

2 Overview

2.1 Name

INSPIRE data specification for the theme *Orthoimagery*.

2.2 Informal description

Definition:

Geo-referenced image data of the earth's surface, from either satellite or airborne sensors [Directive 2007/2/EC]

Description:

Airborne or spaceborne orthoimagery can be considered:

- For the extraction, mapping and updating of specific features on the surface of the Earth (e.g. Transport network, Hydrography, Land cover, Geology)
- For the production of thematic information (e.g. Land use, Production and industrial facilities, Agricultural and aquacultural facilities)
- To provide a synoptic view of a given territory.
- For display as a backdrop to other data

Other applications include:

- The localisation of other thematic data
- The localisation of Earth observation image data itself
- The quick georeferencing and delivery of recently acquired images (e.g. dedicated to natural or industrial hazards) to be co-localised with other thematic interest data (geology, soil, old maps...)
- The continuous updating of rapidly evolving Reference Data layers

Some real use cases for orthoimagery products are detailed in Annex B.

For the purposes of this specification, orthoimagery shall include orthorectified imagery from the radio, through the visible, to the ultraviolet region of the electromagnetic spectrum derived from:

- scanned film positives or negatives
- digital airborne sensors (such as frame cameras or push-broom sensors)
- satellite imagery of the Earth
- radar imaging systems
- LiDAR (Light Detection And Ranging) intensity images generated from point clouds

The scope of the *Orthoimagery* data specification does not include:

- Data from the X-ray and gamma ray areas of the electromagnetic spectrum.
- Oblique imagery (since this is not orthorectified). Note that orthorectified imagery produced from oblique photography - e.g. as a mosaic - **is** included.
- Terrestrial imagery (e.g. from cameras based on the ground or on road or rail vehicles).
- Aerial video imagery. Note that orthorectified images created from video frames **is** included.
- Imagery of the sea bed from underwater sensors (only air-borne and satellite sensors are covered by the specification).
- Imagery from satellite observations of oceanographic parameters (e.g. sea surface temperature, ocean colour, wave height, etc.)
- Meteorological satellite imagery (such data is not primarily concerned with imagery of the Earth's surface).
- Products derived from orthoimagery (e.g. land cover, land use, etc.). Such products may be the subject of other data specifications from annexes II and III.

This does not prevent data providers from delivering such datasets in conformity with this INSPIRE data specification if they feel the need to do so.

Note that the original source data, from which orthoimages are derived, is not covered by the specification.

This INSPIRE data specification does not place restrictions on the spatial resolution given the heterogeneity of data sources and the wide range of use cases across Europe. All levels of resolution are affected: the European level, the National level, the Regional level and the Local level.

Definition:

Geo-referenced image data of the earth's surface, from either satellite or airborne sensors [Directive 2007/2/EC]

Description:

The *Orthoimagery* data theme includes orthorectified image data of the earth's surface, from either satellite or airborne sensors. An orthoimage is a raster image that has been geometrically corrected ("orthorectified") to remove distortion caused by differences in elevation, sensor tilt and, optionally, by sensor optics. Data is orthorectified to achieve an accuracy commensurate with a given topographic map equivalent. The data theme includes orthorectified imagery from the radio, through the visible, to the ultraviolet region of the electromagnetic spectrum.

Entry in the INSPIRE registry: <http://inspire.ec.europa.eu/theme/oi/>

2.3 Normative References

[Directive 2007/2/EC] Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

[ISO 19103] ISO/TS 19103:2005, Geographic information – Conceptual schema language

[ISO 19107] EN ISO 19107:2005, Geographic Information – Spatial Schema

[ISO 19108] EN ISO 19108:2005, Geographic Information – Temporal Schema

[ISO 19108-c] ISO 19108:2002/Cor 1:2006, Geographic Information – Temporal Schema, Technical Corrigendum 1

[ISO 19109] EN ISO 19109:2005, Geographic information – Rules for application schema

[ISO 19111] EN ISO 19111:2007, Geographic information - Spatial referencing by coordinates (ISO 19111:2007)

[ISO 19113] EN ISO 19113:2005, Geographic Information – Quality principles

[ISO 19115] EN ISO 19115:2005, Geographic information – Metadata (ISO 19115:2003)

[ISO 19123] EN ISO 19123:2007, Geographic Information – Schema for coverage geometry and functions

[ISO 19127] ISO/TS 19127:2005, Geographic information – Geodetic codes and parameters

[ISO 19131] EN ISO 19131:2007, Geographic Information – Data product specifications

[ISO 19138] ISO/TS 19138:2006, Geographic Information – Data quality measures

[ISO 19139] ISO/TS 19139:2007, Geographic information – Metadata – XML schema implementation

[ISO 19156] ISO/DIS 19156, Geographic information – Observations and measurements

[ISO 19157] ISO/DIS 19157, Geographic information – Data quality

[OGC 06-103r3] Implementation Specification for Geographic Information - Simple feature access – Part 1: Common Architecture v1.2.0

NOTE This is an updated version of "EN ISO 19125-1:2006, Geographic information – Simple feature access – Part 1: Common architecture". A revision of the EN ISO standard has been proposed.

