

10 Data Capture

This chapter does not aim to define data capture rules as INSPIRE is based on existing data. The data capture rules of source data are up to each data producer. Data producers should clearly describe any deviations from these guidelines in the metadata. This chapter aims to give some guidelines about how to match existing data to INSPIRE specifications. It is not exhaustive but focus on the aspects that are expected to raise some issues.

10.1 Scope of theme Buildings

10.1.1 Purpose

Existing data should be made compliant to INSPIRE, taking into account cost-benefit considerations. The scope of theme *Buildings* and definition of its core feature type Building are rather generic and may open the door to various interpretations.

The costs of transformation will depend on how data related to theme *Buildings* is organised within a Member State. For instance, some data producers have all constructions in a single feature type whereas other data producers have different feature types for buildings, for annex constructions, for urban furniture ; building related data may be scattered between various producers or may be under the responsibility of only one organisation. Making whole scope of theme *Buildings* compliant to INSPIRE will likely be easier when all data regarding buildings and constructions is within the same feature type or at least in the same data set.

This paragraph aims to clarify the interpretation of scope, to provide recommendations about which kinds of buildings and constructions are expected by INSPIRE and so, to assess the benefits of making data compliant to INSPIRE.

The general rules or priority are given by the modular scope defined in clause 2.2.

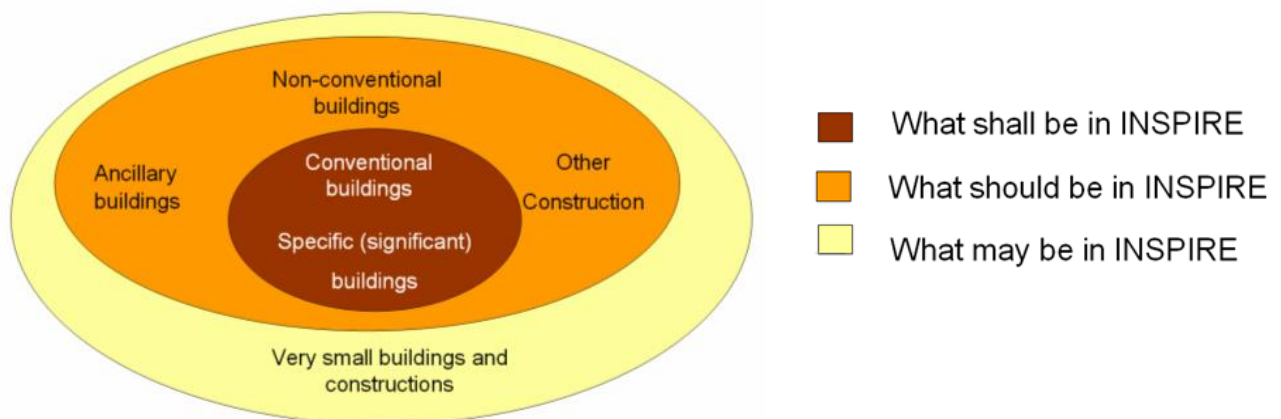


Figure 63: The modular approach for scope of theme Buildings

10.1.2 Code lists

The possible values provided in the code lists on current use and on nature of buildings and constructions, provide the general guidelines about what is expected by / should be in INSPIRE.

More accurately:

- The buildings hosting human activities, i.e. buildings whose current use is residential, agriculture, industrial, commerceAndservices are **necessary for / strongly expected** by many INSPIRE use cases.
- The buildings whose current use is ancillary are useful for / expected by some INSPIRE use cases.
- The buildings that may be obstacles or valuable landmarks for air traffic, i.e. those whose building nature is arch, dam, tower, lighthouse, silo, windmill, wind turbine, transformer, stadium, storageTank are **necessary for / strongly expected by** some INSPIRE use cases, air traffic being an international use case.
- The buildings whose building nature takes other values (e.g. shed, greenhouse, bunker, canopy, chapel, caveBuilding...) are useful for / expected by some INSPIRE use cases (landscape description, mapping).
- The other constructions are **also necessary for / strongly expected by** some INSPIRE use cases:
 - elevated constructions (crane, antenna, monument, pylons, ...) as obstacles for air traffic
 - environmental barriers (protectiveStructure, acousticFence, retainingWall) or open air pools for mitigation of risk and of pollution
 - bridges and tunnels for planning of rescue itineraries in case of disaster.

