



**International
Standard**

ISO 19152-1

**Geographic information — Land
Administration Domain Model
(LADM) —**

**Part 1:
Generic conceptual model**

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

Partie 1: Modèle conceptuel générique

**First edition
2024-01**

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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 19152-1, together with all other parts of the ISO 19152 series, cancels and replaces the first edition (ISO 19152-2:2012), which has been technically revised.

The main changes are as follows:

- This document defines fundamental terms, basic components and relationships related to land administration/georegulation objects. A general overview of the model has been presented in its individual packages, and a more detailed overview of the LA_Source and VersionedObject classes has been included.
- The terms, although unchanged in principle, have been defined more rigorously (i.e. basic administrative unit, land, party, right, restriction, responsibility, source, spatial unit), enriched with examples and notes, and new terms have been introduced, such as "georegulation", "regulation" and "fraction". Updates in other ISO/TC 211 documents (i.e. definitions, data types) have been reflected, and corresponding adjustments have been made where necessary.
- With the association relationships between VersionedObject and LA_Source, instances of sources have now been versioned, in contrast to ISO 19152:2012. Constraints have been introduced for the relationships to ensure that dates and times in VersionedObject and LA_Source correspond. In addition, VersionedObject and LA_Source have a second set of optional temporal attributes (beginRealWorldLifespanVersion, endRealWorldLifespanVersion, and acceptance) representing the corresponding valid times in the real world. The bi-temporal model with intervals for both system and real-world time is now supported with the addition of temporal attributes to VersionedObject. The multiplicity of the beginLifespanVersion attribute has been changed from mandatory [1] to optional [0..1] and the initial value for this attribute has been set to "realWorldTime". The initial value of availabilityStatus attribute of LA_Source has been set to "documentAvailable".

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- Requirements to which a land administration/georegulation system can conform have been formulated.
- Generic definitions for code list values have been provided.
- An overview of all parts in the ISO 19152 series has been provided.
- 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

To achieve public policy objectives, authorities establish rules for mandating or enabling particular behaviours or outcomes. Some of these rules use territorial strategies. In the previous edition of this document, ISO 19152:2012, the term "land administration" was used in the broad sense. In this new edition of the document, ISO 19152-1:2023, a new term, with a wider meaning is introduced: "georegulation". This is defined as an activity to delimit and assert control over geographical spaces through regulations.

Through land administration/georegulation, it is possible to create a multitude of geographic spaces serving multiple functions in the contexts of international law, constitutional law, administrative law, private law and customary law. Land administration/georegulation can potentially be used, for example, to delegate powers regionally, to control accessibility to a territory for security or health reasons, to organize the circulation of people, goods and information, to manage resources or for conservation purposes. These geographic spaces are juxtaposed or overlap, producing a complex legal spatial configuration.

The purpose of this document is to present the fundamental notions and define the basic components and relations shared by all objects created by land administration/georegulation.

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. This document does not aim to replace existing systems, but rather to provide a formal language (the Unified Modelling Language, UML) 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 land administration systems, 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. Four considerations during the design of the model were:

- 1) it will cover common aspects shared by objects created by land administration/georegulation;
- 2) it will be based on the conceptual framework of "Cadastre 2014" of the International Federation of Surveyors (FIG);^[14]

NOTE 1 The principle of legal independence from Cadastre 2014 can be implemented with complete separate LADM implementations of Cadastre 2014 per layer or with only the spatial unit package of LADM per layer.

- 3) it will be as simple as possible in order to be useful in practice;
- 4) the geospatial aspects will follow the ISO/TC 211 conceptual model, i.e. basic types are defined in ISO 19103, geometric elements are defined in ISO 19107 and the General feature model used in this document is defined in ISO 19109.

This document defines the Land Administration Domain Model (LADM). It allows different types of systems to be described but in the same notation. Other parts of the ISO 19152 series will address specific areas of the land administration paradigm, building upon the common core schema defined in this document. The previous edition of this document, ISO 19152:2012, concentrated on land registration. This subject is now contained in ISO 19152-2. This document provides the general reference model for all objects of land administration/georegulation and also provides an overview of all parts. Additional parts are planned to align with the model defined in this document, addressing the following topics:

- Land registration (ISO 19152-2:—¹⁾)
- Marine georegulation (ISO 19152-3:—²⁾)
- Valuation information (ISO 19152-4:—³⁾)

-
- 1) Under preparation. Stage at the time of publication: ISO/CD 19152-2:2023.
 - 2) Under preparation. Stage at the time of publication: ISO/FDIS 19152-3:2023.
 - 3) Under preparation. Stage at the time of publication: ISO/CD 19152-4:2023.

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— Spatial plan information (ISO 19152-5:—⁴⁾)

This document is backwards compatible to the ISO 19152:2012 version of the LADM. Any country profile established using the elements defined in accordance with ISO 19152:2012 remains compliant with this edition of ISO 19152-1, as the main changes do not affect the main structure of the model given in ISO 19152:2012.

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4) Under preparation. Stage at the time of publication: ISO/CD 19152-5:2023.

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Geographic information — Land Administration Domain Model (LADM) —

Part 1: Generic conceptual model

1 Scope

This document:

- defines a reference Land Administration Domain Model (LADM) covering basic information-related components of land administration/georegulation;
- provides an abstract, conceptual model with packages related to:
 - parties (people and organizations),
 - basic administrative units, rights, responsibilities and restrictions (RRRs),
 - spatial units,
 - a generic conceptual model (sources and versioned object);
- provides terminology for land administration/georegulation, 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 content model independent of encoding, allowing for the support of various encodings;
- provides a basis for national and regional profiles;
- enables the combining of land administration/georegulation information from different sources in a coherent manner.

The following are outside the scope of this document:

- interference with (national) land administration/georegulation laws with potentially legal implications due to the possibility of describing different types of systems but in the same notation;
- 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 basic structure for standardization in the land administration/georegulation domain. It defines a general schema that permits regulatory information to be described. It also allows for the relationship to multiple parties and groups to be expressed together with a referencing structure so that sourcing of all information systems can be maintained. This document establishes the common elements and basic schema upon which more detailed schema can be established.

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 19103, *Geographic information — Conceptual schema language*

ISO 19105, *Geographic information — Conformance and testing*

ISO 19107, *Geographic information — Spatial schema*

ISO 19109, *Geographic information — Rules for application schema*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions 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

abstract test suite

set of conformance classes that define tests for all requirements of a specification

[SOURCE: ISO 19105:2022, 3.3, modified — Note 1 to entry removed.]

3.1.2

basic administrative unit

BAUnit

administrative entity which can be subject to registration (by law) or recordation (by informal right, or customary right, or another social tenure relationship), consisting of zero or more spatial units, and against which one or more unique and homogeneous rights, responsibilities or restrictions are associated, as included in a land administration system

EXAMPLE 1 Ownership right or land use right are examples of homogeneous rights.

EXAMPLE 2 A condominium unit comprising two spatial units (e.g. an apartment and a garage), a farm lot comprising one spatial unit (e.g. parcel of land), a servitude comprising one spatial unit (e.g. the road representing the right-of-way), a land consolidation area, or a right-of-use unit with several right holders and restricted objects.

EXAMPLE 3 A windmill farm on the sea as one spatial unit combined with cable to the land as another spatial unit together form one BAUnit.

Note 1 to entry: "Unique" means that a right, restriction or responsibility is held by one or more parties (e.g. owners or users) for the whole basic administrative unit. "Homogeneous" means that a right, restriction or responsibility (ownership, use, social tenure, lease, or easement) affects the whole basic administrative unit. For a restriction, zero parties are a possibility.

Note 2 to entry: A BAUnit may be a proxy party where it is used to hold a right on behalf of its associated party. This is a legal pattern which can be used to register a right (e.g. easement) which is held as an appurtenance to another BAUnit.

Note 3 to entry: A BAUnit should be assigned a unique identifier when registered or recorded.

Note 4 to entry: A BAUnit can consist of zero spatial units when a registry exists, and not a cadastral (spatial unit) map.

Note 5 to entry: There are countries with a registry without a cadastral map. Access to the registry is based on party identifier or on BAUnit identifier (optional). Spatial units are not explicitly represented in the land administration because there is no cadastral map.

