The European Reference Systems in Inspire

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SUMMARY

- ***About INSPIRE: principles and terminology***

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- ***From Brussels2008 to Florence2009***

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- ***From Brussels2008 to Florence2009***
- ***Implementing Rules: CRS & GGS***

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- *From Brussels2008 to Florence2009*
- *Implementing Rules: CRS & GGS*
- ***Remaining issues***

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INSPIRE

INfrastructure for SPatial InfoRmation in Europe

- *Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing INSPIRE was published in the official Journal on the 25th April 2007*

- *The INSPIRE Directive entered into force on the 15th May 2007 (http://inspire.jrc.it/directive/l_10820070425en00010014.pdf)*

About INSPIRE: principles and terminology

- *the infrastructures for spatial information in the Member States should be designed to ensure that spatial data are stored, made available and maintained at the most appropriate level*
- *it is possible to combine spatial data from different sources across the Community in a consistent way and share them between several users and applications*
- *it is possible for spatial data collected at one level of public authority to be shared between all the different levels of public authorities*
- *spatial data are made available under conditions that do not restrict their extensive use*
- *it is easy to discover available spatial data, to evaluate their fitness for purpose and to know the conditions applicable to their use*

ANNEX I
SPATIAL DATA THEMES…

1. Coordinate reference systems

Systems for uniquely referencing spatial information in space as a set of coordinates (x, y, z) and/or latitude and longitude and height, based on a geodetic horizontal and vertical datum.

2. Geographical grid systems

Harmonised multi-resolution grid with a common point of origin and standardised location and size of grid cells.

3. Geographical names

Names of areas, regions, localities, cities, suburbs, towns or settlements, or any geographical or topographical feature of public or historical interest.

ANNEX I
…SPATIAL DATA THEMES…

4. Administrative units

Units of administration, dividing areas where Member States have and/or exercise jurisdictional rights, for local, regional and national governance, separated by administrative boundaries.

5. Addresses

Location of properties based on address identifiers, usually by road name, house number, postal code.

6. Cadastral parcels

Areas defined by cadastral registers or equivalent.

ANNEX I
…SPATIAL DATA THEMES

7. Transport networks

Road, rail, air and water transport networks and related infrastructure. Includes links between different networks.

8. Hydrography

Hydrographic elements, including marine areas and all other water bodies and items related to them, including river basins and sub-basins.

9. Protected sites

Area designated or managed within a framework of international, Community and Member States' legislation to achieve specific conservation objectives.

About INSPIRE: principles and terminology

SDIC: Spatial Data Interest Community
LMO: Legally Mandated Organisation

DS: Data Specifications
IR: Implementing Rules

DT: Drafting Teams (national experts)
CT: Consolidation Team (EC services)

About INSPIRE: principles and terminology

Data Specification Drafting Team ⟷ *definition and scopes of the nine so-called Annex I Themes*

↓

registered SDIC (Spatial Data Interest Community) and LMO (Legally Mandated Organization)

↓

Thematic Working Group ⟷ *implement the reccomendations into a new version of the description of the Themes*

↓

The TWGs are expected to elaborate the descriptions on more detail and generate Draft Implementig Rules

From Brussels2008 to Florence2009

Document	Description	When	Who
TWG-XX-nn	*Evaluation of user requirements (for each Annex I theme)*	*2008-06*	*TWG, CT, EIONET*
TWG-XX-nn	*Development of use-cases / documentation for the development of specifications*	*2008-06*	*TWG*
TWG-XX-nn	*Analysis of possible "holes" in the documents*	*2008-08*	*TWG*
DS-D2.8.I.n	*Working document "Data Specifications" (technical annex for the IR – one for each Annex I theme)*	*2008-11*	*TWG*
DS-D2.8.I.n b	*Launch of the specifications for testing (based on use-cases that require data from different themes)*	*2008-11 2008-12*	*SDIC, LMO*
DS-D2.8.I.n c	*Launch of the consultation on "Data Specifications" to SDIC/LMO*	*2008-11 2008-12*	*SDIC. LMO*
DS-D2.8.I.n d	*Revised Draft Data specifications*	*2009-03 2009-06*	*TWG*
DS-D2.8.I.n e	*IR governing the interoperability of spatial datasets and services of Annex I themes submitted for opinion to the INSPIRE Committee*	*2009-05 2009-11*	*Comitology*