NOTE: according to the modular scope, other constructions are under the second priority, due to the expected feasibility issues, but there are quite strong user requirements about these constructions.

Recommendation 1 OtherConstructions should be made available for INSPIRE, as much as possible.

10.1.3 Definition of theme buildings

Considered as under scope of the theme *Buildings* are **constructions** above and/or underground which are intended or used for the shelter of humans, animals, things, the production of economic goods or the delivery of services and that refer to any structure permanently constructed or erected on its site.

NOTE 1: According to the definition, the construction should be **permanently constructed or erected on its site**. However, the notion of “permanence” may be interpreted in a flexible way. For instance, some types of dwellings are theoretically designed to be mobile (e.g. mobile homes, caravans) or to be used for short time (huts, cabins, shacks, shanties) but are in practice used in permanent way and may require the set up of public services. Moreover, there are strong user requirements for data about precarious habitat (vulnerability to natural risks, improvement of habitat).

Recommendation 2 A construction that is considered as permanent enough to be captured in existing data should be published for INSPIRE theme *Buildings*, especially if the construction hosts human activities.

NOTE 2: All buildings, whatever their size is, are in the scope of theme *Buildings*. As explained in clause 1.2.2, the scope is modular with first priority to the big or normal buildings. However, there are exceptions where small buildings are of great interest, such as a hut in mountainous area that may be a valuable landmark or shelter for hikers. Once again, this is generally already taken into account by the capture rules of data producers.

NOTE 3: The construction must be above or underground, i.e. it must have a significant height. This excludes “flat” constructions such as roads, railways that should be reported in INSPIRE theme Transport. On the opposite, constructions that are totally or partly underground (bunker, underground stations, underground car parks, swimming pools...) are under scope of theme Building and should be published for INSPIRE, if data is available.

NOTE 4: The constructions that are not buildings and that are already in another INSPIRE theme should generally not be included in the scope of theme *Buildings*, except if attributes typical to theme *Buildings*, such as height or date of construction are required by use cases.

10.2 Use of Building and BuildingPart

10.2.1 When to split a Building into BuildingParts?

BuildingPart is generally used for buildings that are not homogeneous, regarding attributes related to physical aspects (such as height above or below ground, height below ground, number of floors above or under ground, roof type), temporal aspects (such as year of construction) or functional aspects (building nature or current use). A BuildingPart may be used for a contiguous part of a building of which one or more attributes (except identifier and geometry) differ from all other parts it touches.

EXAMPLE 1:


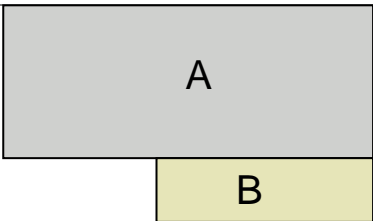

		
Real world building	The Building may be split into 2 BuildingParts A and B because of different height above ground (e.g. 8 m for A, 6m for B)	The building may be represented just as single generalised Building (e.g. with height above ground = 8 m)

Figure 64: Split into building parts (example 1)

EXAMPLE 2:


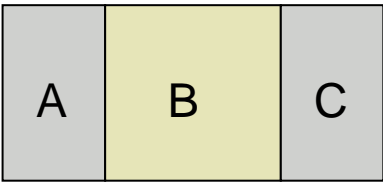


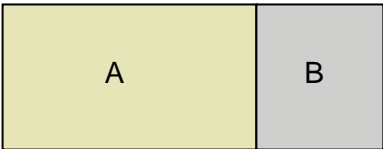

		
Real world building	This Building may be split into 3 BuildingParts A, B and C because of different number of floor above ground (e.g. 20 floors for A and B, 5 floors for B)	The building may be represented just as single generalised Building (e.g. with number of floors above ground = 20)

Figure 65: Split into building parts (example 2)

EXAMPLE 3:

		
Real world building	This Building may be split into 2	The building may be

	BuildingParts A and B because of different current use (agriculture for A, residential for B)	represented just as single generalised Building with current use = {residential, agriculture}
--	---	---

Figure 66: Split into building parts (example 3)

EXAMPLE 4:


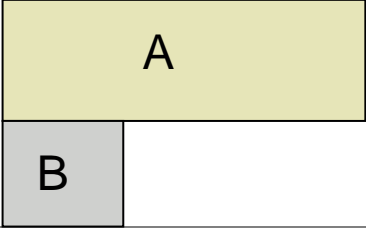
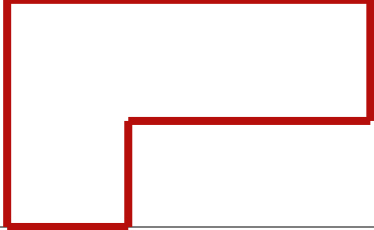
		
Real world building	This Building may be split into 2 BuildingParts A and B because of different date of construction (e.g. 1920 for A, 1950 for B) and roof type (gable roof for A, pavillon roof for B)	The building may be represented just as single generalised Building with date of construction = 1920 (and date of renovation = 1950 if enlargement is considered as renovation)

Figure 67: Split into building parts (example 4)

10.2.2 How to split a Building into BuildingParts?

This data model is quite flexible. It is up to the data capture rules of each data producer to define the relevant building parts. These rules should be explained in the template for additional information.

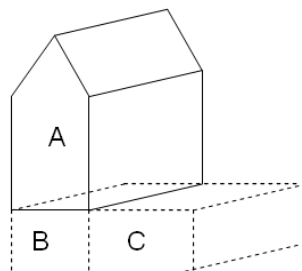


Figure 68: Example from Germany

On the previous figure, the building has been split into 3 building parts, with complete overlap between building parts A and B.

	A	B	C
Number of floors above ground	3	0	0
Number of floors below ground	0	1	1

EXAMPLE 2:

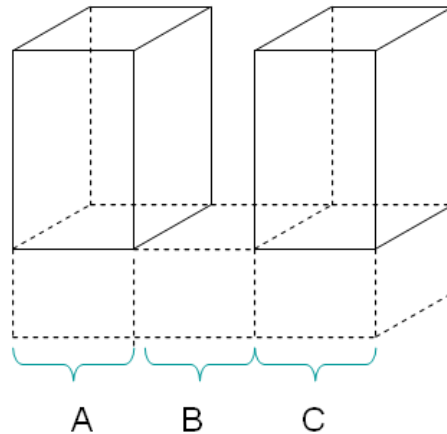
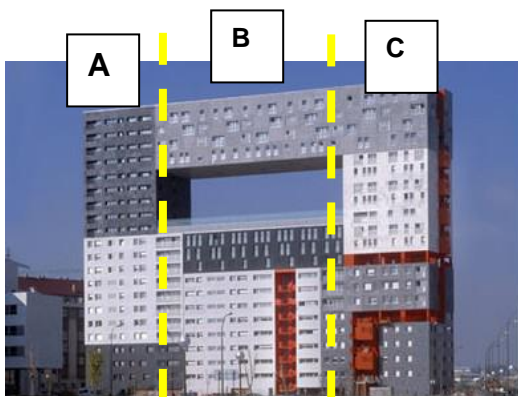


Figure 69: Example from Spain

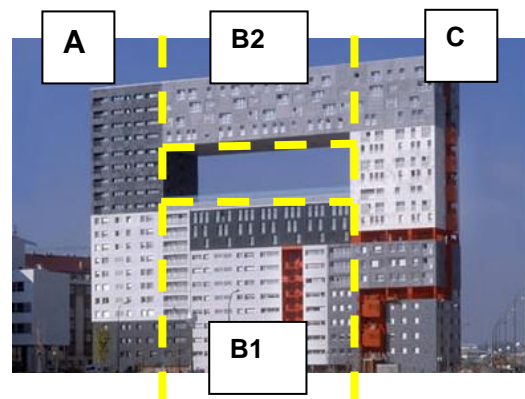
On the previous figure, the building (two blocks of flats sharing common basement) has been split into 3 non overlapping building parts

	A	B	C
Number of floors above ground	8	0	8
Number of floors below ground	3	3	3

EXAMPLE 3



This building has been split into 3 building parts



This building has been split into 4 building parts

Figure 70: Building parts with various floor distributions.

	A	B	C
Floor distribution	[0,21]	[0,12], [18, 21]	[0, 21]

	A	B1	B2	C
Floor distribution	[0,21]	[0,12]	[18, 21]	[0, 21]

10.2.3 How to fill the attributes of Building and BuildingPart?

- The mandatory attributes **inspireId** and **geometry** have to be filled on both Building and BuildingPart.
- If available, the attributes **beginLifespanVersion** and **endLifespanVersion** have also to be filled on both Building and BuildingPart.
- If available, the attributes **numberOfDwellings** and **numberOfBuildingUnits** may be filled on both Building and BuildingPart with the consistency rules:
 - o number of dwelling on Building = sum of number of dwellings of the BuildingParts composing the Building
 - o similar rule with numberOfBuildingUnit
- Among the other attributes:
 - o The specific attributes shall and can be filled only on Building Parts
 - o The common attributes should be filled only on *Buildings*.