Note 6 to entry: Rights, restrictions and responsibilities are collectively referred to as RRRs.

Note 7 to entry: Restrictions and responsibilities can be associated with their own BAUnits, each with their own type of spatial unit.

3.1.3

feature

abstraction of real world phenomena

Note 1 to entry: A feature can occur as a type or an instance. Feature type or feature instance will be used when only one is meant.

[SOURCE: ISO 19101-1:2014, 4.1.11]

3.1.4

feature type

class of features having common characteristics

[SOURCE: ISO 19156:2023, 3.9]

3.1.5

fraction

<LADM> pair of numbers, the top number called the numerator, the bottom number called the denominator, with a line usually separating the numerator and denominator

EXAMPLE "½" and "¾" are examples of exact fractions.

Note 1 to entry: The value type of the denominator is a positive integer value > 0. The value type of the numerator is a non-negative integer value ≥ 0, and is less than or equal to the denominator value.

3.1.6

georegulation

activity to delimit and assert control over geographical spaces through regulations

3.1.7

group party

any number of parties, together forming a distinct entity, with each party registered

EXAMPLE A partnership (with each partner registered as a party), or two tribes (with each tribe registered as a party).

Note 1 to entry: A group party may be a party member of another group party.

3.1.8

land

<LADM> spatial extent to be covered by rights, restrictions and responsibilities, encompassing the wet and dry parts of the Earth surface, including all space above and below

Note 1 to entry: Land consists of collection of spatial units.

Note 2 to entry: Land includes water, air or space.

3.1.9

land administration

process of determining, recording and disseminating information about the relationship between people and land

Note 1 to entry: Some countries' part of land administration is called a cadastre, which is defined by UNECE (1996) as a "type of land information system that records land parcels".^[13]

3.1.10

object identifier

Oid

generic object identifier providing support in object identification

Note 1 to entry: Adapted from ISO/IEC 8824-1:2021.

3.1.11

party

<LADM> person or organization that plays a role in any land administration process

EXAMPLE 1 An organization may be a company, a municipality, the state, a tribe, a farmer cooperation, or a church community (with each organization represented by a delegate: a director, chief, CEO, etc.).

EXAMPLE 2 Person or organization that plays a role in a transaction of rights, responsibilities or restrictions in the context of a land registry system.

Note 1 to entry: In order to be registered as a party, it not necessary for all members to be identified and registered individually.

Note 2 to entry: A basic administrative unit may be a party because it may hold a right of easement, for example.

3.1.12

party member

party registered and identified as a constituent of a group party

3.1.13

profile

set of one or more base standards or subsets of base standards, and, where applicable, the identification of chosen clauses, classes, options and parameters of those base standards, that are necessary for accomplishing a particular function

Note 1 to entry: A profile valid for a whole country is named a "country profile".

Note 2 to entry: A profile is derived from base standards so that by definition, conformance to a profile is conformance to the base standards from which it is derived.

Note 3 to entry: The country profile in the context of LADM is a profile as defined above, but where it can be extended with country-specific elements.

[SOURCE: ISO 19106:2004, 4.5, modified —Notes 1 and 3 to entry have been added.]

3.1.14

register

set of files containing identifiers assigned to items with descriptions of the associated items

[SOURCE: ISO 19135-1:2015, 4.1.9]

3.1.15

registry

information system on which a register is maintained

[SOURCE: ISO 19135-1:2015, 4.1.13]

3.1.16

regulation

document providing binding legislative rules, that is adopted by an authority

[SOURCE: ISO/IEC Guide 2:2004, 3.6]

3.1.17

required relationship

explicit association between either spatial units, or between basic administrative units

Note 1 to entry: Due to legal aspects, history of data, inaccurate geometries or missing geometries, geospatial overlay techniques can generate invalid, or no relationships between spatial units, which can be introduced by required relationships.

Note 2 to entry: Relationships for spatial units may be defined with ISO 19107:2019 types.

3.1.18

responsibility

<LADM> formal or informal obligation on the land owner to allow or perform an action

EXAMPLE The responsibility to clean a ditch, to keep a snow-free pavement or to remove icicles from the roof during winter, or to maintain a monument.

Note 1 to entry: "Owner" implies leaseholder, usufruct holder, etc.

3.1.19

restriction

<LADM> formal or informal obligation on the land owner to refrain from performing an action

EXAMPLE 1 It is not allowed to build within 200 metres of a fuel station; or, a servitude or mortgage as a restriction to the ownership right.

EXAMPLE 2 Sequestration can be registered for BAUnit as a restriction.

3.1.20

right

<LADM> formal or informal entitlement to own or perform an action

EXAMPLE Ownership right, apartment right, tenancy right, possessions, customary right, Islamic right (e.g. miri or milk), Indigenous right, informal right, sovereign rights, rights of innocent passage or rights of transit passage.

Note 1 to entry: A right can provide a formal or informal entitlement to own or do something.

Note 2 to entry: Rights may be overlapping, or may be in disagreement.

3.1.21

source

<LADM> document providing legal and/or administrative facts on which the land administration object is based

Note 1 to entry: Any kind of document may be added as a source according to ISO 19115-1:2014.

Note 2 to entry: Land administration object types are all the subclasses of a versioned object, e.g. right, restriction, responsibility, basic administrative unit, party, or spatial unit.

3.1.22

spatial unit

feature type related to land administration/georegulation with associated spatial and thematic attributes

Note 1 to entry: Spatial units are structured in a way to support the creation and management of basic administrative units.

Note 2 to entry: This document supports either 2-dimensional (2D), 3-dimensional (3D), or mixed (2D and 3D) representations of spatial attributes associated to spatial units. In addition, the spatial geometry associated with a spatial unit may be described in text ("from this tree to that river").

Note 3 to entry: In addition to spatial units represented by a single point, text, or a set of unstructured lines, a spatial unit may have an area equal to zero for administrative reasons.

Note 4 to entry: When areas of spatial unit are concerned, rounding to an integer value is an issue. For example, the case where a spatial unit with 1 square meter has to be split into two equal parts requires rules that have to be implemented in the system.

3.1.23

spatial unit group

any number of spatial units, considered as an entity

EXAMPLE Spatial units together forming an administrative zone such as a section, a canton, a municipality, a department, a province, or a country. Spatial units within a planning area.

Note 1 to entry: The spatial units in a spatial unit group are not necessarily continuous.

3.2 Acronyms and abbreviated terms

ECDIS	Electronic Chart Display Information System
FIG	International Federation of Surveyors
IHO	International Hydrographic Organization
LADM	Land Administration Domain Model
Oid	Object identifier
RRR	right, restriction, responsibility
UML	Unified Modelling Language

4 Conformance requirements and notation

4.1 Conformance

Conformance to this document consists of alignment with the requirements established in [4.2](#) and [6.3](#) in this document. The Abstract Test Suite given in [Annex A](#) describes a methodology for testing conformance to these requirements. A land administration/georegulation system, as defined in accordance with this document, shall satisfy the conditions specified in the abstract test suite in [Annex A](#).

4.2 Conformance classes

Six conformance classes are identified in this document. These conformance classes are labelled "1)" - "6)" throughout the document.

1) CoreClassConformant

Requirement 1: The description, development and refinement of a land administration/georegulation system using this document shall be compatible with the classes described in [Clause 5](#) (Party, Administrative and Spatial Unit Packages), and the classes and attributes described in [Clause 6](#) (LA_Source and VersionedObject).

2) TripletStructurePresent

Requirement 2: The three elements LA_Party – LA_RRR and/or LA_AdministrativeSource – LA_BAUnit/LA_SpatialUnit provide the common pattern for land administration/georegulation and form the basic structure. A land administration/georegulation system shall be constructed using groupings of LA_SpatialUnit, LA_BAUnit and/or LA_Party classes.

NOTE In some jurisdictions, deeds registries only record deeds/administrative sources. They do not have records of RRRs. Also, in some common law jurisdictions, transactions can refer to a survey plan/spatial source (and not a parcel number/spatial unit). The relationship between the party and the spatial unit is established by a legal instrument (source).

3) BackwardsCompatible

Requirement 3: Any country profile established using the elements defined in conformance with ISO 19152:2012 shall remain conformant with this version of the standard.

