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Geographic information — Land Administration Domain Model (LADM)
Part 4: Valuation information

FDBNS ISO 19152-4:2025

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BBSQ Foreword

This draft national standard is identical to International Organization for Standardization Geographic information — Land Administration Domain Model (LADM) — Part 4 — Valuation information. The national committee responsible for reviewing this standard is Technical Committee 17 Geographic Information System. The standard contains the requirements relevant for The Bahamas.

BBSQ Committee Representation

This Bahamas National Standard was adopted under the supervision of the National Technical Committee for Geographic Information Systems (TC 17) hosted by The Bahamas Bureau of Standards and Quality which at the time comprised of the following members:

BBSQ Committee Representation

This Bahamas National Standard was adopted under the supervision of the National Technical Committee for Geographic Information System (NTC 17) hosted by The Bahamas Bureau of Standards and Quality which at the time comprised of the following members:

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SCOPE

Introduces the Valuation Information Package concerning valuation information used and produced in the context of Land Administration, specifying the characteristics and semantics of valuation registries maintained by public authorities.

International Standard

ISO 19152-4

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Geographic information — Land Administration Domain Model (LADM) —

Part 4: Valuation information

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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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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 19152-4, 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.

Introduction

Property valuation is the process of estimating the value of a property at a particular moment in time. It is performed by public and private sector actors for several land administration (LA) processes, such as property taxation, compensation on expropriation, land readjustment, land consolidation, public value capture, insurance assessment, real estate financing and property transactions.

Appropriate systems are required for fair and timely valuation of tenure rights in order to promote broader social, economic, environmental and sustainable development objectives. One of the key components of an effective valuation system is access to information on the nature and extent of property units, together with the location and physical characteristics; uniform and accurate valuation of property units requires correct, complete and up-to-date property data. Therefore, property valuation systems require the establishment of links between multiple public registries that keep and maintain information about property units, such as cadastre, land registry, planning and permitting registries, and building and dwelling registries.

The fundamental elements underpinning immovable property valuation are public registries, which accommodate regular data maintenance and updating of property characteristics, ownership details, and transaction information. It is important for valuation processes to ensure that property units and rights have been unambiguously identified. This is supported by the land administration systems, including cadastre and land registry. ISO 19152:2012 provided a descriptive conceptual model with a reference for land administration systems. However, it focused on legal, geometric, and administrative aspects of land administration. The “semantics of value” component of LA was considered to be out of the scope.

This document defines property valuation system-related information in the context of LA and as an extension of the Land Administration Domain Model (LADM; see ISO 19152-1 and ISO 19152-2). This document is a conceptual model and not a data product specification (in the sense of ISO 19131).

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 is not intended to replace existing property valuation systems but rather to provide 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 property valuation systems based on a model-driven architecture (MDA). This document is designed to represent all stages of administrative property valuation, namely identification of properties, assessment of properties through single or mass appraisal procedures, recording transaction prices, generation and representation of sales statistics, and dealing with appeals. This document can provide public bodies with a common basis for the development of local or national information models, or both, and databases, enabling the integration of valuation databases with land administration databases. It can also act as a guide for the private sector. This document is designed especially for representing and refining administrative valuations (e.g. immovable property taxation, compensation on expropriation, land readjustment, land consolidation, and public value capture). However, it can be also used for other purposes.

This document is relevant for creating standardized information services in a local, national or regional context, where valuation domain semantics have to be shared between organizations or countries in order to enable necessary translations. Four considerations during the design of the model were:

— that it will cover the common aspects shared by objects created by the value component of land administration all over the world;[48]

— that it will be based on the conceptual framework of "Cadastre 2014" of the International Federation of Surveyors (FIG);[36]

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

— that the geospatial aspects will follow the ISO/TC 211 conceptual model and that the valuation aspects will follow international property valuation standards, e.g. International Valuation Standards of International Standards Council and Technical Standards of the International Association of Assessing Officers (IAAO).

Conformance in relation to this document is specified in Clause 4, and a conformance test is specified in Annex A. Clause 5 provides the notation. Clause 6 gives a global overview of classes used in this document. Clause 7 introduces the classes, attributes, and associations in detail. Annex B presents an extension of the model (i.e. profiles) for representing 2D and 3D spatial analysis conducted for property valuation processes. A set of informative examples using instance-level diagrams is available in Annex C. Annex D gives an overview about the relationships between this document and international property valuation standards and guidelines. Annex E details an approach for the valuation of unregistered land. Annex F presents code lists as a basis to describe flexible enumeration. A set of country profiles is presented in Annex G. Annex H presents an overview of how the International Property Measurement Standards (IPMS) can be used within the context of this document.

