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Geographic information — Land Administration Domain Model (LADM) —

Part 2: Land registration

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

Partie 2: Enregistrement foncier

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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 19152-2, together with all other parts of the ISO 19152 series, cancels and replaces the first edition (ISO 19152:2012), which has been technically revised.

The main changes are as follows:

— This document defines fundamental terms, basic components, relationships, attributes and constraints for land registration. A detailed overview of the model has been presented in its individual packages.

— The terms, although unchanged in principle, have been defined more rigorously (i.e. administrative source, liminal spatial unit), enriched with examples and notes. Updates in other ISO/TC 211 documents (i.e. definitions, data types) have been reflected, and corresponding adjustments have been made where necessary.

— Requirements to which a land registration system can conform have been formulated.

— This document introduces 13 new (featureType) classes (LA_SurveySource, LA_DesignSource, LA_SurveyRelation, LA_DistanceObservation, LA_LevelObservation, LA_AngularObservation, LA_ImageObservation, LA_TPSObservation, LA_PointCloudObservation, LA_GNSSObservation, LA_GNSSCorrection, LA_GPRObservation, LA_MBESObservation), which are different from ISO 19152:2012. These new classes also include specific attributes. In addition, the attributes of the 3 new (featureType) classes of ISO 19152-1 (LA_RequiredRelationshipRRR, LA_LegalSpaceCivilEngineeringElement, LA_LegalSpaceParcel) have been introduced into this document. No (featureType) classes originally specified in ISO 19152:2012 have been removed.

— The surveying and representation sub-packages have been refined with types of observation information, such as distance, level, angular, image, terrestrial positioning system (TPS), point cloud, global navigation satellite system (GNSS) and ground-penetrating radar (GPR).

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— In order to support all types of spatial units, two new subclasses for LA_SpatialUnit have been introduced: LA_LegalSpaceCivilEngineeringElement and LA_LegalSpaceParcel. An optional geometry attribute has been added to LA_SpatialUnit.

— The LA_LegalSpaceUtilityNetwork (featureType) class has been renamed to LA_LegalSpaceUtilityNetworkElement. LA_UtilityNetworkType code list has been renamed to LA_UtilityNetworkElementType.

— In order to represent topological relationships between spatial units, two new (dataType) classes (i.e. TopoRelation and IntersectionPatternMatrix) have been created and introduced, based on the definition given in ISO 19107. In addition, 3 code lists (i.e. TopoRelationType, DimensionExtension and SetMask) have been introduced based on the definition given in ISO 19107.

— The optional attributes human sex, signature, fingerprint, photo and civil status have been added to LA_Party.

— One multiplicity of an association has been changed so that a point can now be associated with more than one spatial unit.

— The former Annex I has been refined and repositioned as Annex B (normative).

— The former Annex A has been redesigned in accordance with the requirements of the main body of this document.

— A new Annex K and Annex L have been introduced

— The former Annex H and Annex N have been deleted.

— All the other annexes not mentioned have been updated and refined, including notably:

  — Annex C, which has been refined and extended to support all types of spatial unit representation; and

  — Annex G, which has been refined and extended to support semantically enriched code list values. Generic definitions for code list values have been provided. Existing code lists have been refined with new values, and 24 new code lists have been introduced (i.e. LA_CivilEngineeringType, LA_ParcelUseType, LA_SurveyPurposeType, LA_AutomationLevelType, LA_PlatformType, LA_SurveyMethodType, LA_ObservationsAccuracyType, LA_LifecyclePhaseType, LA_DesignFileCreatorRoleType, LA_DesignObjectType, LA_SourceFileType, LA_SpatialTransactionType, LA_DistanceType, LA_AngleType, LA_SatelliteSystemType, LA_GNSSSurveyType, LA_GNSSReferenceStationsNetworkType, LA_GNSSReferenceStationsNetworkScale, LA_CorrectionServiceType, LA_GNSSFrequencyType, LA_SSR_Error_Components, TopoRelationType, DimensionExtension and SetMask).

— The bibliography has been revised to include additional references and has been reformatted.

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

This document defines the land administration domain model (LADM). The LADM is a conceptual model, and not a data product specification (in the sense of ISO 19131).

The purpose of the LADM is not to replace existing systems, but rather to provide a formal language for describing them, so that their similarities and differences can be better understood. This document is a descriptive standard, not a prescriptive standard.

Land administration/geo-regulation is a large field; the focus of this document is on that part of land administration (LA) that concerns parties and the rights, responsibilities and restrictions affecting land, and the geometrical (geospatial) components thereof. The LADM provides a reference model which will serve two goals:

a) to provide an extensible basis for the development and refinement of efficient and effective land administration systems, based on a model driven architecture (MDA); and

b) to enable involved parties, both within one country and between different countries, to communicate, based on the shared vocabulary (i.e. an ontology), implied by the model.

The second goal is relevant for creating standardized information services in a national and international context, where land administration/geo-regulation domain semantics have to be shared between regions, or countries, in order to enable necessary translations. Four considerations during the design of the model were:

— it will cover the common aspects of land administration/geo-regulation worldwide;

— it will be based on the conceptual framework of “Cadastre 2014” of the International Federation of Surveyors (FIG);[52]

— it will be as simple as possible to be useful in practice;

— the geospatial aspects will follow the ISO/TC 211 conceptual model.