Requirements of ISO 19103, ISO 19105, ISO 19107 and ISO 19109 therefore remain applicable.

4.3 Notation

The conceptual schema specified in this document is described using the Unified Modelling Language (UML), following the guidance of ISO 19103.

Several model elements used in this schema are defined in other ISO geographic information standards. By convention within some ISO/TC 211 standards, names of UML classes, with the exception of basic data type classes, include a two-letter prefix that identifies the document and the UML package in which the class is defined. This provides a global unique name for the class. UML classes defined in this document have the two-letter prefix of LA. [Table 1](#) lists the prefixes as used for some of the other parts of the ISO 19152 series. The same prefix is used for ISO 19152-1 and ISO 19152-2 to support backward compatibility. [Table 2](#) provides the two-letter prefix for externally defined UML classes referenced.

Table 1 — Sources of internally defined UML classes

Prefix	Document	Part
LA	ISO 19152-1	Generic conceptual model
LA	ISO 19152-2 ^a	Land registration
MG	ISO 19152-3 ^b	Marine georegulation
VM	ISO 19152-4 ^c	Valuation information
SP	ISO 19152-5 ^d	Spatial plan information
^a	Under preparation. Stage at the time of publication: ISO/CD 19152-2:2023	
^b	Under preparation. Stage at the time of publication: ISO/FDIS 19152-3:2023	
^c	Under preparation. Stage at the time of publication: ISO/CD 19152-4:2023	
^d	Under preparation. Stage at the time of publication: ISO/CD 19152-5:2023	

NOTE An overview of the other parts of the LADM is given in [Annex B](#).

Table 2 — Sources of externally defined UML classes

Prefix	Document	Part
CI	ISO 19115-1	Metadata Part 1: Fundamentals

5 Conceptual basis

5.1 General

The LADM generic model is a high-level model that serves as the root for other more specific land administration/georegulation specific models expressed in other parts of the ISO 19152 series.

All LADM parts addressing land administration and georegulation (ISO 19152 series) make use of the generic General feature model as described in ISO 19109. It describes a feature-oriented approach where a feature may have thematic, temporal, spatial, quality, etc. attributes. The spatial geometries derive directly from this structure.

5.2 Packages and sub-packages of the core LADM

The LADM is organized as a set of application schemas; see [Figure 1](#). Each application schema has its own namespace and is organized into a set of packages and sub-packages. A sub-package is a group of classes with a certain degree of cohesion. Sub-packages facilitate the maintenance of different data sets by different organizations. The complete model may therefore be implemented through a distributed set of (geo-) information systems, each supporting data maintenance activities and the provision of elements of the model. The model may also be implemented by one or more maintenance organizations, operating at national, regional or local level. This underlines the relevance of the model: different organizations have their own responsibilities in data maintenance and supply, but may communicate on the basis of standardized administrative and technical update processes.

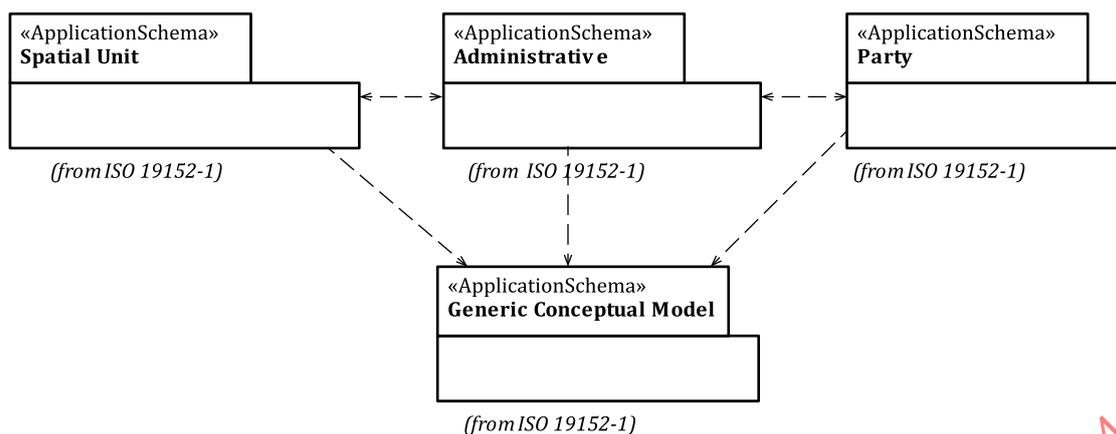


Figure 1 — Sub-packages of the core LADM

5.3 Conceptual Overview

This document defines the high-level structure (global view) for the whole topic area of land administration/georegulation. The core LADM is based on six basic classes, all inheriting from VersionedObject (and associated to LA_Source):

- 1) Class LA_Party. Instances of this class are parties.
- 2) Class LA_RRR. Instances of subclasses of LA_RRR are rights, restrictions or responsibilities.
- 3) Class LA_BAUnit. Instances of this class are basic administrative units.
- 4) Class LA_SpatialUnit. Instances of this class are spatial units.
- 5) Class VersionedObject. This class is an abstract class and instances of subclasses of VersionedObject are all LADM classes (except LA_Source and its subclasses).
- 6) Class LA_Source. Instances of this class are sources, i.e. administrative and spatial.

Figure 2 shows the basic classes of the core LADM. An overview of the involved packages will be given in this document. The details of the LADM classes are described in more detail in each of the other parts of the ISO 19152 series.

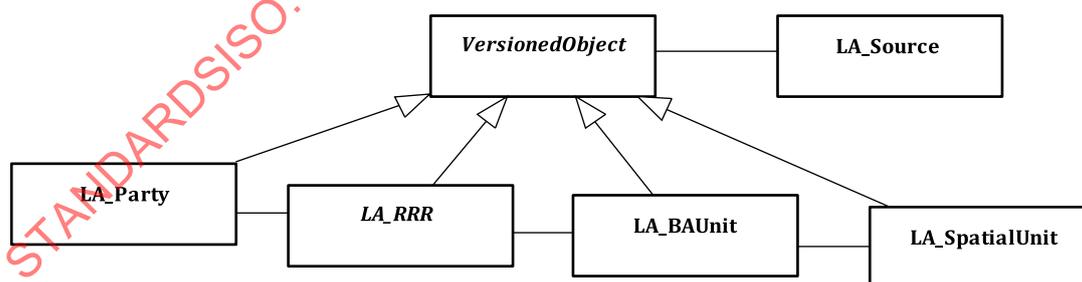


Figure 2 — Basic classes of the core LADM

5.4 Party Package

The main class of the Party Package is the basic class LA_Party (with party as an instance). LA_Party has a specialization: LA_GroupParty (with group party as an instance). Between LA_Party and LA_GroupParty there is an optional association class: LA_PartyMember (with party member as an instance). See Figure 3.

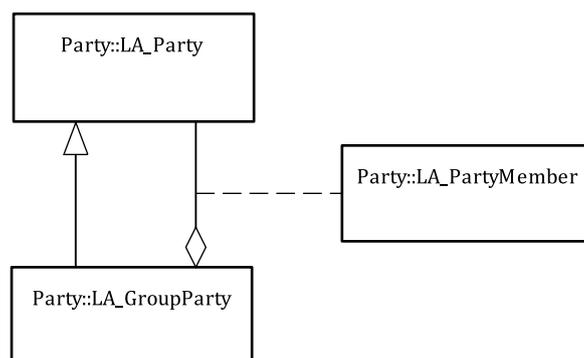


Figure 3 — Classes of Party Package

A group party, being a specialization of party, is also a party. This means that the aggregation relationship between LA_Party and LA_GroupParty in [Figure 3](#) creates group parties with (registered) parties as constituents. Every party, being a constituent of a group party, may then be registered as a party member of class LA_PartyMember.

5.5 Administrative Package

The main classes of the Administrative Package are basic classes LA_RRR and LA_BAUnit. See [Figure 4](#).

LA_RRR is an abstract class with three specialization classes:

- 1) LA_Right, with rights as instances. The type of rights depends upon the domain and will be described in more detail in each of the other parts of the ISO 19152 series;
- 2) LA_Restriction, with restrictions as instances. The type of restriction depends upon the domain and will be described in more detail in each of the other parts of the ISO 19152 series;
- 3) LA_Responsibility, with responsibilities as instances. The type of responsibility depends upon the domain and will be described in more detail in each of the other parts of the ISO 19152 series.

