "000" if not (dataset name contains "FR" or dataset name contains "20" ), "FR"+ INSEEEREG + INSEEDEP + INSEEARD + "00" Case 4 : DEPARTEMENT if (dataset name contains "FR" or dataset name contains "20" ), "FR"+ INSEEEREG + INSEEDEP + "0000" if not (dataset name contains "FR" or dataset name contains "20" ), "FR"+ INSEEEREG + INSEEDEP + "000" Case 5 : REGION "FR"+ INSEEEREG + "000000" Case 6 : ETAT "FR" + "00000000"                     </pre>	Arrondissement municipal/Commune/Arrondissement/ Département/Région/Etat



# Make transformations easier

## ■ Example: administrative hierarchy

- Current situation:
  - Complex transformation
  - Confusion between external identifier (inspireId) and thematic identifier
- Decision for new product:
  - Create a feature type for each level of AU
  - Manage in production database a unique and persistent identifier for each feature

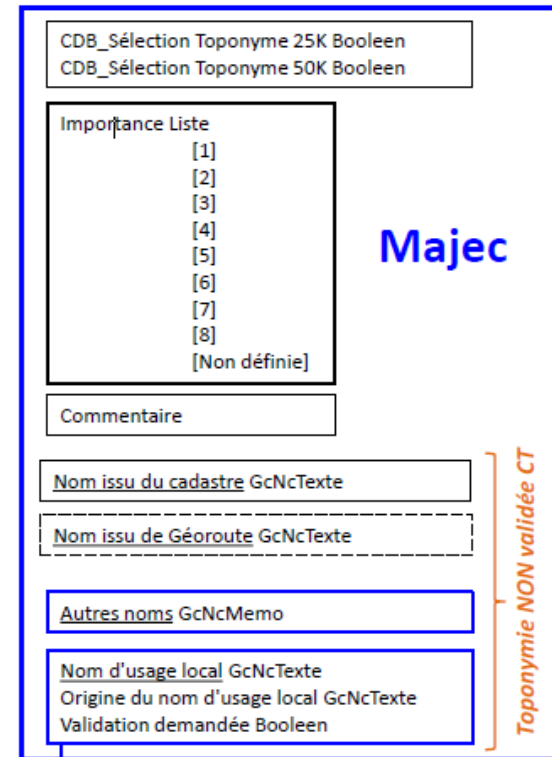
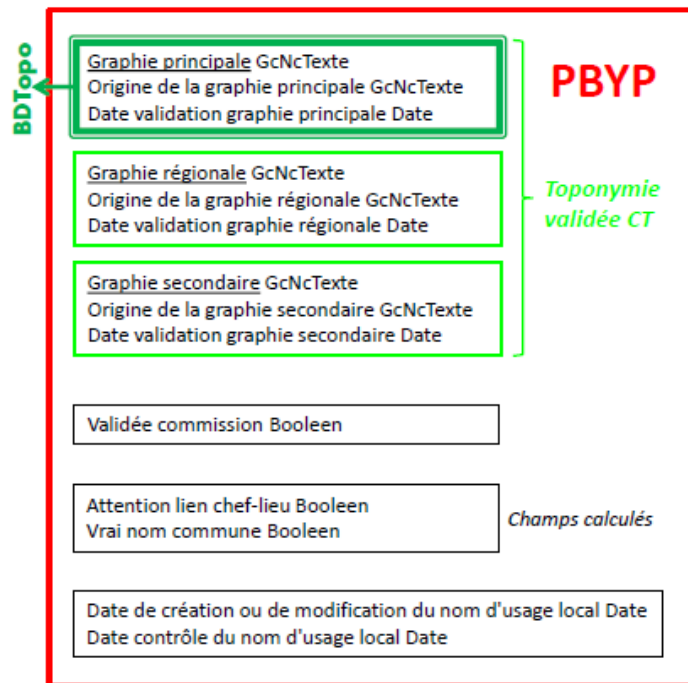


# Pumping up our data model

- Case of geographical names
  - Lot of information related to geographical name(s) in source data

A feature may have several names in source data

## Structure des toponymes dans la BDUi actuelle :



# Pumping up our data model

## ■ Case of geographical names

### ■ Current situation:

- Lot of information related to geographical name(s) in source data
- Our old product is in traditional database
  - Fixed multiplicity for attribute values
  - Example:
    - name-1, name-1.status, ...
    - name-2, name-2.status, ....
- Named places are grouped in a theme “Points of Interest”
- Advantage:
  - the complex set of attributes applies only to places having a name
  - Easy to manage (on production side)
- Drawback:
  - The name is carried by a POI and not by the “true” feature
  - **Not user-friendly**, not in line with INSPIRE