[Regulation 1205/2008/EC] Regulation 1205/2008/EC implementing Directive 2007/2/EC of the European Parliament and of the Council as regards metadata

[Regulation 976/2009/EC] Commission Regulation (EC) No 976/2009 of 19 October 2009 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards the Network Services

[Regulation 1089/2010/EC] Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services

2.4 Terms and definitions

General terms and definitions helpful for understanding the INSPIRE data specification documents are defined in the INSPIRE Glossary¹³.

Specifically, for the theme *Orthoimagery*, the following terms are defined:

(1) **band**

Range of wavelengths of electromagnetic radiation that produce a single response by a sensing device.

SOURCE ISO/TS 19101-2:2008

(2) **mosaic**

Image composed of multiple overlapping or adjoining photographs or images merged together.

NOTE A mosaic is often used to aim at a geometrical and radiometrical continuity. A single mosaic may be made from images taken at different dates and even from different sensors.

(3) **orthoimage aggregation**

Combination of subsets from several homogeneous orthoimage coverages forming a new orthoimage coverage.

NOTE Although their concepts are close, orthoimage aggregation and mosaicking differ: the former is not an extensive production process already achieved but a dynamic view to structure datasets.

(4) **raster**

Usually rectangular pattern of parallel scanning lines forming or corresponding to the display on a cathode ray tube.

SOURCE ISO 19123

¹³ The INSPIRE Glossary is available from <http://inspire-registry.jrc.ec.europa.eu/registers/GLOSSARY>

NOTE The resulting term “raster data” is often used colloquially in the field of geographic information to identify the whole class of data where the spatial geometry is organized into a, usually rectangular, grid.

(5) seamline

Line used in the process of mosaicking to delineate the areas of the contributing input images.

NOTE These lines usually pass through areas where radiometric image differences are minimum or alternatively follow natural borders to minimize the observation of borders between images.

(6) tiling

Process of cutting out an image into smaller images (tiles).

NOTE The resulting tiles usually form a mathematical partition of the original image. A set of tiles may be created from a single image or from a mosaic.

2.5 Symbols and abbreviations

ATS	Abstract Test Suite
ASCII	American Standard Code for Information Interchange
EC	European Commission
EEA	European Environmental Agency
ETRS89	European Terrestrial Reference System 1989
ETRS89-LAEA	Lambert Azimuthal Equal Area
EVRS	European Vertical Reference System
GCM	General Conceptual Model
GeoTIFF	Geographic Tagged Image File Format
GML	Geographic Markup Language
GMLJP2	GML in JPEG 2000 for Geographic Imagery
IR	Implementing Rule
ISDSS	Interoperability of Spatial Data Sets and Services
ISO	International Organization for Standardization
ITRS	International Terrestrial Reference System
JPEG	Joint Photographic Experts Group
LAT	Lowest Astronomical Tide
LMO	Legally Mandated Organisation
LZW	Lempel-Ziv-Welch compression algorithm
OCL	Object Constraint Language
OGC	Open Geospatial Consortium
RGB	Red Green Blue
SDIC	Spatial Data Interest Community
SWE	Sensor Web Enablement
TG	Technical Guidance
TIFF	Tagged Image File Format
TWG-OI	Thematic Working Group Orthoimagery
UK	United Kingdom
UML	Unified Modelling Language
URI	Uniform Resource Identifier
UTC	Coordinated Universal Time

2.6 How the Technical Guidance maps to the Implementing Rules

The schematic diagram in Figure 1 gives an overview of the relationships between the INSPIRE legal acts (the INSPIRE Directive and Implementing Rules) and the INSPIRE Technical Guidance document. The INSPIRE Directive and Implementing Rules include legally binding requirements that describe, usually on an abstract level, *what* Member States must implement.

In contrast, the Technical Guidance documents define *how* Member States might implement the requirements included in the INSPIRE Implementing Rules. As such, they may include non-binding technical requirements that must be satisfied if a Member State data provider chooses to conform to the Technical Guidance. Implementing this technical guidance will maximise the interoperability of INSPIRE spatial data sets.