Instances of class LA_BAUnit are basic administrative units (abbreviated as BAUnits). The BAUnit is a core class of the model and defines the elements upon which rights, restrictions and responsibilities apply.

EXAMPLE Land Tenure (ISO 19152-2:—⁵), BAUnits are needed, among other things, to register "basic property", which consist of several spatial units, belonging to a party, under the same RRR ("homogeneous" over the whole BAUnit). RRR needs to be unique for each BAUnit in order to establish a unique combination between an instance of LA_Party, an instance of a subclass of LA_RRR, and an instance of LA_BAUnit.

In principle, all rights, restrictions and responsibilities are based on an administrative source, as instances from class LA_AdministrativeSource.

The class LA_RequiredRelationshipBAUnit allows for creating instances of relationships between BAUnits. Relationships can be legal, temporal or of a spatial nature.

The class LA_RequiredRelationshipRRR allows for creating instances of relationships between RRRs.

5) Under preparation. Stage at the time of publication: ISO/CD 19152-2:2023.

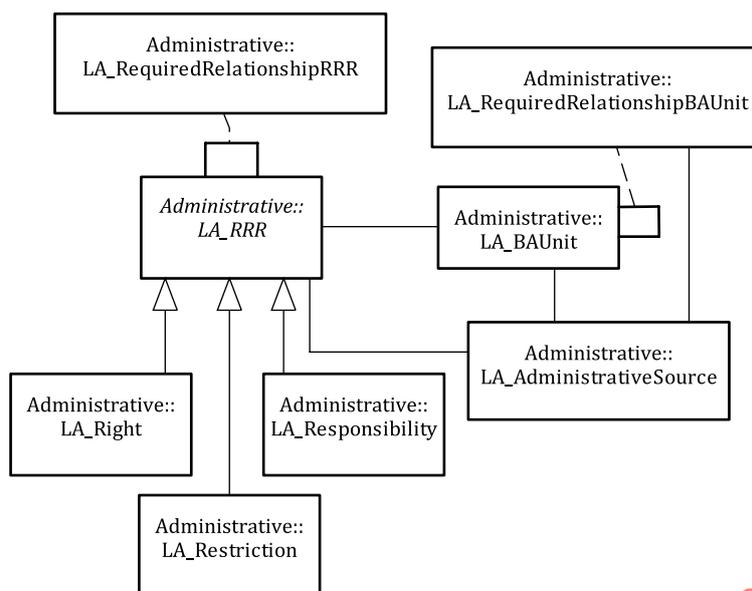


Figure 4 — Classes of Administrative Package

5.6 Spatial Unit Package

Many different spatial geometries may be used to relate spatial units to spatial geometry (and topology). Different parts that relate to different application areas may use different spatial primitives and spatial relationships. The main class of the Spatial Unit Package is the basic class LA_SpatialUnit, with spatial units as instances. LA_Parcel is an alias for LA_SpatialUnit. See Figure 5.

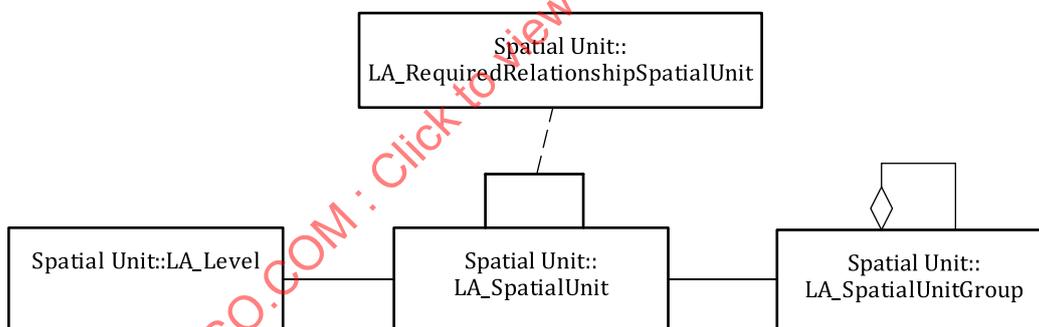


Figure 5 — Classes of Spatial Unit Package

Spatial units may be grouped into two forms:

- 1) As spatial unit groups, as instances of class LA_SpatialUnitGroup. Spatial unit groups can be further grouped into larger spatial unit groups. This is realized by an aggregation relationship of LA_SpatialUnitGroup onto itself (see Figure 5). An example of a spatial unit group is a municipality. A spatial unit group may be a grouping of other spatial unit groups. In the implementations of the LADM, this is to enable the inclusion of spatial unit identifiers in hierarchical zones.
- 2) As sub-spatial units, or subparcels, that is, a grouping of a spatial unit into its parts. This is realized by an aggregation relationship of LA_SpatialUnit onto itself (see Figure 5). Parts, in their turn, may be grouped into subparts (subsubparcels), and so on.

An instance of LA_Level is a level. A level is a collection of spatial units with a geometric and/or topologic and/or thematic coherence.

Required relationships explicitly describe the spatial relationship between spatial units, and instances of class `LA_RequiredRelationshipSpatialUnit` without reference to geometry. Sometimes there is a need for these explicit relationships, for example when the geometry of the spatial units is not accurate enough to give reliable results when applying geospatial overlaying techniques.

EXAMPLE Required relationships override implicit relationships, established through geospatial overlaying techniques. For example, a building, in reality inside a parcel, is reported to fall outside the parcel; the same applies to the geometry of a right, e.g. an easement.

5.7 Generic Conceptual Model Package

The main classes of the Generic Conceptual Model Package are basic classes `VersionedObject` and `LA_Source`. See [Figure 2](#).

The `VersionedObject` class is introduced in this document for the management and maintenance of historical data. All classes introduced in this document are directly or indirectly subclasses of `VersionedObject`, with the exception of `LA_Source` and its subclass `LA_AdministrativeSource`.

The `LA_Source` class is introduced in this document to support any type of source. This class represents the event that causes the changes in the registry.

6 LADM objects

6.1 General

The fundamental classes are shared among the various parts of LADM and therefore included in this document in detail (i.e. ISO 19152-1). The more detailed content of the other packages is given in the other parts of the ISO 19152 series.

6.2 General feature model

The ISO 19109 General feature model is utilized in this document. All LADM classes adhere to ISO 19103 stereotype class `featureType` (a feature type is a class of features, i.e. abstractions of real world phenomena, having common properties). Many LADM classes are subclasses of class `VersionedObject`. The LADM allows user-defined elements to be added. It is likely that additional attributes, operators, associations, or perhaps new classes, will be needed for a specific region or country. It is possible that parts of the LADM are not used. A user-defined application schema based on the LADM that potentially implements only parts of the LADM structure, but which also adds additional attributes, operators, associations, or new classes, is a Type 2 Profile, in accordance with ISO 19106.

6.3 Classes of generic conceptual model package

6.3.1 Versioned object

Legal, legislative and official data with associated rights, restrictions and responsibilities and relationships to parties change incrementally. Versioning is required at the object level. The abstract class `VersionedObject` is introduced in the LADM to manage and maintain historical data in the database. History requires inserted and superseded data to be given a timestamp. All LADM classes (direct or indirect) inherit from `VersionedObject` (except for `LA_Source`). In this way, the contents of the database can be reconstructed, as they were at any historical moment. Objects begin, change and end due to events, which are represented in the source object `LA_Source` (which can be administrative, spatial or integrated). All classes, except source documents, inherit from `VersionedObject` (see [Figure 2](#)).

[Figure 6](#) illustrates how the attributes `beginLifespanVersion` and `endLifespanVersion` (and via `featureType` also the associated quality and source) are defined in the class `VersionedObject`, the `LA_Source` class which has a `lifeSpanStamp` attribute. All the dates and times are system (or database) time, corresponding to the moment the event was processed and stored in the system. Constraints make sure the dates and times in `VersionedObject` and `LA_Source` correspond. In addition, `VersionedObject` and `LA_Source` have a second

set of optional temporal attributes (beginValidLifespanVersion, endValidLifespanVersion, and acceptance) which related to the corresponding real-world time (according to the source document/event).

