The participation of EUREF in the activities of INSPIRE

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Background

- INSPIRE=Infrastructure for Spatial Information in Europe
- <u>INSPIRE is a legal entity</u>: 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 and is available at http://inspire.jrc.it/directive/I_10820070425en00010014.pdf

<u>Terminology</u>

- 'infrastructure for spatial information' means metadata, spatial data sets and spatial data services; network services and technologies; agreements on sharing, access and use; and coordination and monitoring mechanisms, processes and procedures, established, operated or made available in accordance with this Directive;
- 'spatial data' means any data with a direct or indirect reference to a specific location or geographical area

Guiding Principles of INSPIRE

The guiding principles of INSPIRE are:

- that 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;
- that 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;
- that it is possible for spatial data collected at one level of public authority to be shared between all the different levels of public authorities;
- that spatial data are made available under conditions that do not restrict their extensive use;
- that it is easy to discover available spatial data, to evaluate their fitness for purpose and to know the conditions applicable to their use.

How EUREF, ETRS89 and EVRS appear in the present Inspire documents

From Drafting Team "Data Specifications" - deliverable D2.3:

- The **ETRS89** is an example for a coordinate reference system in Europe, which has been adopted by the European Commission (ref COGI action decision 2003 F/GIS/69/EN). It is today realised through a network of more than 200 permanent operating GNSS observing stations of the EUREF organization. This realisation not only provides static, but furthermore kinematic information of spatial referencing. This geodetic reference is widely used in continental Europe. Furthermore the increasing use of GPS networks incline countries to use the European system.
- ETRS89 and EVRS could be implemented in a spatial information system following the ISO 19111 standards with the above mentioned restrictions concerning kinematic aspects.
- Many national reference frames are distorted. Therefore, coordinates can only be transformed to the ETRS89 system with decimeter to meter accuracies.
- An example of **Coordinate operations** in the scope of ISO 19111 is realised through the "Information and Service for European Coordinate Reference Systems (CRS)" at http://crs.bkg.bund.de, which was established by BKG, EuroGeographics and EUREF.

CRS Registry

- Information and Service System for European Coordinate Reference Systems (CRS)
 - maintained by EUREF, EuroGeographics and BKG
- OGP Surveying & Positioning Committee the former European Petroleum Survey Group (EPSG), http://www.epsg.org/, <u>Objectives:</u>
 - EPSG Geodetic Parameters Data Set (maintains and publishes a dataset of parameters for coordinate reference system and coordinate transformation description = <u>"de facto standard"</u> for GIS applications)
 - OGP Surveying and Positioning Guidance Notes
 - Data Exchange Formats

Interaction of INSPIRE Team and EUREF

- The INSPIRE Team envisages technical support from a maximum of 16 experts in the field of the Annex I spatial data themes (in particular, for Coordinate reference systems, Geographical grid systems, Geographical names, Administrative units, Addresses, Cadastral parcels, Transport networks, Hydrography, and Protected sites).
- Two EUREF/Eurogeographics candidates were accepted (Habrich, Caporali) for the Thematic Working Group 'Coordinate reference system'. This WG later absorbed the WG 'Geographical grid systems', with some caveat
- Inspire Thematic WG KOM in Ispra (Italy) 14-15 February 2008
- Bi-weekly telecons

Composition of the COREF TWG

- Paul Smit: JRC interface and facilitator
- Bruno Garayt, France
- Heinz Habrich, Germany
- Alessandro Caporali, Italy
- Jonathan Iliffe, UK
- Paul Cruddace, UK
- Lassi Lehto, Finland
- Lars Erland Engberg, Sweden
- Vida Bitenc, JRC editor

COREF position, interfaces and assignments

- A Data Specification Drafting Team drafted definition and scopes of the nine so-called Annex I Themes
- The document was distributed to registered SDIC (Spatial Data Interest Community) and LMO (Legally Mandated Organization) for review
- First assignment of our WG: attempt to implement the reccomendations into a new version of the description of the Themes (Definitions cannot be changed)
- The TWGs are expected to <u>elaborate the descriptions on more detail and</u> <u>generate Draft Implementig Rules</u>.
- ISO191xx very important as a scheme of data. Discussion on the final accuracy which is implied by the scheme, and which accuracy and time stability is required for the several Inspire tasks
- Resolutions from IUGG, Technical specifications from IERS need to be taken into account
- ETRS89 is a basis but some reccommendation must be made for portions of European states not in continental Europe, or not in 'stable' Europe. For them the tie to 'stable Europe' foreseen in ETRS89 would imply changes in the coordinates of some centimeters/yr.