Geographic information — Land Administration Domain Model (LADM) —

Part 4: Valuation information

1 Scope

This document:

a) builds on the models established in ISO 19152-1 and ISO 19152-2 to cover the valuation aspect of the Land Administration Domain Model (LADM);

b) provides an abstract conceptual model covering:

   1) values (assessed values, valuation procedures, mass valuation);

   2) transaction prices;

   3) sales statistics;

   4) valuation units (parcel (legal space parcel), building, condominium unit, valuation unit group).

c) provides terminology for the valuation component of 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;

d) specifies a content model independent of encoding that can be employed as a basis for local, national and regional profiles for valuation processes; and

e) enables the combining of valuation information from different sources in a coherent manner.

NOTE This document does not interfere with national property valuation-related regulations with potential legal implications.

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 4217, *Codes for the representation of currencies*

ISO 19103, *Geographic information — Conceptual schema language*

ISO 19105, *Geographic information — Conformance and testing*

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 abbreviated terms

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
appraisal
<LADM> process of estimating the value of property

Note 1 to entry: ISO 19152-1 describes BAUnit as a synonym of a basic property unit, i.e. property.

3.1.2
accessory part
<LADM> privately owned building part, generally attached to one or more condominium unit

EXAMPLE A garage in the basement and a shop on the ground floor are examples of an accessory part.

Note 1 to entry: Adapted from OGC LandInfra 2016, 7.11.

3.1.3
assessed value
<LADM> monetary worth of property

Note 1 to entry: The assessed value of a property is generally used for tax purposes. On the other hand, the value of a property can be assessed for other purposes such as compensation on expropriation, land readjustment, land consolidation, public value capture, insurance assessment, etc.

3.1.4
building
construction works that have the provision of shelter for its occupants or contents as one of its main purposes, usually partially or totally enclosed and designed to stand permanently in one place

Note 1 to entry: Buildings are constructions above and/or underground that are intended or used for the shelter of humans, animals, things, the production of economic goods, or the delivery of services, and that refer to any structure permanently constructed or erected on the site.

Note 2 to entry: Buildings can be used for dwelling (e.g. detached and semi-detached), industrial, retail or other purposes. A condominium building contains condominium units established according to condominium schemes. A whole building or a part of a building can be subject to a valuation. A building can be considered a complementary part of the parcel(s) and can be valued separately from the parcels on which they are located. A building can represent a condominium building, which consists of:

a) condominium units (e.g. apartments, offices);

b) accessory parts assigned for exclusive use (e.g. garages, storage areas);

c) joint facilities covering parcel, structural components (e.g. foundations, roofs), accession areas (e.g. entrance halls, spaces), and other remaining areas of buildings (e.g. staircases, heating rooms).

[SOURCE: ISO 6707-1:2020, 3.1.13, modified — Note 1 to entry has been replaced; a new Note 2 to entry has been added.]

3.1.5
condominium unit
one or more privately used building parts together with commonly used joint facilitates in a building

Note 1 to entry: This includes compounds of one or more condominium building elements.

Note 2 to entry: A condominium is concurrent ownership of real property that has been divided into private and common portions, in which the privately used part is made up of clearly demarcated parts of a building.

Note 3 to entry: Adapted from OGC LandInfra 2016, 4.8.6.

3.1.6
cost approach
<LADM> valuation of property based on estimates of costs

Note 1 to entry: This approach estimates the value of property by:

a) estimating the cost of construction based on replacement or reproduction cost new, or trended historical cost (often adjusted by a local multiplier);

b) subtracting depreciation; and

c) adding the estimated land value.

3.1.7
income approach
<LADM> valuation of property on the basis of its income stream

Note 1 to entry: This is a valuation approach that involves any valuation method whereby the capital value is found by capitalizing or discounting the estimated future income to be derived from the property, whether this income is rent or whether it is income generated by the business that is carried out on the property.