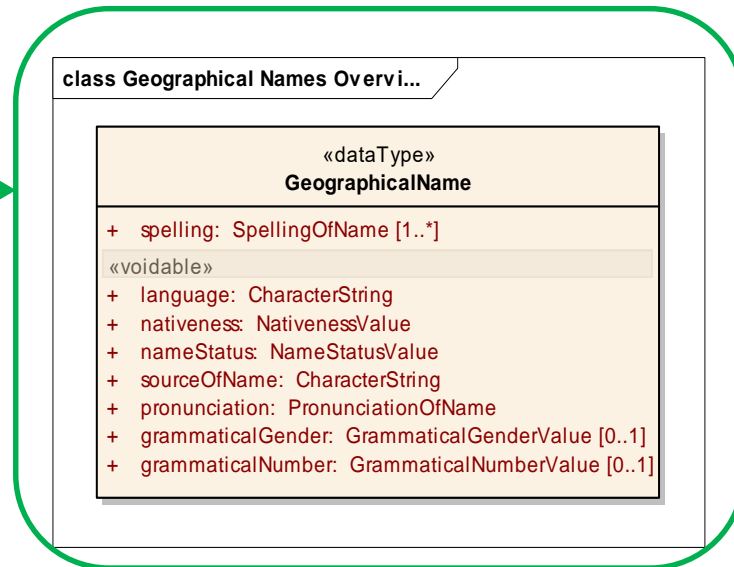
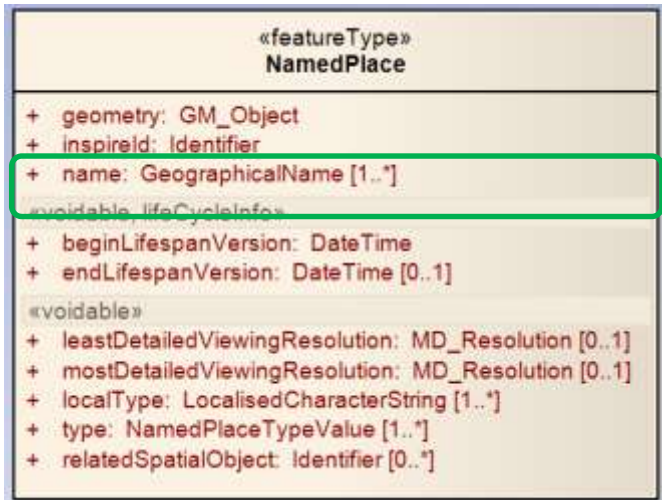
# Pumping up our data model

## ■ Case of geographical names

### ■ Decision for new product:

#### ■ Model close to INSPIRE

- Named place
- Carrying unlimited number of names
- Names described by their script and by “metadata” attributes : language, source, status, ...



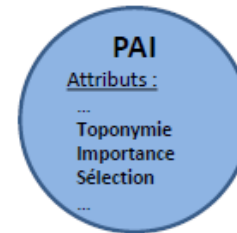
# Pumping up our data model

Plusieurs solutions de modélisation dans la BDUi v2 : 2) Créer un champ unique 'JSON'

Champ JSON : champ de type clé-valeur avec saisie d'un nombre de toponymes illimité

Graphie	Origine	Date de validation	Statut	...
le vieil armand	BDTopo	31/07/1994	Classique	
hartmannswillerkopf	BDTopo	31/07/1994	Régional	
Hartmannswillerkopf (le vieil armand)	BDTopo	31/07/1994	Cartographique	
au vieil armand	EJN		Cadastral	
le vieil armand ou hartmannswillerkopf	SDIS		Partenarial	
...				

Ajouter la 'Sélection', ... ?



Use of JSON attributes  
New tools to be developed to capture and manage this kind of attributes

```

POI { Importance : 8,
      CDB_Sélection : GE,
      Commentaire : Blabla,
      Toponymie : [ { Statut : Validé,
                    Graphie : mon lieu-dit,
                    Source : BDTopo,
                    Date : 26/05/2010,
                    Validation demandée : -,
                    Id_partenaire : ... },
                  { Statut : Collecté,
                    Graphie : cet endroit,
                    Source : Mairie,
                    Date : 26/05/2010,
                    Validation demandée : oui,
                    Id_partenaire : ... }, ...
                ]
    }
    
```

Hierarchic structure in our new product!

- STATUT**
- Validé
  - Collecté
  - Partenarial
  - Régional
  - Autre (BAN ?)