NOTE The attribute quality from VersionedObject is according to the featureType through the QualityAttributeType (ISO 19109). The attribute source from VersionedObject is according to featureType, through the MetadataAttributeType (ISO 19109).

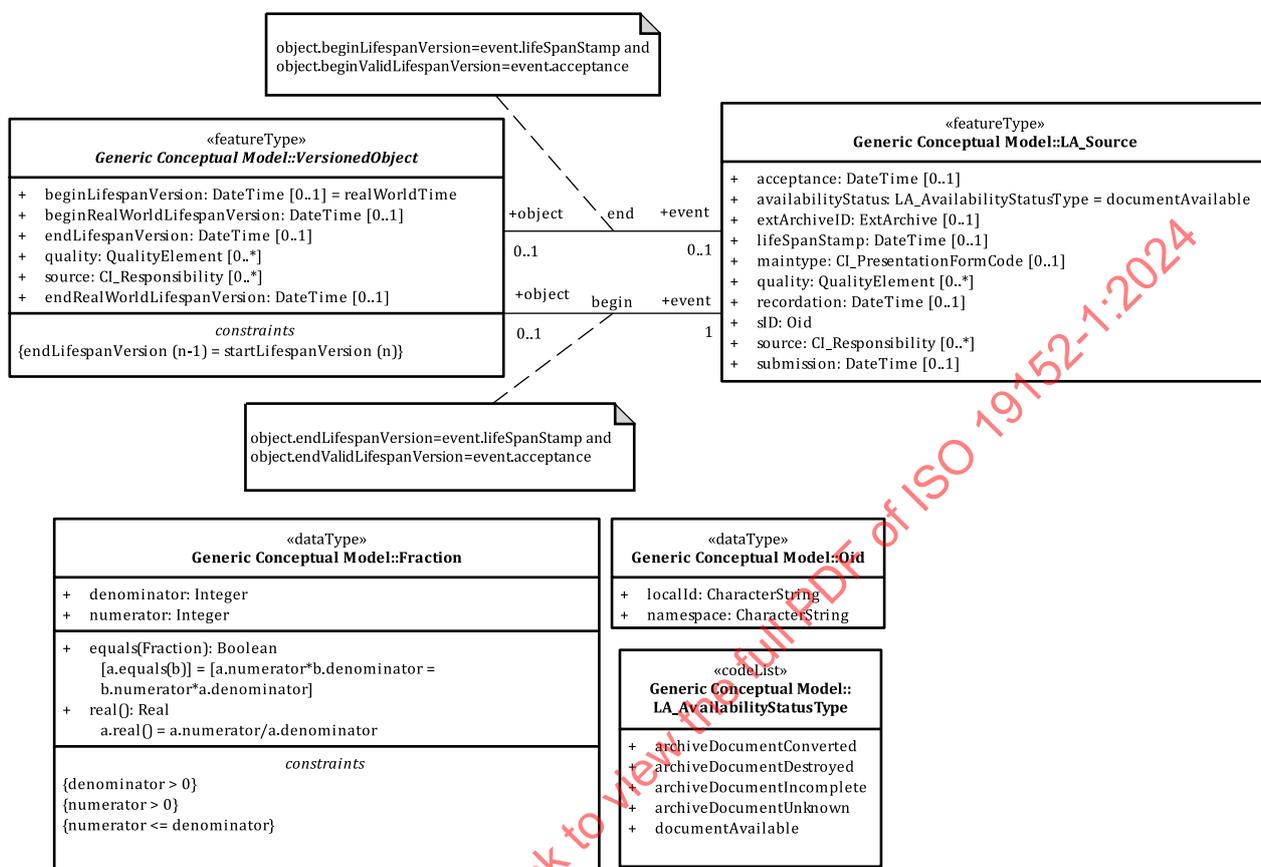


Figure 6 — LA_Source, Versioned Object, Fraction and Oid

The attributes of VersionedObject are shown in Table 3.

Table 3 — Attributes of VersionedObject

Attribute name	Description	Value type	Multiplicity
beginLifespanVersion	Start time of a specific instance version.	DateTime, based on ISO 19108 (default value is 'realWorldTime')	0..1
endLifespanVersion	End time of a specific instance version.	DateTime, based on ISO 19108	0..1
beginRealWorldLifespanVersion	Start real world time of a specific instance version.	DateTime, based on ISO 19108	0..1
endRealWorldLifespanVersion	End real world time of a specific instance version.	DateTime, based on ISO 19108	0..1
quality	Quality of a specific instance version.	QualityElement, based on ISO 19157-1	0..*
source	Responsible organization of a specific instance version.	Responsibility, based on ISO 19115-1	0..*

4) VersionedObjects

Requirement 4: All land administration/georegulation systems shall support (bi-)temporal data management by inheritance from LA_VersionedObject.

6.3.2 Fraction

Generic data type Fraction is introduced in the LADM to provide support for fractions. A fraction is written as a pair of numbers, the top number called the numerator, and the bottom number called the denominator (see [Figure 6](#)). A denominator/numerator type of fraction is required in order to express a share exactly, for example three parties each have an equal share of $\frac{1}{3}$.

The attributes of Fraction are shown in [Table 4](#).

Table 4 — Attributes of Fraction

Attribute name	Description	Value type	Multiplicity
denominator	The bottom number in the notation of a fraction.	A positive integer value > 0	1
numerator	The top number in the notation of a fraction.	A non-negative integer value ≥ 0 and must be lower or equal than the denominator value.	1

6.3.3 Oid

Generic data type Oid is introduced in the LADM to provide support for object identifiers (see [Figure 6](#)).

The attributes of Oid are shown in [Table 5](#).

Table 5 — Attributes of Oid

Attribute name	Description	Value type	Multiplicity
localId	Local identifier, assigned by the data provider. The local identifier must be unique within the namespace, i.e. no other spatial object should carry the same identifier.	CharacterString	1
namespace	Identifier for the data source of the spatial object.	CharacterString	1

NOTE Country profiles can limit the set of characters to ensure conformance to local standards (e.g. {"A".."Z", "a".."z", "0".."9", "_", ".", ",", "-"}, i.e. only letters from the Latin alphabet, digits, underscores, periods, commas, and dashes are allowed).

5) OidPresent

Requirement 5: The local object identifier (Oid) shall be unique within the namespace.

6.3.4 LA_Source

In the LADM, concrete class LA_Source is introduced to provide support for sources (see [Figure 6](#)). The source documents are the basis for building up trusted and reliable land administration/georegulation systems. LA_Source has two subclasses: (1) LA_AdministrativeSource, and (2) LA_SpatialSource (see ISO 19152-2).

The attributes of LA_Source are shown in [Table 6](#).

Table 6 — Attributes of LA_Source

Attribute name	Description	Value type	Multiplicity
acceptance	The date of force of law of the source by an authority (the real-world date/time of the event marking acceptance of the linked objects, e.g. acceptance of the survey).	DateTime, based on ISO 19108	0..1
availabilityStatus	The availability status of the source.	LA_AvailabilityStatusType (default value is 'documentAvailable', see Annex C for more values)	1
extArchiveID	The identifier of a source in an external registration.	ExtArchive	0..1
lifeSpanStamp	The moment that the event, represented by the instance of LA_Source, is further processed in the LA system (this is the moment of endLifespanVersion of old instances, and the moment of beginLifespanVersion of new instances).	DateTime, based on ISO 19108	0..1
maintype	The type of document.	CI_PresentationFormCode, based on ISO 19115-1	0..1
quality	Quality of a specific instance version (from ISO 19157-1).	QualityElement, based on ISO 19157-1	0..*
recordation	The date of registration (recordation) of the source by the registering authority (the date/time of the event indicating that the linked objects were recorded in the registry).	DateTime, based on ISO 19108	0..1
sID	The identifier of the source.	Oid	1
source	The responsible party of the source.	Responsibility, based on ISO 19115-1	0..*
submission	The date of submission of the source by a party.	DateTime, based on ISO 19108	0..1

NOTE 1 The fact that all different (public or private law) rights find their base in some kind of transacting document (except for treaties or UN conventions) is represented by the association between LA_RRR and LA_AdministrativeSource. The party responsible for drafting the document is connected to the latter as 'conveyancer', 'notary', or 'writer'.