3.1.8
market value
highest price that a ready, willing and able buyer will pay and the lowest price a seller will accept

[SOURCE: ISO/IEC TR 27016:2014, 3.14]

3.1.9
mass appraisal
<LADM> process of valuing a group of properties as of a given date, using standard methods, employing common data, and allowing for statistical testing

Note 1 to entry: Adapted from Standard on Mass Appraisal of Real Property, IAAO.[27]

3.1.10
sales comparison approach
market approach
comparable sales approach
<LADM> valuation of property based on estimates of the worth of similar properties

Note 1 to entry: The sales comparison approach uses sales prices as evidence of the value of similar properties. The price at which a particular property sells is the price determined by the interaction of supply and demand at the time of sale. If supply or demand factors shift, prices generally rise or fall.

Note 2 to entry: In this approach, sales data of similar properties is employed to estimate the value of a property.

3.1.11
sales statistic
<LADM> statistical analysis produced through transaction prices for properties meeting required reporting criteria

Note 1 to entry: Contracts, declarations and mortgage documents can be used in order to produce sales statistics.

Note 2 to entry: Sale statistics are generally produced for a specific period and at a specific administrative/ geographic level.

3.1.12
transaction price
<LADM> amount of consideration for transferring right(s) on property, excluding amounts collected on behalf of third parties

Note 1 to entry: The sale price or rental price of a property can be considered as a transaction price. In the case of a sale/purchase, the type of transaction can be an exchange, family transfer, forced sale, inheritance, open market sale, voluntary transfer, etc.

3.1.13
valuation
<LADM> process to estimate the value of any administrative unit/spatial unit

Note 1 to entry: This results in a valuation unit.

Note 2 to entry: The value of a property produced through an administrative valuation process pertains to an amount that a local or central government has designated for a specific property and specific purpose(s). The legal, geometric, physical and environmental characteristics of the immovable property, together with the economic indicators, are taken into consideration during this process.

3.1.14
value
<LADM> value of a property or a property unit estimated under certain assumptions at a particular moment of time

EXAMPLE Possible value types can include annual rental value, assessed value, book value, cadastral value, capital value, commercial value, fair value, market value, tax value, use value, etc.

Note 1 to entry: A property or a property unit can have more than one value.

Note 2 to entry: The value of a property or a property unit, in some cases, can be equal to the assessed value or market value.

3.1.15
valuation approach
<LADM> approach used to determine the value of a property

Note 1 to entry: Each valuation approach includes different methods that can be used to apply the principles of the approach to specific properties or situations. The basic approaches are cost, income and sales comparison.

3.1.16
valuation source
<LADM> sources used or produced in the valuation process

EXAMPLE Possible valuation source types can include transaction declaration documents, valuation reports, etc.

3.1.17
valuation unit
<LADM> smallest unit that is subject to the property valuation process

Note 1 to entry: The object of the valuation can be:

a) only a land parcel,

b) only a building,

c) land parcel(s) with/without building(s) together as land property,

d) condominium unit consisting of building part(s) (e.g. condominium main part, condominium accessory part, joint access facility), and

e) a share in land parcel(s).

Note 2 to entry: For any BAUnit, there can be multiple valuation units, for example, a BAUnit can have different valuation units for sale or lease.

Note 3 to entry: Valuation unit types can vary by jurisdiction. Moreover, the basic registration unit of cadastral systems (e.g. a cadastral parcel) can differ from the basic units of valuation systems.

3.1.18
valuation unit group
<LADM> group of valuation units that share similar characteristics to support mass or individual appraisal approaches and sales statistics

Note 1 to entry: Valuation units can be grouped according to zones (e.g. administrative divisions, market zones) that have similar environmental and economic characteristics. Valuation units can also be grouped considering the functions (e.g. commercial, residential and agricultural).

3.2 Abbreviated terms

BAUnit	basic administrative unit
FIG	International Federation of Surveyors
GIS	geographic information system
GLTN	Global Land Tool Network
IAAO	International Association of Assessing Officers
INSPIRE	infrastructure for spatial information in Europe
IVSC	International Valuation Standards Council
LA	land administration
LADM	Land Administration Domain Model
MDA	model-driven architecture
OGC	Open Geospatial Consortium
RICS	Royal Institution of Chartered Surveyors
RRR	right, restriction, responsibility
STDM	Social Tenure Domain Model
TEGoVA	The European Group of Valuers' Associations
UML	Unified Modeling Language

4 Conformance

4.1 Conformance requirements and testing

Conformance to this document consists of alignment with the requirements established in Clause 6 and Clause 7. 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 classes, 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.