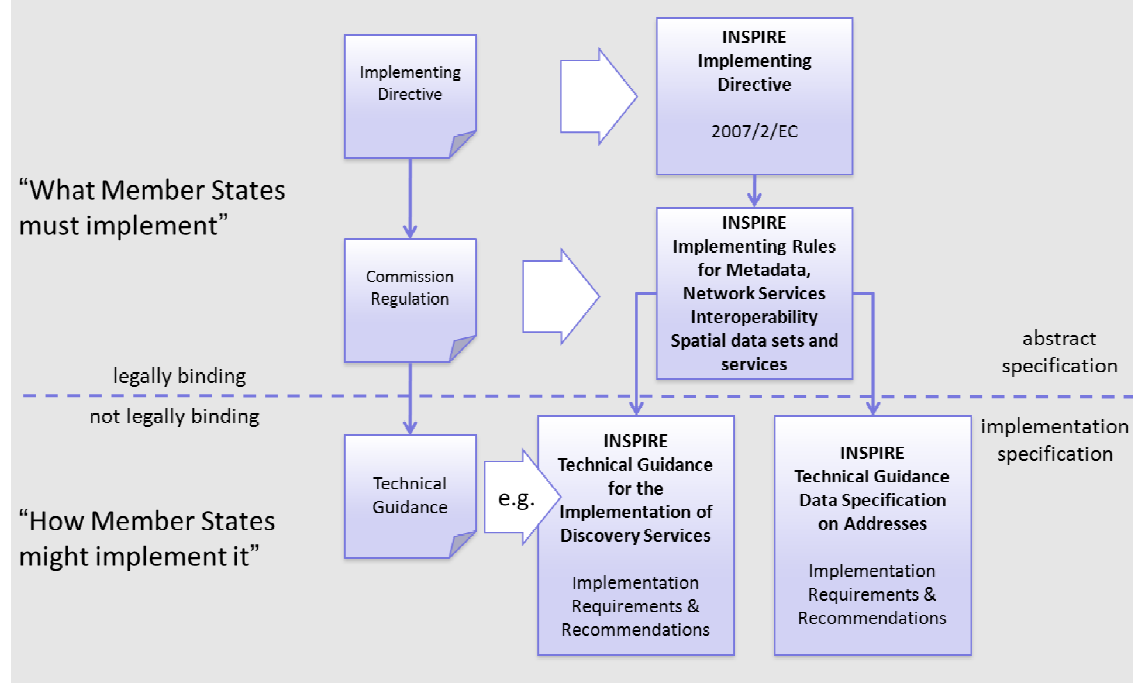


Figure 1 - Relationship between INSPIRE Implementing Rules and Technical Guidance

2.6.1 Requirements

The purpose of this Technical Guidance (Data specifications on *Orthoimagery*) is to provide practical guidance for implementation that is guided by, and satisfies, the (legally binding) requirements included for the spatial data theme *Orthoimagery* in the Regulation (Implementing Rules) on interoperability of spatial data sets and services. These requirements are highlighted in this document as follows:

IR Requirement

Article / Annex / Section no.

Title / Heading

This style is used for requirements contained in the Implementing Rules on interoperability of spatial data sets and services (Commission Regulation (EU) No 1089/2010).

For each of these IR requirements, this Technical Guidance contains additional explanations and examples.

NOTE The Abstract Test Suite (ATS) in Annex A contains conformance tests that directly check conformance with these IR requirements.

Furthermore, this Technical Guidance may propose a specific technical implementation for satisfying an IR requirement. In such cases, this Technical Guidance may contain additional technical requirements that need to be met in order to be conformant with the corresponding IR requirement *when using this proposed implementation*. These technical requirements are highlighted as follows:

TG Requirement X This style is used for requirements for a specific technical solution proposed in this Technical Guidance for an IR requirement.
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NOTE 1 Conformance of a data set with the TG requirement(s) included in the ATS implies conformance with the corresponding IR requirement(s).

NOTE 2 In addition to the requirements included in the Implementing Rules on interoperability of spatial data sets and services, the INSPIRE Directive includes further legally binding obligations that put additional requirements on data providers. For example, Art. 10(2) requires that Member States shall, where appropriate, decide by mutual consent on the depiction and position of geographical features whose location spans the frontier between two or more Member States. General guidance for how to meet these obligations is provided in the INSPIRE framework documents.

2.6.2 Recommendations

In addition to IR and TG requirements, this Technical Guidance may also include a number of recommendations for facilitating implementation or for further and coherent development of an interoperable infrastructure.

Recommendation X Recommendations are shown using this style.

NOTE The implementation of recommendations is not mandatory. Compliance with this Technical Guidance or the legal obligation does not depend on the fulfilment of the recommendations.

2.6.3 Conformance

Annex A includes the abstract test suite for checking conformance with the requirements included in this Technical Guidance and the corresponding parts of the Implementing Rules (Commission Regulation (EU) No 1089/2010).