From Brussels2008 to Florence2009

- *XTWG Meeting in Ispra, 20-21 May 2008*
- *INSPIRE Conference in Maribor, 23-25 June 2008*
- *XTWG Meeting in Ispra, 25-26 August 2008*
- *XTWG Meeting in Ispra, 4 November 2008*
- *TWG Meeting in Ispra, 20 November 2008*
- *XTWG Meeting in Ispra, 16 March 2009*
- *TWG Meeting in Ispra, 17 March 2009*
- *CRW in Ispra, 23-24 April 2009*
- *TWG Meeting in Florence, 25 May 2009*
- *INSPIRE Conference in Rotterdam, 15-19 June 2009*
- *Several telecons*

Implementing Rules CRS

For the horizontal component, INSPIRE will mandate for the areas within the geographical scope of ETRS89 the use of the European Terrestrial Reference System 1989 (ETRS89).

The International Terrestrial Reference System (ITRS) or other geodetic coordinate reference systems compliant with ITRS shall be used in areas that are outside the geographical scope of ETRS89.

For the vertical component, INSPIRE will mandate for the areas within the geographical scope of EVRS the use of the European Vertical Reference System (EVRS).

Implementing Rules CRS

The mandated CRS is used for any kind of information/resolution/accuracy; the resolution and accuracy of data are out of scope of the theme CRS.

The accuracy of the data sets resulting from transformations and conversion formulas are out of scope of the theme CRS.

The accuracy of the data sets must be documented by the data set provider according to all the aspects that contribute to it, namely the original accuracy and the accuracy of the conversions, transformations and handling of data.

Implementing Rules CRS

There are themes for which data are expressed in linear systems for the horizontal component or on non-length-based vertical systems like pressure, density, for the vertical component. There are also themes that may require temporal references.

This kind of referencing is parametric.

The referencing by parameters and temporal reference systems are out of scope of the theme CRS because the parametric systems do not provide unique and unambiguous referencing in space.

The parameters shall be associated with the specific data according to ISO 19111 (Part 2: Extension for parametric values). If there is a need to assign time series (array of values) to data, the ISO 19123 shall be used.

Implementing Rules CRS

INSPIRE will mandate the Lambert Azimuthal Equal Area (ETRS89-LAEA) for spatial analysis and display reporting where true area representation is required

INSPIRE will mandate the Lambert Conformal Conic (ETRS89-LCC) for conformal pan-European mapping at scales smaller or equal to 1:500,000

INSPIRE will mandate the Transverse Mercator (ETRS89-TMzn) for conformal pan-European mapping at scales larger than 1:500,000

Implementing Rules CRS

There are themes that may require other types of projections to fulfil their requirements.

Specific themes may use special projections internally.