Table 1 — Content conformance class

Conformance class	https://standards.isotc211.org/19152/-4/1/conf/valuation
Standardization target type	Valuation information registration and dissemination system.
Dependency	https://standards.isotc211.org/19152/-1/1/ (Generic conceptual model)
Dependency	https://standards.isotc211.org/19152/-2/1/ (Land registration)
Dependency	https://standards.isotc211.org/19103/-/1/ (Conceptual schema language)
Dependency	https://standards.isotc211.org/19105/-/2/ (Conformance and testing)
Dependency	https://standards.isotc211.org/19107/-/2/ (Spatial schema)
Dependency	https://standards.isotc211.org/19109/-/2/ (Rules for application schema)
Requirement class	https://standards.isotc211.org/19152/-4/1/req/valuation (see 6.1)
Test	All tests in Clause A.2.

4.2.2 Dependencies

The dependency to ISO 19152-1 and ISO 19152-2 means that an effective land administration system for valuation information compatible with this document shall be modelled using or extending the core LADM concepts (i.e. ISO 19152-1 and ISO 19152-2), namely party, RRR, BAUnit, spatial unit and versioned object, which are all based on source documents.

This dependency also implicitly implies the modelling of the effective land administration system for valuation information in accordance with ISO standards, including ISO 19103, ISO 19107, ISO 19109 and ISO 4217.

5 Notation

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

Several model elements used in this schema are defined in other ISO geographic information International Standards. By convention, within some ISO/TC 211 documents, 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 VM. Table 2 lists the prefixes used for some of the other parts of the ISO 19152 series.

Table 2 — Sources of internally defined UML classes

Prefix	Document	Part
LA	19152-1	Generic conceptual model
LA	19152-2	Land registration
VM	19152-4	Valuation information
SP	19152-5	Spatial plan information

6 Overview of LADM valuation information

6.1 General requirements of the conceptual LADM valuation information

The generic model specified in this document as a product is a conceptual schema. This is a high-level model that is created through extending ISO 19152-1 and ISO 19152-2.

Table 3 lists the requirements defined in this document.

Table 3 — List of requirements

Requirement class	https://standards.isotc211.org/19152/-4/1/req/valuation
Standardization target type	Valuation information registration and dissemination system
Dependency	https://standards.isotc211.org/19152/-1/1/ (Generic conceptual model)
Dependency	https://standards.isotc211.org/19152/-2/1/ (Land registration)
Dependency	https://standards.isotc211.org/19103/-/1/ (Conceptual schema language)
Dependency	https://standards.isotc211.org/19105/-/2/ (Conformance and testing)
Dependency	https://standards.isotc211.org/19107/-/2/ (Spatial schema)
Dependency	https://standards.isotc211.org/19109/-/2/ (Rules for application schema)
Requirement 1	https://standards.isotc211.org/19152/-4/1/req/valuation/informationmanagement
Requirement 2	https://standards.isotc211.org/19152/-4/1/req/valuation/linkedpublicregistries
Requirement 3	https://standards.isotc211.org/19152/-4/1/req/valuation/valuationunitregistration
Requirement 4	https://standards.isotc211.org/19152/-4/1/req/valuation/valuationprocedure
Requirement 5	https://standards.isotc211.org/19152/-4/1/req/valuation/transactionpricesandstatistics
Requirement 6	https://standards.isotc211.org/19152/-4/1/req/valuation/valuationsourcedocument
Requirement 7	https://standards.isotc211.org/19152/-4/1/req/valuation/valuedissemination

6.2 LADM valuation information

This document is organized into a set of packages. The relationship between ISO 19152-1 and ISO 19152-2 represents the core LADM content; see Figure 1.

