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Geographic information — Land Administration Domain Model (LADM) —

Part 5: Spatial plan information

Information géographique — Modèle du domaine de l'administration des terres (LADM) —

Partie 5: Informations sur le plan d'aménagement du territoire

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 287, *Geographic Information*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This edition of ISO 19152-5, together with all other parts of the ISO 19152 series, cancels and replaces the first edition (ISO 19152:2012), which has been technically revised. This document is a new part to the ISO 19152 series.

A list of all parts in the ISO 19152 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Spatial planning plays an essential role in land management. Integration of physical and sectoral planning at the local level usually produces some degree of permissions, authorizations, restrictions, responsibilities, obligations and sanctions. Essentially, jurisdictions reserve the power to control activities over certain areas of land. They exert this power by providing agencies with powers that either restrict or sanction the rights of landowners or create positive obligations (responsibilities or obligations) on landowners. The same agencies can potentially have the power to empower landowners with rights that would otherwise be restricted or waive positive obligations. Where this occurs, a time-limited permit or authorization is commonly used. However, it is typical in many countries to establish land administration and spatial plan processes through different regulations, authorities and processes. Cities establish and maintain land administration systems (LAS) to manage information about the land and urban space. Information about land rights recorded in a land administration system (under its applicable legislation) can be required to inform spatial planning decisions. Legally binding planning conditions that create rights, responsibilities and restrictions under local or national planning legislation, which are not recorded in a land registration system, can be required for a full understanding of the permitted uses of a specific land parcel. Outputs of the planning system can anticipate changes in land rights that will be recorded in the land registration system in the future. The land administration domain model (LADM) offers guidelines to support interoperability in the representation of rights, restrictions and responsibilities (RRRs). The LADM is also capable of standardizing multi-dimensional representation, including the temporal aspects in documenting and visualizing all legal aspects of land use or space.

The purpose of this document is to provide the general reference model as an extension of core LADM (i.e. ISO 19152-1 and ISO 19152-2) for all objects of spatial planning covering land/water and below/on/above surfaces. This document supports a 4D (3D + time) representation of the spatial plans, including marine spatial plans.

The first goal of this document is to enable involved parties, both within one country and between different countries, to communicate based on the shared vocabulary implied by the model. It is not intended to replace existing systems but rather to provide a formal language for describing them so that their similarities and differences can be better understood.

The second goal is to provide an extensible basis for the development and refinement of efficient and effective LAS based on a model-driven architecture (MDA). This document is relevant for creating standardized information services in a national or international context, where land administration domain semantics have to be shared between organizations, regions, or countries in order to enable necessary translations. Three considerations during the design of the model were:

— that it will cover the common aspects shared by objects created by spatial plans;

— that it will be based on the conceptual framework of "Cadastre 2014" of the International Federation of Surveyors (FIG)[13], Plan4all[4][15] and Land Use/Cover data themes of INSPIRE[11];

— it will be as simple as possible in order to be useful in practice.

Conformance in relation to this document is given in Clause 4, and a conformance test is specified in Annex A. Clause 5 provides the notation. Clause 6 introduces the classes, attributes and associations of this document in detail. Clause 7 presents the relationships between the core LADM and this document. Annex B presents studies related to spatial plan interoperability. A set of country profiles is presented in Annex C. Annex D presents code lists as a basis to describe a flexible enumeration. The relationships between this document and INSPIRE are presented in Annex E. Examples of 3D spatial planning information and regulation are given in Annex F.

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Geographic information — Land Administration Domain Model (LADM) —

Part 5: Spatial plan information

1 Scope

This document:

— specifies a reference land administration domain model (LADM) covering basic information-related components of spatial plan information on land/water and elements below/on/above the surface of the Earth with 2D/3D/4D (3D + time) geometric representation;

— provides an abstract, conceptual model with packages related to:

  — plan unit, i.e. the smallest homogenous area/space (2D/3D/4D) with assigned function/purpose, e.g. office, education, retail;

  — plan block, i.e. a set of neighbouring plan units decided on by planning authorities, e.g. high-density residential area, nature area, heavy industry area;

  — plan group unit, i.e. areas corresponding to the higher planning levels;

  — plan group, i.e. hierarchy in spatial plans consisting of multiple plan blocks, e.g.:

    — continent/regional-wide (e.g. European regions),

    — country-wide (e.g. Indonesia, the Netherlands),

    — island,

    — state or region province,

    — municipality or city, and

    — urban or rural;

  — permit, i.e. something that is granted to a party which gives the party permission to undertake an activity which would otherwise be restricted;

— defines terminology for spatial plan information as part of land administration, based on various national and international systems, that is as simple as possible in order to be useful in practice. The terminology allows a shared description of different formal or informal practices and procedures in various jurisdictions;

— provides a platform for comparison and monitoring of spatial planning information based on Sustainable Development Goal (SDG) indicators;

— provides an approach to modelling the integration of spatial plan information (outputs of spatial plans) into land administration;

— provides a basis for national and regional profiles;

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— enables the combining of land-use planning and land development planning in land administration information from different sources in a coherent manner;

— allows for the relationship to multiple parties and groups to be expressed together with a referencing structure so that the sourcing of all information systems can be maintained. It reuses core LADM classes so that sourcing of all information systems can be maintained;

— establishes the common elements and basic schema for spatial plan information upon which a more detailed schema can be established.