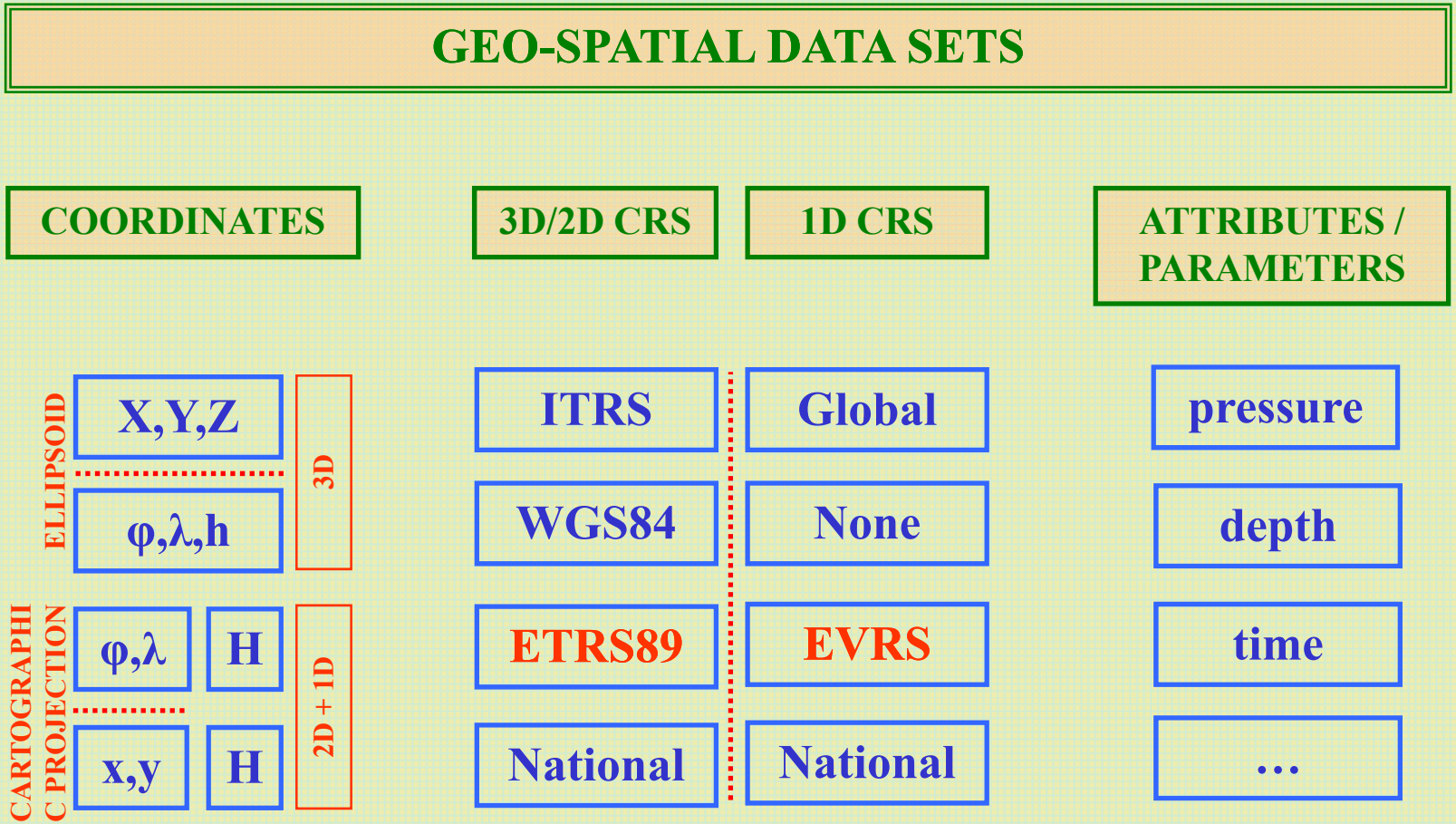
In this case, these projections must be well documented to allow the conversion to geographic coordinates.

The documentation shall be provided according to ISO 19111, which states how a projected coordinate reference system must be described.

IDENTIFIERS

- *ETRS89 for Cartesian coordinates in ETRS89 in space (X,Y,Z)*
- *ETRS89-GRS80 for geographic coordinates in ETRS89 on the GRS80 ellipsoid (Longitude, Latitude)*
- *ETRS89-GRS80h for geographic coordinates in ETRS89 and height related to the GRS80 ellipsoid (Longitude, Latitude, Ellipsoidal height h)*
- *EVRS for the height in EVRS (H)*
- *ETRS89-LAEA for ETRS89 coordinates projected into plane coordinates by the Lambert Azimuthal Equal Area projection (x, y)*
- *ETRS89-LCC for ETRS89 coordinates projected into plane coordinates by the Lambert Conformal Conic projection (E, N)*
- *ETRS89-TMzn for ETRS89 coordinates projected into plane coordinates by the Transverse Mercator projection (E,N)*

Coordinate Reference Systems Concept



Implementing Rules GGS

INSPIRE will mandate the Grid_ETRS89-LAEA5210 for pan-European spatial analysis or reporting where true area representation is required. The grid is based on the ETRS89 Lambert Azimuthal Equal Area coordinate reference system with the centre of the projection at the point 52° N, 10° E and false easting: x0 = 4321000 m, false northing: y0 = 3210000 m.