10.3 Geometric representation

10.3.1.1. Multiple representation

The INSPIRE model is quite flexible as it allows multiple representations for buildings and building parts. However, not all allowed representations are meaningful and relevant for any kind of buildings.

EXAMPLE:



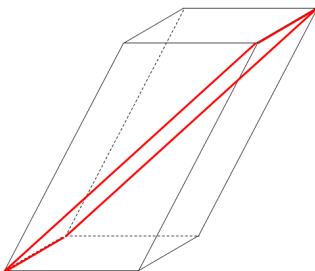
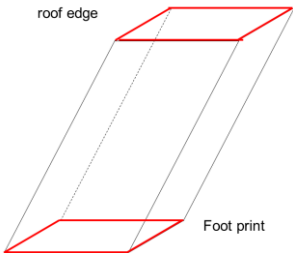
			
Above ground envelope geometry is relevant	Real-world building	Building represented by above ground envelope	Building represented by foot print and roof edge
The representation by above ground envelope geometry is less relevant than the representation by footprint and roof edge.			

Figure 71: Various geometric representations of buildings

Recommendation 3 Data producers should publish for INSPIRE the most relevant geometric representation(s) of buildings and building parts.

NOTE: The representation of envelope geometries by 2,5D data may raise issues; typically, the Z value may be not very meaningful.

10.3.1.2. Missing Z and 2,5D data

Some existing data sets may include both 2,5 D and 2D data. This is typically the case for data sets where most buildings are captured by stereo-plotting with Z coordinate (i.e. as 2,5D data) whereas some others are captured by other ways (e.g. from existing maps or from orthoimages) without the Z coordinate (i.e. as 2D data).

This case may be avoided if the data producer can wrap the buildings on a DTM and so, can attribute to the building geometric representation a reasonable Z value at ground level; the vertical geometry accuracy enables to document the process approximation.

Nevertheless, for cases where there are still missing Z values on some buildings, the general rule is to attach the Coordinate Reference System at feature level (instead of declaring it for the whole data set):

- Buildings captured as 2,5D data will be attached with a 3D Coordinate Reference System
- Buildings captured as 2D data will be attached with a 2D Coordinate Reference System

Normally, the 3D Coordinate Reference System will be a compound system whose 2D component is the same Coordinate Reference System as the one used for the buildings captured as 2D data.

An alternative solution would be to provide 2D and 2,5D buildings in different data sets.

10.4 Mapping examples for attribute currentUse

The principle is to match at the most detailed level as possible. Some approximate mappings are acceptable and even necessary. However, they should be reported in the template for additional information (Annex E)