NOTE 2 In some Land Administration systems, sources are required to perform the transactions, but these are not archived afterwards. The registration itself then serves as such evidence.

6) SourceDocumentPresent

Requirement 6: All land administration/georegulation systems shall make use of the LA_Source class to support references to source documents.

Annex A (normative)

Abstract test suite

A.1 General

A.1.1 Conformance with ISO 19105 and ISO 19106

The abstract test suite is in conformance with ISO 19105 and ISO 19106. The LADM specifies a conceptual schema. Actual use of the LADM requires that an application schema, such as a country profile, be developed. This annex specifies how to test whether a specific application schema is conformant with the LADM in terms of package and level. Testing whether a specific data set is conformant means checking the data set content against the corresponding conformant LADM application schema (package and level).

A.1.2 Test requirements

This test suite specifies the requirements that the implementation under test has to meet in order to be conformant to this document. For each test the metadata conformity element takes one of the following values:

- 1) Conformant (conformant) — the resource is fully conformant with the cited specification;
- 2) Not conformant (notConformant) — the resource does not conform to the cited specification;
- 3) Not evaluated (notEvaluated) — conformance has not been evaluated.

A.1.3 Test methods

The test method in this annex is used in all test cases to examine the application schema of the implementation under test, including class, attribute(s) and association definitions. There are two ways to document the positive results of the test method:

- 1) show inheritance structure between the LADM and the tested model (elements) or
- 2) show mapping of elements between the LADM and the tested model.

The test is documented per class in [Clause A.2](#).

In order to realize this conformance test explicitly and completely, knowledge and understanding is required of both the LADM and any specific profile used. The profile should not include different structures or solutions where the LADM has standard provisions.

A.2 Abstract test suite

A.2.1 Test case identifier: CoreClassConformant

[Table A.1](#) describes the Core class conformant test.

Table A.1 — Core class conformant test

Test purpose	Verify that the description, development and refinement of a land administration/georegulation system using this document (ISO 19152-1) is compatible with the classes described in Clause 5 (Party, Administrative and Spatial Unit packages), and the classes and attributes described in Clause 6 (LA_Source and VersionedObject) in accordance with Requirement 1.
Test method	Examine the application schema of the implementation under test, including class, attribute(s) and associations.
Reference	Subclause 4.2 and all classes, attributes and relationships defined in Clause 5 and Clause 6 .
Test type	Basic

A.2.2 Test case identifier: TripletStructurePresent

[Table A.2](#) describes the Triplet structure present test.

Table A.2 — Triplet structure present test

Test purpose	Verify that the three elements LA_Party – LA_RRR and/or LA_AdministrativeSource – LA_BAUnit/LA_SpatialUnit provide the common pattern for land administration/georegulation and form the basic structure in accordance with Requirement 2.
Test method	Examine the application schema of the implementation under test, including class, attribute(s) and association definitions.
Reference	Subclause 4.2 and all classes, attributes and relationships defined in Clause 5 and Clause 6 .
Test type	Basic

A.2.3 Test case identifier: BackwardsCompatible

[Table A.3](#) describes the Backwards compatible test.

Table A.3 — Backwards compatible test

Test purpose	Verify that the any country profile established using the elements defined in conformance with ISO 19152:2012 remains in conformance with this document (ISO 19152-1:2023) in accordance with Requirement 3.
Test method	Examine the application schema of the implementation under test, including class, attribute(s) and association definitions.
Reference	Subclause 4.2 and all classes, attributes and relationships defined in Clause 5 and Clause 6 .
Test type	Basic

A.2.4 Test case identifier: VersionedObjects

[Table A.4](#) describes the Versioned object test.

Table A.4 — Versioned object test

Test purpose	Verify that a land administration/georegulation system has capability to support (bi-) temporal data management in accordance with Requirement 4.
Test method	Examine the application schema of the implementation under test, including class, attribute(s) and association definitions.
Reference	Subclause 6.3.1
Test type	Basic

A.2.5 Test case identifier: OidPresent

[Table A.5](#) describes the Oid present test.

Table A.5 — Oid present test

Test purpose	Verify that a local identifier is unique within the namespace in accordance with Requirement 5.
Test method	Examine the application schema of the implementation under test, including class, attribute(s) and association definitions.
Reference	Subclause 6.3.3
Test type	Basic

A.2.6 Test case identifier: SourceDocumentPresent

[Table A.6](#) describes the Source document present test.

Table A.6 — Source document present test

Test purpose	Verify that a land administration/georegulation system needing capability to support source documents shall use the LA_Source class in accordance with Requirement 6.
Test method	Examine the application schema of the implementation under test, including class, attribute(s) and association definitions.
Reference	Subclause 6.3.4
Test type	Basic

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Annex B (informative)

Overview of LADM parts, packages and extended core classes

B.1 General

This annex illustrates the flexibility and functionality of this document, by showing its use in real world cases. The ISO 19152 series consists of the multiple parts, under the general title Geographic information — Land Administration Domain Model (LADM). After ISO 19152-1 (this document: Generic conceptual model) additional parts are intended to be added to address conceptual models of other application areas, such as Land registration (a revision of ISO 19152:2012), Marine georegulation, Valuation information and Spatial plan information. Implementation aspects will be addressed in a separate part.

B.2 Overview of the extended LADM packages

The parts of LADM are organized into a set of packages and subpackages. A complete overview of the packages is given in [Figure B.1](#). This does not exclude the addition of other packages and additional extensions in other future parts supporting the principles defined in this document.

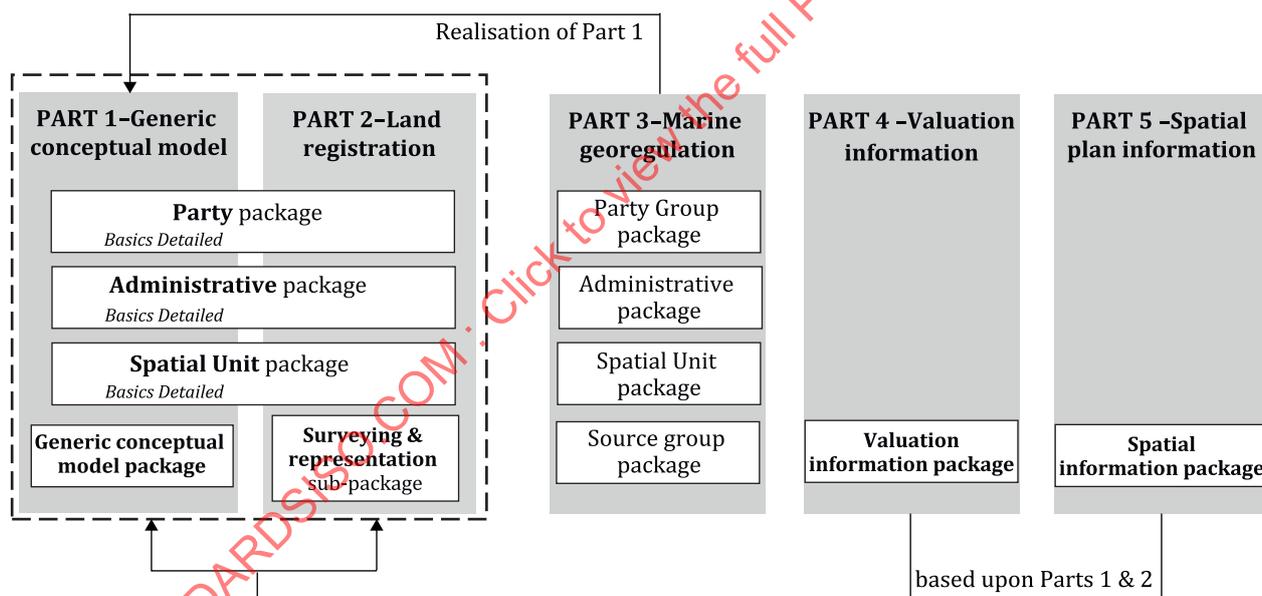


Figure B.1 — Packages and sub-packages of the extended LADM: Land registration, Marine georegulation, Valuation information and Spatial plan information

The extended LADM is based on six basic classes, all inheriting from VersionedObject (and associated to LA_Source). The first four core classes (LA Party, LA_RRR, LA_BAUnit, and LA_SpatialUnit) have been described in [Clause 5](#). The two new classes are:

- 1) Class VM_ValuationUnit. Instances of this class are valuation units.
- 2) Class SP_PlanUnit. Instances of this class are spatial plan units.

