2 Overview

2.1 Name

INSPIRE data specification for the theme Land Cover.

2.2 Informal description

Definition:

Physical and biological cover of the earth's surface including artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies [Directive 2007/2/EC]

Description:

Land cover is an abstraction of the physical and biophysical cover on the earth's surface.

Land cover data provides a description of the surface of the earth by its (bio-) physical characteristics. Land cover mapping and surveying of land cover is done through land cover survey initiatives. The EEA CORINE Land Cover program, the LUCAS survey carried out by Eurostat and many national and regional land cover mapping programs are examples of such land cover survey initiatives. The variety of survey initiatives show that land cover can be described, classified and mapped in many different ways, justified by a multitude of applications and user requirements.

Land cover is an abstraction. The surface described as land cover is in reality populated with landscape elements. The landscape elements are physical features like buildings, roads, trees, plants, water bodies etc. Inside a unit of land, the (bio-)physical characteristics of these landscape elements combine to form the land cover of that unit. Mapping and description of land cover is, however, different from the mapping of the individual landscape elements and concerned with the portrayal of a continuous surface and not with the individual elements that comprise this surface. In this sense, land cover is to be understood as an abstraction of the surface.

Land cover is different from land use (INSPIRE Annex III, theme number 4), which is dedicated to the description of the use of the earth's surface. Land cover and land use are, however, related to each other and often combined in practical applications. Data combining land use and land cover information often emphasize land use aspects in intensively used areas (e.g. built-up or industrial areas, artificial land) and land cover aspects in extensively used areas (e.g. natural vegetation, forest areas). A detailed discussion of the relationship between land cover and land use is found in an annex to the INSPIRE data specification for land use.

Harmonized, homogenous and comparable land cover information for Europe is available as the result of the EEA CORINE Land Cover program and the Eurostat LUCAS survey. Land cover data created and maintained by many member states, together with initiatives within the framework of the GMES, can provide further input to a European infrastructure of land cover information.

Definition:
Physical and biological cover of the earth's surface including artificial surfaces, agricultural areas, forests, (semi-)natural areas, wetlands, water bodies.

Description
Land cover data is a physical or biological description of the earth surface. In this way it is different from the land use data (Annex III, theme number 4), dedicated to the description of the use of the Earth surface.
Land cover information has to be homogenous and comparable between different locations in Europe, based on the infrastructures for Land Cover information created by the Member States (if existing), and made available and maintained at the most appropriate level.

A land cover data set consists of a collection of land cover units. These units may be points, polygons or raster cells (resulting in two core models, one for vector data and one for raster data). The land cover data set is also linked to a code list (e.g. the CORINE Land Cover code list). CORINE Land Cover as well as most regional and national land cover data sets, can be represented using one of the core models.
Land cover information used in monitoring linked to EU agricultural policy (IACS), in carbon monitoring (LULUCF) and used in land and ecosystem accounting based on CORINE Land Cover (LEAC)

Entry in the INSPIRE registry: *http://inspire.ec.europa.eu/theme/lc/*

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 19105] EN ISO 19105:2000, Geographic information -- Conformance and testing

[ISO 19107] EN ISO 19107:2005, Geographic Information – Spatial 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 19118] EN ISO 19118:2006, Geographic information – Encoding (ISO 19118:2005)

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

[ISO 19125-1] EN ISO 19125-1:2004, Geographic Information – Simple feature access – Part 1: Common architecture

[ISO 19135] EN ISO 19135:2007 Geographic information – Procedures for item registration (ISO 19135:2005)

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

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

[ISO 19144-1] ISO 19144-1:2009, Geographic information – Part 1: Classification system structure

[ISO 19144-2] ISO/FDIS 19144-2:2012, Geographic information - Classification systems - Part 2 : Land Cover Meta Language (LCML)

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

[OGC 06-103r4] Implementation Specification for Geographic Information - Simple feature access – Part 1: Common Architecture v1.2.1

NOTE This is an updated version of "EN ISO 19125-1:2004, Geographic information – Simple feature access – Part 1: Common architecture".

[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 Glossary[13].

Specifically, for the theme Land Cover, the following terms are defined:

(1) Classification System
System for assigning objects to classes, in accordance with ISO 19144-1:2012.

Classification is an abstract representation of real world phenomena (i.e. the situation in the field) using classifiers. A classification is a systematic framework with the names of the classes and the definitions used to distinguish them, and the relation between classes. Classification thus necessarily involves definition of class boundaries that must be clear and based upon objective criteria.

(2) Discrete Coverage
Coverage that returns the same feature attribute values for every direct position within any single spatial object, temporal object or spatiotemporal object in its domain, in accordance with EN ISO 19123:2007.

NOTE The domain of a discrete coverage consists of a finite set of spatial, temporal, or spatiotemporal objects

(3) Land Cover Object
Spatial object (point, pixel or polygon) where the land cover has been observed.

(4) Legend
Application of a classification in a specific area using a defined mapping scale and specific data set [UNFAO LCCS 2:2005].

A *legend* is the application of a classification in a specific area using a defined mapping scale and specific data set. Therefore, a legend may contain only a proportion, or subset, of all possible classes of the classification.A legend shall be
- *scale dependent*, and
- *source dependent*.

[ISO 19144-1]

(5) Minimal Mapping Unit
Smallest area size of a polygon allowed to be represented in a particular land cover data set.

(6) Mosaic
Group of land cover classes assigned to the same land cover object at a same time. A covered percentage may be affected to each LC class.

(7) Nomenclature
A list of codes and corresponding names and definitions for all the valid classes resulting from a classification system.

(8) Situation

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

State of a particular land cover object at a particular point in time.