Example 1: from Dutch Dwelling Register to INSPIRE

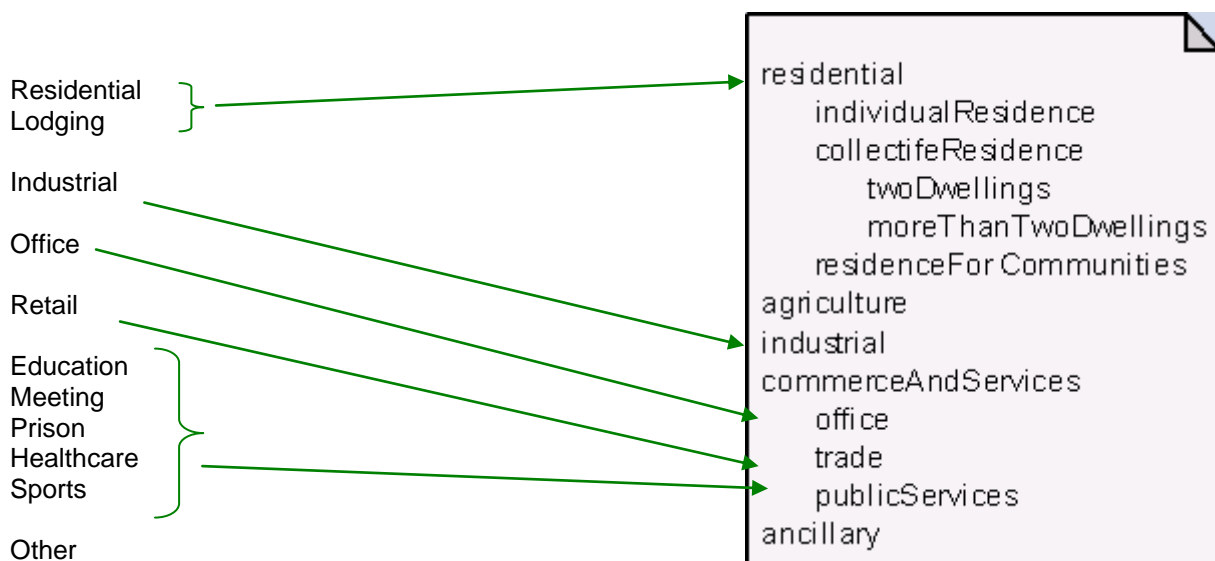


Figure 72: Matching example from national classification to INSPIRE classification of current use

Example 2 : from Eurostat classification to INSPIRE

Eurostat classification

Residential buildings

One-dwelling buildings
Two- and more dwelling buildings
- two dwellings
- more than two dwellings
Residences for communities

Non-residential buildings

Industrial buildings and warehouses
Office buildings
Hotels and similar buildings
Wholesale and retail trade buildings
Traffic and communication buildings
Public entertainment, education, hospital or institutional care buildings
Other non-residential buildings
- religious buildings
- historic monuments
- farm buildings
- other

INSPIRE classification

residential
individualResidence
collectiveResidence
twoDwellings
moreThanTwoDwellings
residenceFor Communities
agriculture
industrial
commerceAndServices
office
trade
publicServices
ancillary

Figure 73: Matching example from EUROSTAT classification to INSPIRE classification of current use

NOTE 1: some data producers have already implemented the Eurostat classification.

10.5 Temporal aspects

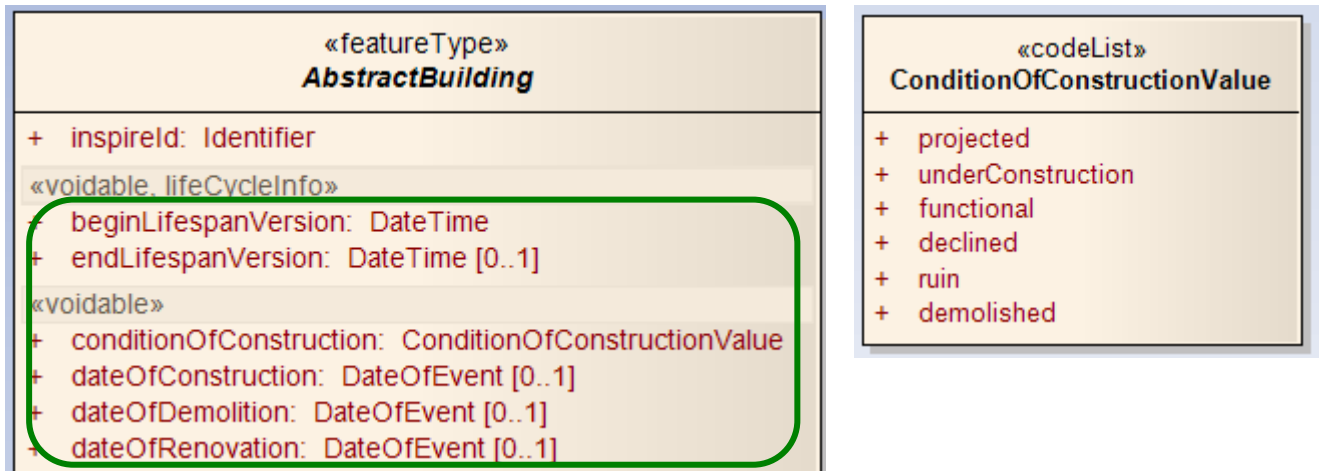


Figure 74: Temporal aspects

The INSPIRE UML schema includes 6 attributes that are related to the temporal aspects:

- **conditionOfConstruction**: current condition of the construction or building
- **date of construction**, **date of renovation** and **date of demolition** that are related to respective events in the real world
- **beginLifespanVersion** and **endLifespanVersion** that are related to the events in the dataset (e.g. when a construction was inserted in the data set or when it was depreciated).