Grid points of grids based on ETRS89-LAEA must coincide with grid points at Grid_ETRS89-LAEA5210.

Reference point of grid cell for grids based on ETRS89-LAEA is the lower left corner of the grid cell.

Implementing Rules GGS

- *Grid points of grids based on ETRS89-LAEA must coincide with grid points at Grid_ETRS89-LAEA5210.*
- *The grid is defined as hierarchical one in metric coordinates in power of 10.*
- *The resolution of the grid is 1m, 10m, 100m, 1000m, 10,000m, 100,000m.*
- *The grid orientation is south-north, west-east.*
- *Reference point of a grid cell for grids based on ETRS89-LAEA is the lower left corner of the grid cell.*
- *Cell code is composed of the size of cell and the coordinates of the lower left cell corner in ETRS89-LAEA*

(follows the recommendations from the European Environmental Agency)

Implementing Rules GGS

Inspire geographical grid systems form a geo-referencing framework for the themes where grids with fixed and unambiguously defined location of grid cells are needed. Mandating or recommending the use of these grid systems for individual Inspire themes or concrete cross themes applications is out of scope of this Inspire theme.

When discrete values referred to one grid (e.g. sampling results) are converted to a different grid, there is no possibility to maintain the original thematic information.

Controlling and recording resampling steps provides the needed input for calculation of expected errors.

Implementing Rules GGS

Inspire geographical grids themselves, with no values assigned to individual cells, are implemented and exchanged as vector data (lines or polygons).

Thematic datasets based on geographical grids are exchanged as tables, lists or as gridded data.

Implementing Rules CRS & GGS

Comments on version 2 overview:

1 - ~190 comments
2 - ~ 20 duplicate comments
3 - Selection of invitees for the Cross Resolution Workshop:
- Meteorological and Hydrographic communities (Height)
- NMA (Map projections)
4 - Other comments and concerns

Remaining issues

- *Confusion about WGS84, ITRS, ETRS89*
  - *Insert and introductory text about the relationships between different systems*
- *Geographical scope*
  - *Rephrase the requirements*
- *Height reference (meteorological and hydrographic communities)*
  - *Rephrase the requirements*
- *Map projections for global use (meteorological community)*
  - *Rephrase the Map Projections text*
- *Map Projection for viewing services*
  - *understand the requirements; include statements related to web services and to whom it is addressed, etc.*
- *For 3D and 4D grids in the atmospheric and oceanographic sciences, and their representations in 2D, the grids must be defined or referenced in the metadata accompanying the data. These definitions may be using standards recognized by WMO, ICAO or IOC, or may be defined in an accepted scientific reference.*

Remaining issues

Text proposed by the meteorological and hydrographic communities representatives

For the Vertical coordinate, there are 5 classes:

- *for heights measured with respect to the land surface, they must be measured to EVRS;*
- *the depth of the sea floor must be measured with respect to the Lowest Astronomical Tide where there is any appreciable tide;*
- *in the free atmosphere, where heights are inferred from measured barometric pressure, then the conversion must be according to ISO 2533:1975 and related National, European and International legislation derived from the Chicago Convention 1947;*
- *the free ocean depths will be inferred from pressure using the (TBN) reference;*
- *For coordinates which do not use height directly, but which are parametric according to ISO 19111-2 then the Coordinate system must be declared under 19111-2 or appropriately referenced in the metadata.*

Conclusion

- *Deadline for the version 3 of the document: 26 June 2009!*
- *Terminology harmonization needed between the IAG and CRS worlds; EUREF TWG must be involved in the IAG related initiatives; a short-term action is needed (conversion-table???)*
- *The NMA have a fundamental role in helping the other communities to understand the requirements*
- *The NMA representatives in EUREF are a fundamental piece in the INSPIRE implementation process (RESOLUTION)*