NOTE: Any particular polygon may then support more than one classification class, each corresponding to a specific observation at a particular point in time.

(9) Tessellation
Partitioning of a space into a set of conterminous subspaces having the same dimension as the space being partitioned [ISO 19123].

NOTE A tessellation in a 2D space consist of a set of non-overlapping polygons that entirely cover a region of interest.

2.5 Symbols and abbreviations

ATS	Abstract Test Suite
CLC	CORINE Land Cover
CORINE	Coordination of information on the environment
EC	European Commission
EEA	European Environmental Agency
ETRS89	European Terrestrial Reference System 1989
ETRS89-LAEA	Lambert Azimuthal Equal Area
EVRS	European Vertical Reference System
FAO	Food and Agricultural Organization
GCM	General Conceptual Model
GMES	Global Monitoring for Environment and Security
GML	Geography Markup Language
IACS	Integrated Administration and Control System
IGBP	International Geosphere-Biosphere Programme
IR	Implementing Rule
ISDSS	Interoperability of Spatial Data Sets and Services
ISO	International Organization for Standardization
ISO	International Standard Organization
ITRS	International Terrestrial Reference System
LAT	Lowest Astronomical Tide
LC	Land Cover
LCCS	Land Cover Classification System
LCML	Land Cover Meta Language
LEAC	Land and Ecosystem Accounting
LMO	Legally Mandated Organisation
LPIS	Land Parcel Identification System
LU	Land Use
LUCAS	Land Use/Cover Area Frame Survey by EUROSTAT
LULUCF	Land Use, Land Use Change and Forestry
MMU	Minimal Mapping Unit
OCL	Object Constraint Language
SDI	Spatial Data Infrastructure
SDIC	Spatial Data Interest Community
TG	Technical Guidance
TWG	Thematic Working Group
UML	Unified Modeling Language
UTC	Coordinated Universal Time
XML	EXtensible Markup Language

2.6 How the Technical Guidelines map to the Implementing Rules

The schematic diagram in Figure 2 gives an overview of the relationships between the INSPIRE legal acts (the INSPIRE Directive and Implementing Rules) and the INSPIRE Technical Guidelines. 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 Guidelines 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 Guidelines. Implementing these Technical Guidelines will maximise the interoperability of INSPIRE spatial data sets.

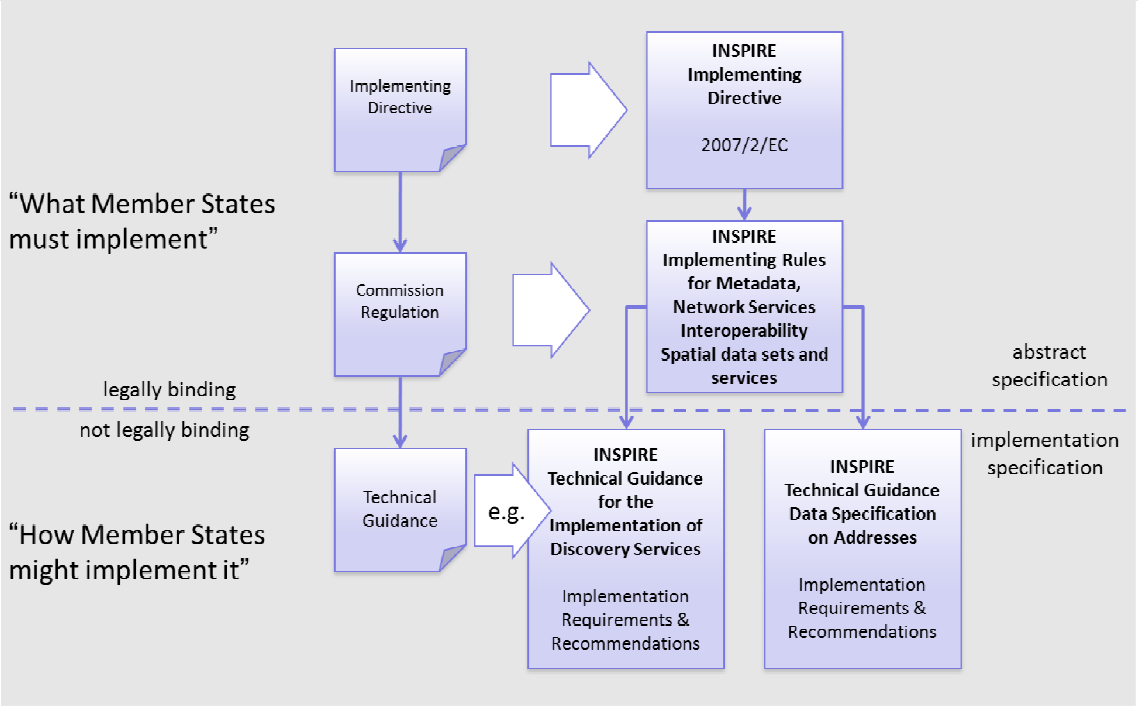

Figure 2 - Relationship between INSPIRE Implementing Rules and Technical Guidelines

2.6.1 Requirements

The purpose of these Technical Guidelines (Data specifications on *Land Cover*) is to provide practical guidance for implementation that is guided by, and satisfies, the (legally binding) requirements included for the spatial data theme Land Cover 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, these Technical Guidelines contain 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, these Technical Guidelines may propose a specific technical implementation for satisfying an IR requirement. In such cases, these Technical Guidelines 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 these Technical Guidelines for an IR requirement.

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, these Technical Guidelines 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 these Technical Guidelines 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 these Technical Guidelines and the corresponding parts of the Implementing Rules (Commission Regulation (EU) No 1089/2010).