# Enrich our data model

## ■ Example: Buildings

### ■ Current situation:

#### ■ INSPIRE requires

- current use - number of dwellings
- date of construction - material of roof
- number of floors - material of structure

#### ■ This information is also required by our users

#### ■ But is not or poorly available in our current product

- residential use is missing – no distinction with tertiary use
- no data for other attributes



# Enrich our data model

## ■ Example: Buildings

### ■ Decision for new product

- These attributes are considered as core information
- Include these attributes in data model
- Struggle to get source information
  - Data available in land registry (Cadastre)
  - Integration test was performed
    - technical difficulties to match IGN buildings with land registry ones
    - privacy issues



# LEARNINGS AND CONCLUSIONS





# Modelling approach

- Data model prepared by Excel tables

Bâti		Besoin(s)	Valeurs de la 'Désignation'
	Etat de l'objet Liste	Inspire / MGCP	
	[En projet]	<sans valeur> réellement	
	[En construction]	idem BDUi	
	[En service]	idem BDUi	
	[En ruines] ???	remplace <sans valeur>	
	Méta-données Unification GcNcTexte	Inspire + MGCP (abandonné, détruit, démantelé, endommagé)... <b>MAIS pas si facile...</b>	
	Date de construction Texte	Métadonnées d'appariement concaténées : TA, TX, TY, Id Parcelle, Type BDP, Anc. SG2D, Anc. CLEABS	
	Bâtiment MultiPolygone Dim3	Année de la source de la donnée : pertinent pour les nouvelles données.	
	Nature Liste		
	[Arc de triomphe]	Valeurs de 'Nature' Inspire supplémentaires :	
	[Arène ou théâtre antique]	[Auvent]	
	[Chapelle]	[Hangar]	
	[Château]	[Mosquée] >> PAI BDUi	
	[Eglise]	[Synagogue] >> PAI BDUi	
	[Fort, blockhaus, casemate]	[Temple] >> PAI BDUi	
	[Indifférenciée]	[Habitation troglodytique] >> PAI BDUi	
	[Industriel, agricole ou commercial]		
	[Monument]		
	[Serre]		
	[Silo]		
	[Tour, donjon, moulin]		
	[Tour, donjon]	Inspire : Valeur scindée en deux autres valeurs	
	[Moulin à vent]		
	[Tribune]		



# Modelling approach

- Why no UML model ?
  - Not in the missions of the Working Group
    - Mission was to decide on content
  - Not (yet) in the IGN culture
    - UML is not a “reflex” among (old) IGN staff
  - UML model not seen as useful
    - New product in simple structure
      - No inheritance
      - Few associations
    - => graphical representation not so useful
  - May come in future





# Flexibility regarding INSPIRE

- INSPIRE has had significantly influence the design of our new product
- But there will remain many differences or even discrepancies between BD UNI v2 and INSPIRE
  - Repartition in themes is not the same
    - Example: Ferry crossings are
      - in Water Transport Network in INSPIRE
      - In Road Transport Network in BD UNI v2
    - Repartition in feature types is not the same
      - Example: AU
        - Compact model in INSPIRE (1 feature type for all AU)
        - Detailed model in BD UNI v2 (1 feature type for each kind of AU)
    - Missing attributes, additional ones
    - ...



# Why adopting INSPIRE (sometimes)

Reason	Examples	Result
<p>Avoid « wrong » transformations. Ensure minimum quality of INSPIRE data. INSPIRE as reasonable constraint</p>	<p>Railway station captured as area (instead of POI)</p>	
<p>INSPIRE helps us to « push » user requirements. INSPIRE as an opportunity.</p>	<p>Enrichment of theme Buildings  Processing of Geographical Names</p>	



# Why not (always) adopting INSPIRE

- INSPIRE not the main driver;
  - Main driver: user requirements
  - Starting point was specification of old product and not the INSPIRE data models
- No need to adopt INSPIRE “natively” in production if transformations don’t raise issues
- INSPIRE not always seen as good practice
  - Example: Transport Network
    - in INSPIRE, transport properties are feature types attached by linear referencing to the transport objects
    - In our source data, transport properties are attributes directly carried by the transport objects
    - Easier to manage in production and to use by GIS
    - => INSPIRE modelling approach was not adopted



# Why not (always) adopting INSPIRE

## ■ Take into account production constraints:

- INSPIRE does not mandate capture of new data
- But INSPIRE pushed us to enrich our new product (e.g. BU)
- Enrichments limited to
  - What is considered as useful
  - What is considered as (more or less) feasible, e.g. more collaborative capture or search for new partnership
- More flexible specifications
  - Core content: with some quality measure and guarantee
  - Extended content: included in the model but no guarantee



# Next steps

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- **Validation:**

- Production of test data on a sample of territory
- To be submitted to users
- Data specifications to be revised if necessary

- **Work on external products**

- **Transformation to INSPIRE**

- New matching tables
- Run again transformation process

-  Check if no remaining (or new) significant issue