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.

Lat/lon/h assumes ellipsoid. Is an ellipsoid part of a datum?

Is height h or H? Is a geoid model part of the datum?

Accuracy, realization is part of the directive?

Potential confusion:

•Coordinate System

•Coordinate Reference System

•Coordinate Reference m specifies how be assigned to points by atical rules. A coordinate s a coordinate system t by a datum. The datum is of parameters that define origin, the scale, and the ordinate system.

es the conceptual schema scription for a minimum or which 1-, 2- and 3nates reference system e given. The first case is ate reference system to dinates is related. The sts of a coordinate ate transformation, sion, concatenated on) to change coordinate ordinate reference system

Description

Systems defines the spatial referencing system for 1, 2 or 3 dimensional terrestrial coordinates. It allows for all coordinate accuracy levels to be described and explicitly uses the definitions given in ISO 19111:2007: A coordinate system specifies how coordinates are to be assigned to points by means of mathematical rules. A coordinate reference system is a coordinate system related to an object by a datum. A datum is a parameter or set of parameters that define the position of the origin, the scale, and the orientation of a coordinate system. The theme uses the conceptual schema within ISO19111:2007 wherever possible, although deviations and supplements are required to fulfill the requirements of the theme (to fully cover coordinate reference system accuracy levels for example). The local realization of a coordinate reference system – the coordinate reference frame, will be covered within this theme. (Coordinate transformation services are covered within the work of the Network Services Drafting Team and so are out of scope of this theme.)

The INSPIRE theme Coordinate Reference

Cruddace's proposal 25.03.2008

Terminology

- Herman Drewes, IERS Conventions Workshop 2007:
 - <u>Reference Systems</u> are the <u>definition</u> of constants, conventions, models, and parameters, which serve as the necessary basis for mathematical descriptions of geometric and/or physical quantities and/or processes
 - <u>Reference Frames</u> realize reference systems physically (materialization) and mathematically (parameter estimation)
 - <u>Geodetic Datum</u> is the unequivocal <u>relation between</u> reference frame and reference system given by a set of datum parameters
- ISO 19111:



Accuracy Aspects

- Geodetic experts of the TWG-RS raised that topic at the KOM in Ispra
- Discussion about user requirements started
 - Is there any need of an accuracy number within INSPIRE?
 - What is the assumed accuracy of a coordinate within INSPRIE (1 m or 1 cm)?
 - Do "control points" (reference sites) belong to any INSPIRE theme?
- Discussion about naming and terminology started
 - "System" against "frame"
 - ISO standards has to be considered, but TWG-RS members are not familiar with the huge amount of ISO documents
- It would help, if EUREF formulates some clear "user requirements"

Coordinates and grids

- Our COREF WG includes also geographical grids: 2D for sure, 3D is yet unclear
- Important Workshop 'Map Projections for Europe' IES/JRC and Eurogeographics in Marne Ia Vallee, December 2001: no problem in EC adopting common reference system; real problem comes when adopting a common coordinate grid (Albers, UTM, Lambert conical..?)
- For the work of our WG it would probably be enough to establish a firm basis on the system and the frame, sticking to XYZ ECEF or (lat long h) on GRS80.
- Projection needs not to be unique, since it is a feature that is added to a map according to specific needs and is uniquely related by mathematical rules to ETRFxx

Conclusions and open questions

- Geodetic concepts and principles are important, but we must remember that the Data Infrastructure is user oriented
- ETRS89 and EVRS are accepted concepts, they are applicable for most European Countries, use ITRS for the rest (i.e. the non stable Europe)?
- What role should ISO 191xx standards play in the COREF and GEOGRID themes?
- INSPIRE portal to mirror EUREF products?
- Time dependence, accuracy, inclusion of marker coordinates into the directive