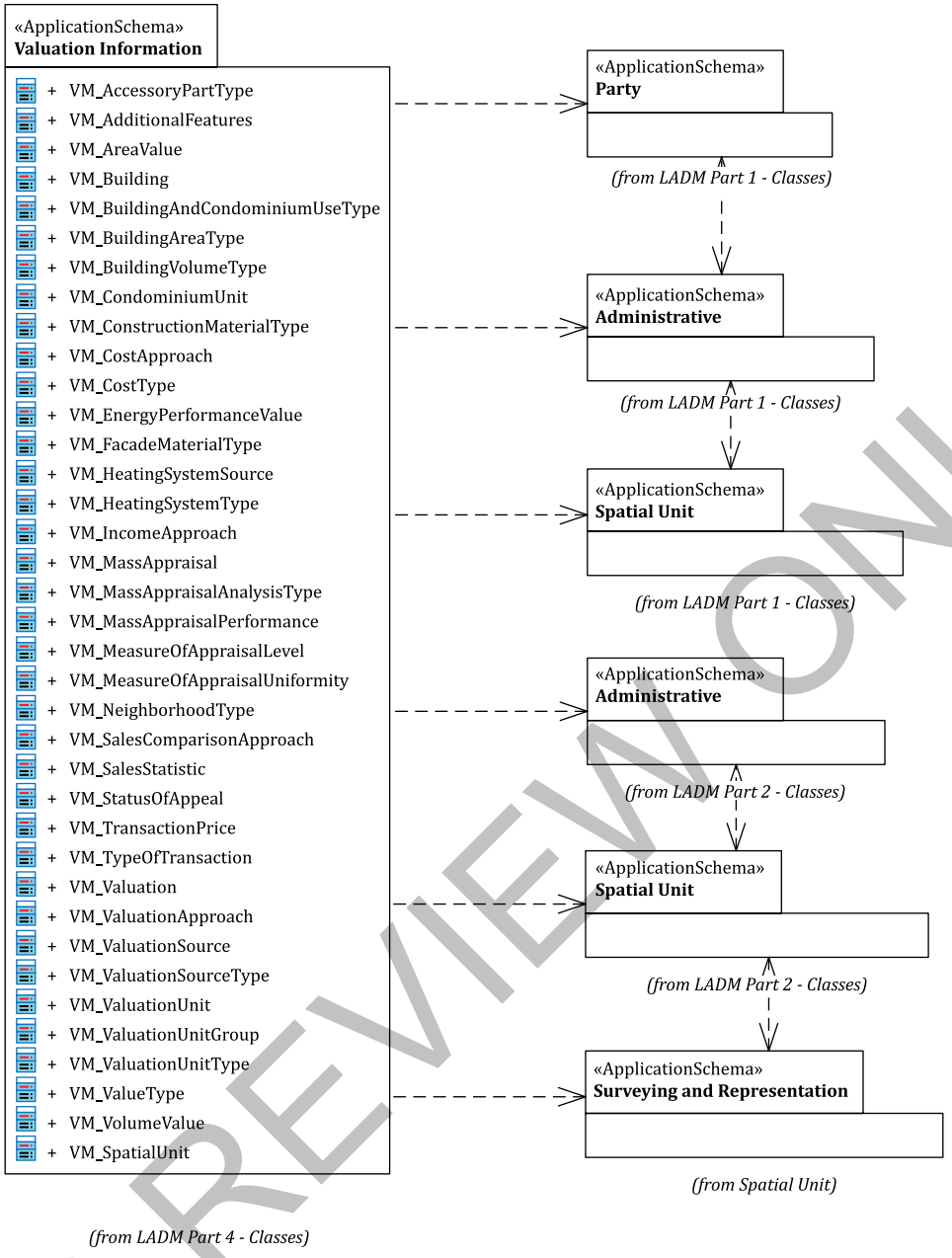

Figure 1 — Relationships between the LADM valuation information package (in this document) and packages of the core LADM (ISO 19152-1 and ISO 19152-2)

The complete model may be implemented through a distributed set of (geo-related) information systems (e.g. valuation information management system, sale price register and sale statistics), 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 local, regional or national levels. This underlines the relevance of the model: different organizations have their own responsibilities in data maintenance and supply but can communicate on the basis of standardized administrative and technical update processes.

6.3 Conceptual overview

This document defines the high-level structure for the LADM valuation information. Figure 2 shows ten basic classes of the LADM valuation information package.