ISO 19152:2012 concentrated on land administration, land registration and cadastre. This information is about the relationship between people and land. This is now included in this document with a more refined survey model.

Until now, most countries (or states, provinces) have developed their own land administration system (LAS). Some systems are centralized, and others decentralized. Some are based on a general boundaries approach, others on fixed boundaries. Some systems have a fiscal background, others a legal one. The different implementations (foundations) of the various LASs do not facilitate meaningful communication across borders. However, looking from a distance, it can be observed that the different systems are in principle largely the same: they are all based on the relationships between people and land, linked by (ownership or use) rights, and are in most countries influenced by developments in information and communication technology (ICT). Furthermore, the two main functions of every land administration (including cadastre and/or land registry) are:

1) keeping the contents of these relationships up-to-date (based on regulations and related transactions); and

2) providing information from the (national) registers.

Land administration is the process of recording and distributing information about the relationship between people and land (this concerns ownership, value and the use of land and its associated resources). Every LAS includes some form of land registration, which is a process for recording, and in some countries guaranteeing, information about the ownership of land. If ownership is understood as the mechanism through which rights to land are held, then it can be viewed as a type of land tenure. A main characteristic of land tenure is that it reflects a social relationship regarding rights to land, which means that in a certain jurisdiction the relationship between people and land is recognized as a legally valid one. These recognized rights are in principle eligible for registration, with the purpose being to assign a certain legal meaning to the registered right (e.g. a title). Therefore, land administration systems are not just “handling geographic information”, as they represent a lawfully meaningful relationship amongst people, and between people and land.

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LA activity deals with huge amounts of data, which are of a dynamic nature, and requires a continuous maintenance process. The role of ICT is therefore of strategic importance. Without the availability of information systems, it will be difficult to guarantee good performance with respect to meeting changing customer demands. Organizations are now increasingly confronted with rapid developments in technology, a technology push (the Internet, geospatial databases, modelling standards, open systems, building information models and geographical information systems), as well as a growing demand for new services and a market pull (e-governance, sustainable development, electronic conveyance, and the integration of public data and systems). Modelling is a basic tool, facilitating appropriate system development and reengineering. In addition, it forms the basis for meaningful communication between different systems.

Standardization has become a well-known process in the work of LA and land registries. In both paper-based systems and computerized systems, standards are required to identify objects, transactions, relationships between objects (e.g. parcels, generally referred to as spatial units) and persons (e.g. citizens and generally referred to as parties), classification of land use, land value, map representations of spatial units, etc. Computerized systems require further standardization when topology and the identification of single boundaries are introduced. In existing LASs and land registries, standardization is generally limited to the region, or jurisdiction, where the LA (including cadastre and/or land registry) is in operation. Open markets, globalization, and effective and efficient development and maintenance of flexible (generic) systems, require further standardization.

Conformance in relation to this document is laid out in Clause 4, and a conformance test is specified in Annex A. Clause 5 provides notation and context. Clause 6 gives a global overview of packages. Clause 7 introduces the classes, attributes and associations in detail. Annex B gives an overview of Social Tenure Domain Model (STDM). Annex C explains the 2D and 3D representations of spatial units, spatial unit profiles and the refined survey model. A comprehensive set of informative examples (using instance level cases) is available in Annex D.

This document provides a generic domain model. It is expandable and it is likely that additional attributes, operators, associations, and perhaps even additional classes, will be needed for a specific region or country. Code list values in the main text are informative (not normative) and can only be considered as examples. Specific parts of the LADM are further detailed in the legal profiles in Annex E. Some examples of using the LADM in a specific context are provided in the INSPIRE cadastral parcels discussed in Annex F. It is possible to use only a subset, or profile, of the LADM for a specific implementation. Annex G presents the LADM code lists as a basis for describing a flexible enumeration and gives an overview of semantic technologies for representing code list values.

The construction of external databases, with party data, address data, taxation data, land cover data, physical utility network data and archive data, is outside the scope of the LADM. However, the LADM provides stereotype classes for these data sets (if available); see Annex H. Interface classes are covered in Annex I. Annex J explains the link between this document and other ISO International Standards. Annex K presents a framework for the integration of the LADM and IndoorGML. Annex L proposes a framework for representing legal spaces in buildings.

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Geographic information — Land Administration Domain Model (LADM) —

Part 2: Land registration

1 Scope

This document:

— defines a reference land administration domain model (LADM) covering basic information-related components of land registration (including elements above and below the surface of the Earth);

— provides an abstract, conceptual model with three packages and one sub-package related to:

  — parties (people and organizations);

  — basic administrative units, rights, responsibilities and restrictions (RRRs);

  — spatial units (parcels, and the legal space of buildings and utility networks and other geometry) with a sub-package on surveying and spatial representation (geometry and topology);

— provides terminology for land administration (LA), 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 that is based on indicators;

— provides a basis for national and regional profiles; and

— enables the combination of land administration information from different sources in a coherent manner.

The following is outside the scope of this document:

— interference with (national) land administration laws with potentially legal implications; and

— construction of external databases with party data, address data, land cover data, physical utility network data, archive data and taxation data. However, the LADM provides stereotype classes for these data sets to indicate which data set elements the LADM expects from these external sources, if available.

This document provides the concepts and the detailed structure for standardization in the land administration domain.

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

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