[Figure B.2](#) shows the basic classes of the extended LADM. An overview of the involved packages will be given in this document. The details of the LADM classes will be described in more detail in each of the other parts of the ISO 19152 series.

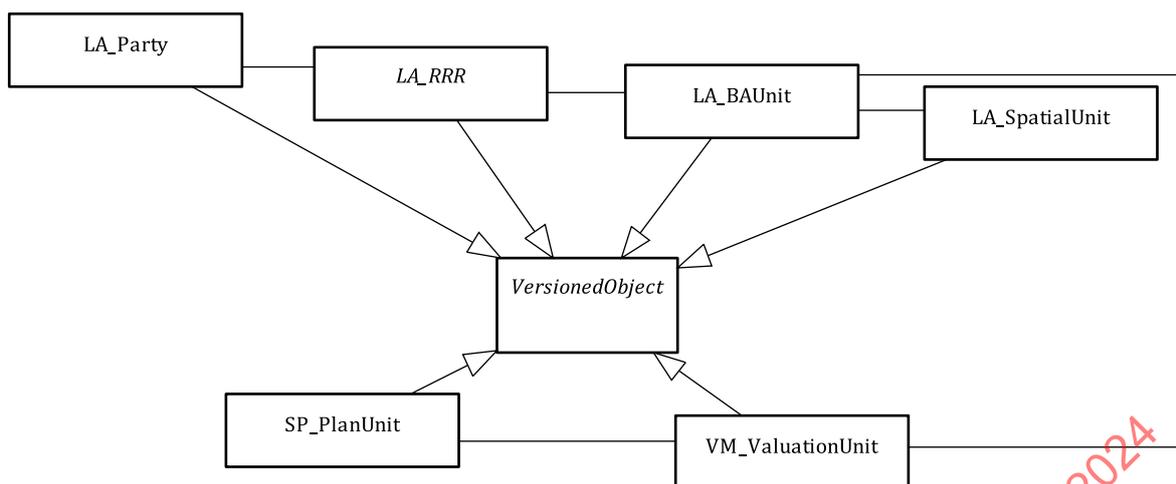


Figure B.2 — Basic classes of the extended LADM

B.3 Land registration

In addition to the classes introduced in the main text of this document (5.4), land registration contains an LA_Mortgage subclass of LA_Restriction. The LA_Mortgage is associated to the LA_Right on which it rests; see Figure B.3.

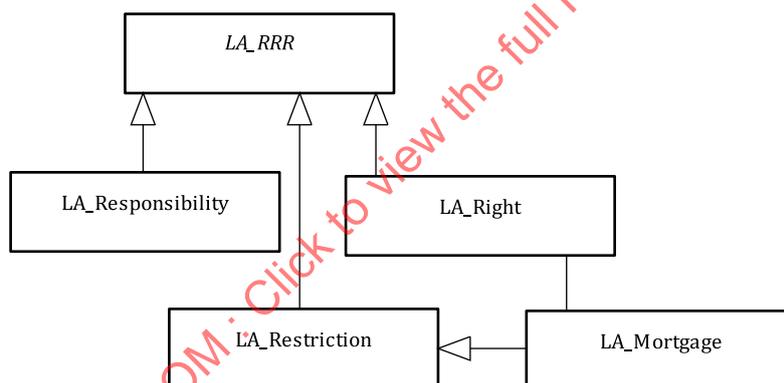


Figure B.3 — LA_Mortgage as part of administrative package

Spatial units are refined into four specializations (see Figure B.4).

- 1) Parcels, as instances of class LA_LegalSpaceParcel.
- 2) Building units, as instances of class LA_LegalSpaceBuildingUnit. A building unit concerns legal space, which does not necessarily coincide with the physical space of a building.
- 3) Utility network elements, as instances of class LA_LegalSpaceUtilityNetworkElement. A utility network element concerns legal space, which does not necessarily coincide with the physical space of a utility network.
- 4) Civil engineering elements (e.g. tunnel, bridge, etc.), as instances of class LA_LegalSpaceCivilEngineeringElement. A civil engineering element concerns legal space, which does not necessarily coincide with the physical space of a civil engineering object.

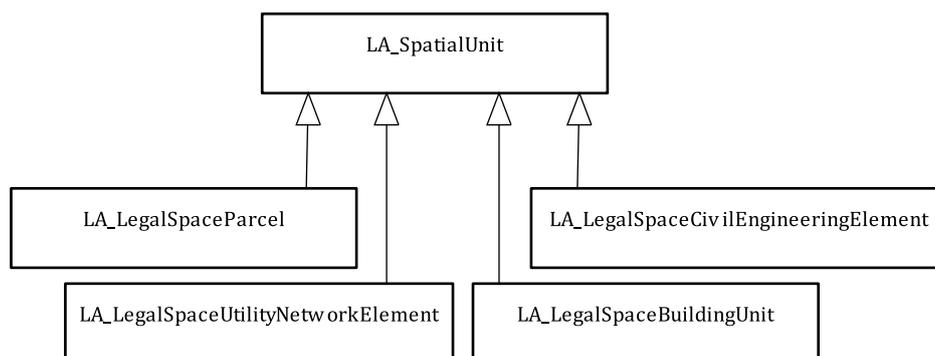


Figure B.4 — The four subclasses of LA_SpatialUnit in the spatial unit package

The six main classes of the Surveying and Representation Sub-package are (1) LA_Point, (2) LA_SpatialSource, (3) LA_BoundaryFaceString, (4) LA_BoundaryFace, (5) LA_DesignSource, and (6) LA_SurveySource. See [Figure B.5](#).

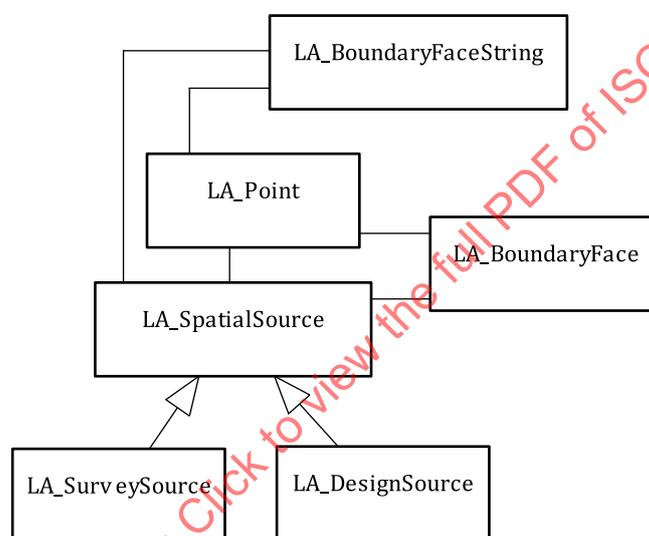


Figure B.5 — Classes of surveying and representation sub-package

Points (as instances of LA_Point), lines and surfaces can be acquired in the field (with classical surveys, or with satellite navigation systems), in an office, or compiled from various sources; for example, using forms, field sketches, ortho-images or orthophotos. The acquisition of points, lines or surfaces (a survey) may concern the identification of spatial units on a photograph, on an image, or on a topographic map; cycloramas or pictometry methods (multiple images from different angles) may also be used for that purpose.

There are two subclasses of LA_SpatialSource: LA_SurveySource and LA_DesignSource. A survey is documented with survey sources, instances from class LA_SurveySource. This may be the final (sometimes formal) documents, or all documents related to a survey. Sometimes, several documents are the result of a single survey. A design document (e.g. BIM/IFC) is documented with design sources, instances from class LA_DesignSource. A spatial source may be official, or not (i.e. a registered survey plan, or an aerial photograph). Paper-based documents (which may be scanned) can be considered as an integral part of the land administration system.

The individual points are instances of class LA_Point, which is associated to LA_SpatialSource. While it is not required that the complete spatial unit be represented, a spatial source may be associated to several points. Geodetic control points, including multiple sets of coordinates for points, and with multiple reference systems, are all supported in the LADM.