NOTE This document does not interfere with (national) and sub-national spatial planning laws.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19105, *Geographic information — Conformance and testing*

ISO 19107, *Geographic information — Spatial schema*

ISO 19152-1, *Geographic information — Land Administration Domain Model (LADM) — Part 1: Generic conceptual model*

ISO 19152-2, *Geographic information — Land Administration Domain Model (LADM) — Part 2: Land registration*

3 Terms, definitions, and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19152-1, ISO 19152-2 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1.1
permit
<LADM> explicit proof of a right (to perform a task) granted by authorities and granted to parties fitting within the relevant plan unit, i.e. the object specified in the permit request has the correct function for the requested location

Note 1 to entry: A permit can be considered as an authorization granted by the authorities to the parties in accordance with the plan unit. The use of plan unit identifiers within a permit document can enable a closely coupled integration.

3.1.2
plan block
<LADM> set of adjacent and non-overlapping plan units that are defined collectively by the *spatial planning authorities* (3.1.8), which represents the intended use of the area

Note 1 to entry: A plan block represents planned land use (PLU) that corresponds to spatial plans defined by spatial planning authorities, depicting the possible utilization or development, or both, of the land. A plan block contains the plan units to express the PLU defined by the spatial planning authority.

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Note 2 to entry: PLU is regulated by *spatial planning* (3.1.7) documents elaborated at various levels of administration. Land use regulation over a geographical area is, in general, composed of an overall strategic orientation, a textual regulation, and a cartographic representation. Spatial planning documents result from the spatial planning process. Once adopted, all parties are required to conform to the document. A spatial planning document corresponds to the plan block.

Note 3 to entry: A plan block contains an area/volume (2D/3D) characterized by a (set of) boundary(ies) of the PLU policy. Typical representations are residential, commercial, retail and industry.

Note 4 to entry: The geometric representation of the plan block is equal to the union of constituent plan units.

3.1.3
plan group
<LADM> *spatial plan* (3.1.6) that can be used to derive more detailed plans

Note 1 to entry: The hierarchy can be as follows: national level (national plans), regional level (regional plans), city-level *spatial planning* (3.1.7) (urban/rural plans), and finally sub-city level (zoning plans).

Note 2 to entry: A spatial plan group has specific attributes, and the level of the administrative hierarchy is accommodated in the plan group. It can include administrative information (which is expressed by an association to LA_AdministrativeSource from ISO 19152-2), such as legislation reference or date and reference to a legal act according to which it entered into force.

3.1.4
plan group unit
<LADM> areas corresponding to the higher planning levels with corresponding boundaries and spatial functions delineated by the higher plan level authorities

EXAMPLE In a national plan, the northwest of a country is designated to the energy plan group unit, the middle of the country is the national park plan group unit, and the south is the designated area for the industry plan group unit (these areas are of national scale).

Note 1 to entry: A higher-level plan [*plan group* (3.1.3)] consists of a collection of plan group units.

Note 2 to entry: The functions of the plan unit are aligned with the function of the plan group unit in which they are located.

3.1.5
plan unit
zoning unit
<LADM> homogenous area/space (2D/3D) with an assigned function or purpose that represents the potential land use development according to the *spatial planning authorities* (3.1.8) at the highest detail (largest scale)

Note 1 to entry: Plan units are usually prepared at the municipality/neighbourhood level.

Note 2 to entry: A plan unit, which is part of *plan block* (3.1.2), is a feature type that consists of area/volumes (2D/3D). It represents a zoning arrangement with regulation regarding the potential land use development. Plan units have several specific attributes to accommodate rights, restrictions and responsibilities (RRR), such as the nature of a regulation, indications on dimension rules that apply to the use of land, and reference to the applicable regulation.

Note 3 to entry: A plan unit consists of area/volume (2D/3D) characterized by a (set of) boundary(ies). Typical representations are high-density residential area, banking area, and heavy industry area.

3.1.6
spatial plan
zoning plan
<LADM> set of documents that establish the strategic direction for the development of a given geographic area

Note 1 to entry: A spatial plan states the policies, priorities, programmes and land allocations that will implement the strategic direction and influence the distribution of people and activities in spaces of various scales.

Note 2 to entry: Spatial plans can be developed for urban planning, regional planning, environmental planning, landscape planning, national spatial plans, or *spatial planning* (3.1.7) at a federal or multinational level.

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3.1.7
spatial planning
<LADM> method typically used by the public sector to influence the future distribution of activities in a space

3.1.8
spatial planning authority
<LADM> entity mandated by the government to design, develop and implement *spatial plans* (3.1.6)

Note 1 to entry: Plans can be implemented after acceptance by relevant authorities.

3.2 Abbreviations

FIG	International Federation of Surveyors
INSPIRE	infrastructure for spatial information in Europe
LADM	land administration domain model
LAS	land administration system
MDA	model driven architecture
PLU	planned land use
RRR	right, restriction, responsibility
SDG	Sustainable Development Goal
UML	unified modelling language

4 Conformance

4.1 Conformance requirements and testing

Conformance to this document consists of alignment with the requirements established in Clause 6. The abstract test suite given in Annex A specifies the methodology which shall be used for testing conformance to these requirements. The conformance class, requirement class, requirements, and abstract test suites are constructed according to ISO 19105.

4.2 Conformance class

4.2.1 General

In this document, one conformance class is defined. The related tests are provided in the abstract test suite in Annex A. Requirements are explicitly marked, and a requirement identifier is assigned. The name and contact information of the maintenance agency for this document can be found at https://www.iso.org/maintenance_agencies.

The contents of the conformance class, as specified in this document, are presented in Table 1.

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