10.5.1 Data type DateOfEvent

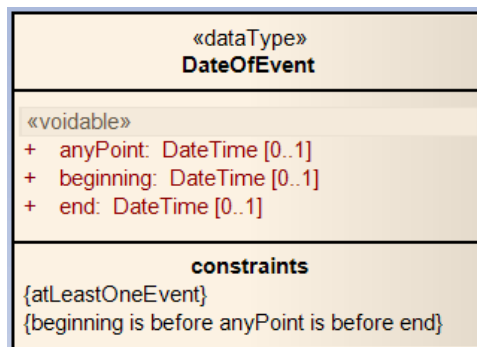


Figure 75: Data type DateOfEvent

The data type **DateOfEvent** enables to supply temporal information about an event (construction, renovation, demolition) in the following cases:

- a data producer has the date of the event but without any other information about which phase of the event the date refers to
- a data producer does not have the date of the event but has the information as an interval (e.g. before 1950, between 1800 and 1900); this case applies mainly for old buildings
- a data producer has several dates corresponding to different points of the event, e.g. the beginning and the end of the event.

EXAMPLES (for date of construction)

- producer knows that construction date is 1978
 - o beginning: void
 - o end: void

- anyPoint: 1978
- producer knows that construction took place before 1950
 - beginning: void
 - end: 1950
 - anyPoint: void
- producer knows that construction took place between 1800 and 1900
 - beginning: 1800
 - end: 1900
 - anyPoint: void
- producer knows that construction took place between 12/04/2008 and 25/12/2010
 - beginning: 12/04/2008
 - end :25/12/2010
 - anyPoint: void

10.5.2 Demolished Buildings

There are two ways to deal with demolished constructions or buildings.

EXAMPLE: a building that was functional was demolished on 20/03/2010 and this information is integrated by data producer on the 15/05/2010

- first method: the building is considered as depreciated (no valid any longer)
 - its attribute endLifespanVersion gets value "15/05/2010"
 - its attribute dateOfDemolition gets value "20/03/2010"
 - the other attributes stay as they are, describing the building as it was just before being demolished (e.g. its attribute conditionOfConstruction remains "functional")
- second method: the building is versioned in the database :
 - the attribute endLifespanVersion of the old version of the building will get value "15/05/2010"
 - the attribute dateOfDemolition of the old version remains empty
 - the other attributes stay as they are, describing the building as it was just before being demolished (e.g. its attribute conditionOfConstruction remains "functional")
 - the attribute beginLifespanVersion of the new version of the building will get value "15/05/2010"
 - the attribute endLifespanVersion of the new version of the building remains empty
 - the attribute conditionOfConstruction of the new version will get value "demolished"
 - the attribute dateOfDemolition of the new version will get value "20/03/2010"

The second method is well adapted for the data sets that aim to manage historical buildings whereas the first one is probably better for data sets that aim to manage current buildings.

10.6 Estimated accuracy

For INSPIRE, buildings shall be published in the Coordinate Reference System mandated by the Implementing Rule on Reference Systems, i.e. in ETRS89 for areas on the Eurasian tectonic plate and in ITRS elsewhere.

Of course, INSPIRE users will be interested by having information about the accuracy of building data, as they receive them, in the Coordinate Reference System mandated by INSPIRE. It is why the clauses about application schema and about quality and metadata require building data providers to give estimated accuracy related to the coordinates in ETRS89 (or ITRS).

However, in most Member States, the estimated accuracy is generally known in the source Coordinate Reference System, the national or local one.

The estimated accuracy for INSPIRE will be the combination of estimated accuracy in original Coordinate Reference System and of the accuracy of the coordinate transformation between original Reference System to INSPIRE Reference System.

Coordinate transformation between two horizontal geodetic datum is generally done, using one of the three following methods:

- transformation with 3 parameters
- transformation with 7 parameters
- transformation with a grid.

Experience in some countries has shown that transformation with 3 or even 7 parameters might bring deviations up to 10 metres. So, the impact of such transformations may not be neglected on building data whose original accuracy generally varies from some decimetres to some metres.

The ideal solution would be for each Member State to define good quality coordinate transformations (using grids and bringing no deviation bigger than some centimetres). However, if not possible before the deadlines of INSPIRE, the impact of coordinate transformation has to be taken into account when giving information about positional accuracy, both in the application schema and in metadata.