2D and 3D representations of spatial units use boundary face strings as instances of class LA_BoundaryFaceString, and boundary faces as instances of class LA_BoundaryFace.

Coordinates themselves either come from points, or are captured as linear geometry.

The LADM supports the increasing use of 3D representations of spatial units, without putting an additional burden on the existing 2D representations. Another feature of the spatial representation within the LADM is that there is no mismatch between spatial units that are represented in 2D and spatial units that are represented in 3D. The LADM is based on accepted and available spatial schemata, such as that published in ISO 19107.

B.4 Marine georegulation

B.4.1 Marine space feature and attribute structure

This clause provides an overview of an Application Schema model for managing rights, restrictions and responsibilities within the context of the marine space. The high-level conceptual model is based on the General feature model defined in ISO 19109 and aligns with the conceptual model defined in IHO S-100 Universal Hydrographic Model.^[9] The model is similar to that defined for any ISO 19109 or IHO S-100 compliant feature-based data model. The major distinguishing characteristic is the introduction of the RRR and Parties structure defined in this document.

The ISO 19109 General feature model defines a structure where a feature is the basic element of geographic information and where a feature has properties. These properties can be spatial, thematic or operations. In many areas of land administration there is only one feature type involved, such as a real property. However, in the marine space there may be many different types of features correlated in the same application schema. Limits and Boundaries are also features with existence in the real world.

An information object is an object with no real geographic spatial position. In a navigational chart it may be something like a note that can appear on a chart. This note may contain important information pertaining to that chart but it does not have a physical location in the real world. Information objects can have thematic attributes or properties. RRRs and Parties are Administrative Objects and are real objects but they have no geographic spatial position.

The marine space application schema includes additional ways of describing position in alignment with the other parts of this document. These are the description of a spatial attribute textually called “location by text” and the description of a position in a coordinate reference system different from that used to describe other positions. Both cases occur in real data. A treaty or law can describe a position as an extension of a line from something, or by some other descriptive means. Also, the reference system used in a treaty or law can be in a coordinate reference system that was used at the time the treaty or law was written. Since this textual description or position in a unique coordinate reference system are what is described in the treaty or law, they are the correct position and need to be included as is in the data set. However, for a Geographic Information System to work, and for it to be possible to calculate geometries, it is necessary for all the spatial attributes to be in the same coordinate reference system. This can require the inclusion of two or more coordinate positions in different coordinate reference systems for a single location.

All of the feature and thematic attributes in marine space data may optionally be versioned. Versioning in some data products is done at the data set level.

In the general marine space application schema spatial attribute objects may be shared. There may be several feature objects that share the same spatial attribute by reference. For example, a curve may be the spatial attribute object referenced by a limit and also be the boundary or an adjacent zone. Similarly, any additional spatial information object with its attributes may be shared.

The application schema defined by the International Hydrographic Organization in its S-100 standard^[9] partitions the “Skin of the Earth” into a single coverage of non-overlapping spatial elements. This is supported by a planar graph topology which is a different approach to partitioning space than exists in some other land administration schemas.

B.4.2 Marine space application schema general model

Figure B.6 shows the overall Marine georegulation application schema model. The Feature Unit is an instantiation of FeatureType from ISO 19109 and takes on both spatial and thematic attributes as instantiations of SpatialAttributeType and ThematicAttributeType. The S-121 Spatial Attribute Type takes on the spatial attribute types of Point, Curve, Surface or Volume.[10],[15] These spatial attributes take their geometry from ISO 19107.

This Feature and Attribute structure has a relationship to Source so that source information can be provided on any feature or spatial attribute. Features may also have a relationship to a Basic Administrative Unit type. This allows Rights, Restrictions and Responsibilities to be described and associated to Parties or Group Parties. These may also be sourced.

The S121_Party and S121_GroupParty are non-spatial objects.[10],[15] Individual parties are identified by the attribute values of the party features.

All of the classes used from the general model of this document include the same attribute defined in the base standard. However, there are no code lists defined at this level. These code lists are application-specific and different code lists that more directly apply to the marine space are intended to be established in the future ISO 19152-3.

The governance object allows additional information to be associated with one or several BasicAdministrativeUnits. This allows information such as the legal text associated with a treaty or other legal document to be linked to the BasicAdministrativeUnit objects and Features with their associated spatial and thematic attributes.

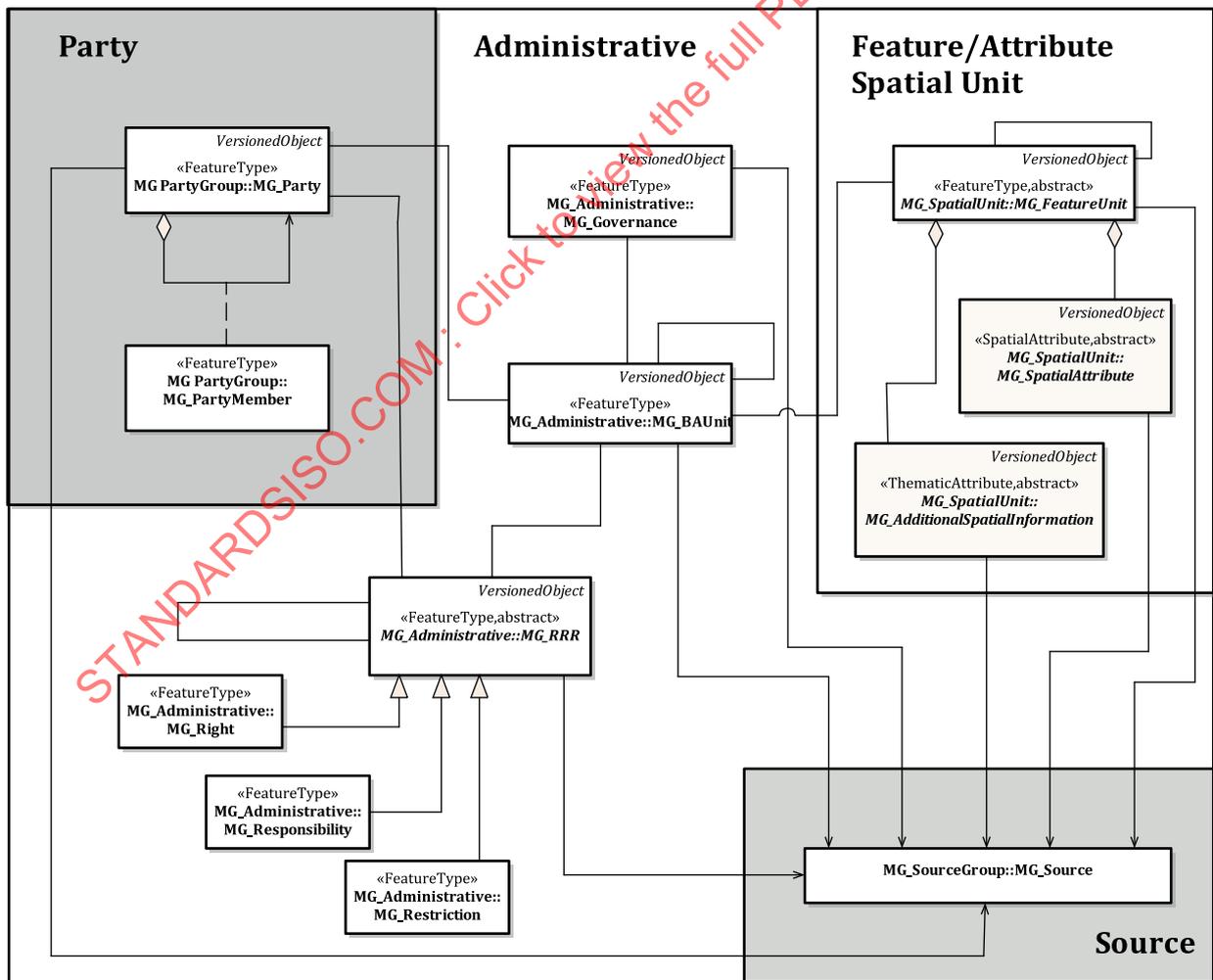


Figure B.6 — Marine georegulation application schema model