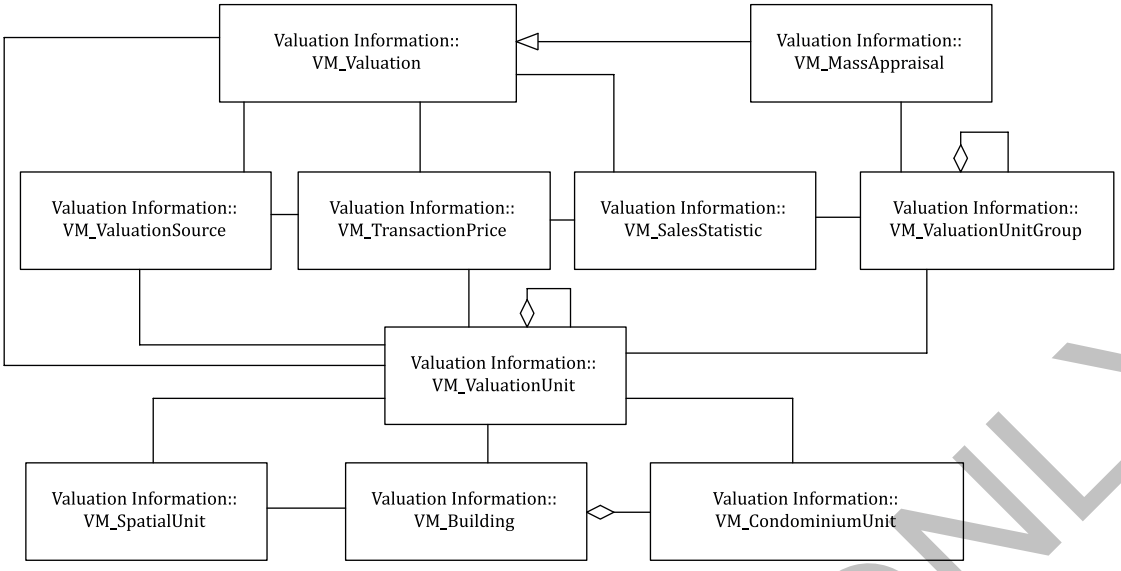

Figure 2 — Basic classes of the LADM valuation information package

Valuation units, as instances of VM_ValuationUnit, are the basic recording units of valuation registries, realized by an aggregation relationship of VM_ValuationUnit onto itself; see Figure 2. The object of the valuation may be:

a) only a land parcel,

b) only a building,

c) land parcel(s) with or without building(s) together as land property,

d) a condominium unit consisting of building part(s) (e.g. condominium main part, condominium accessory part, joint access facility) and a share in land parcel(s).

Valuation unit groups, as instances of class VM_ValuationUnitGroup, are realized by an aggregation relationship of VM_ValuationUnitGroup onto itself; see Figure 2. A valuation unit group may consist of other valuation unit groups. Valuation units may be grouped according to zones (e.g. administrative divisions, market zones) that have similar environmental and economic characteristics or according to the functions of valuation units (e.g. commercial, residential, agricultural).

Class VM_SpatialUnit represents land parcel(s) (e.g. cadastral parcel, subparcel, sub-spatial unit) that are subject to valuation.

VM_Building, with buildings as instances, includes the building characteristics required in valuation processes (e.g. date of construction, energy performance, use type). A building may be considered as a complementary part of the parcel(s) (VM_SpatialUnit) but may be valued separately from the parcels on which they are located. A building may represent a condominium building, which consists of

a) condominium units (e.g. apartments, shops);

b) accessory parts assigned for exclusive use (e.g. garages, storage areas);

c) joint facilities covering parcel, structural components (e.g. foundations, roofs), accession areas (e.g. entrance halls, spaces), and other remaining areas of buildings (e.g. staircases, heating rooms).

Condominium units, as instances of class VM_CondominiumUnit, are each for the exclusive use of an individual condominium owner and share a condominium building with at least one or more condominium units.

VM_Valuation, with valuation information as instances, specifies output data produced within valuation processes. It concerns the date of valuation, value type, the purpose of valuation, valuation approach, and the assessed value of valuation units.

Class VM_Valuation has the mass appraisal class as a specialization, as instance of class VM_MassAppraisal. Mass appraisal is the process of valuing a group of valuation units using standardized procedures at a given date. Class VM_MassAppraisal describes mathematical models, mass appraisal analysis types (e.g. multiple regression analysis), and the sample size of the analysis.

Transaction prices, as instances of class VM_TransactionPrice, characterize the information content of transaction contractor declarations, including the date of contract or declaration, transaction price, date, and type of transaction (e.g. sale, forced sale, rent prices).

VM_SalesStatistic, with sales statistics as instances, represents sales statistics produced through the analysis of transaction prices. VM_SalesStatistic enables representing as well as monitoring property price trends.

Valuation sources are instances of the class VM_ValuationSource. In principle, property valuation is based on valuation sources (e.g. valuation report, sale contract, rental contract, declaration), as instances from class LA_ValuationSource.

7 Content of classes of the LADM valuation information and their associations

7.1 General

All classes of LADM valuation information shall adhere to the ISO 19103 stereotype class featureType (a feature type is a class of features, i.e. abstractions of real-world phenomena having common properties). Figure 3 presents the core classes of LADM valuation information and its relations with the core LADM, namely ISO 19152-1 and ISO 19152-2.

Similarly to core LADM (i.e. ISO 19152-1 and ISO 19152-2), this document 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.

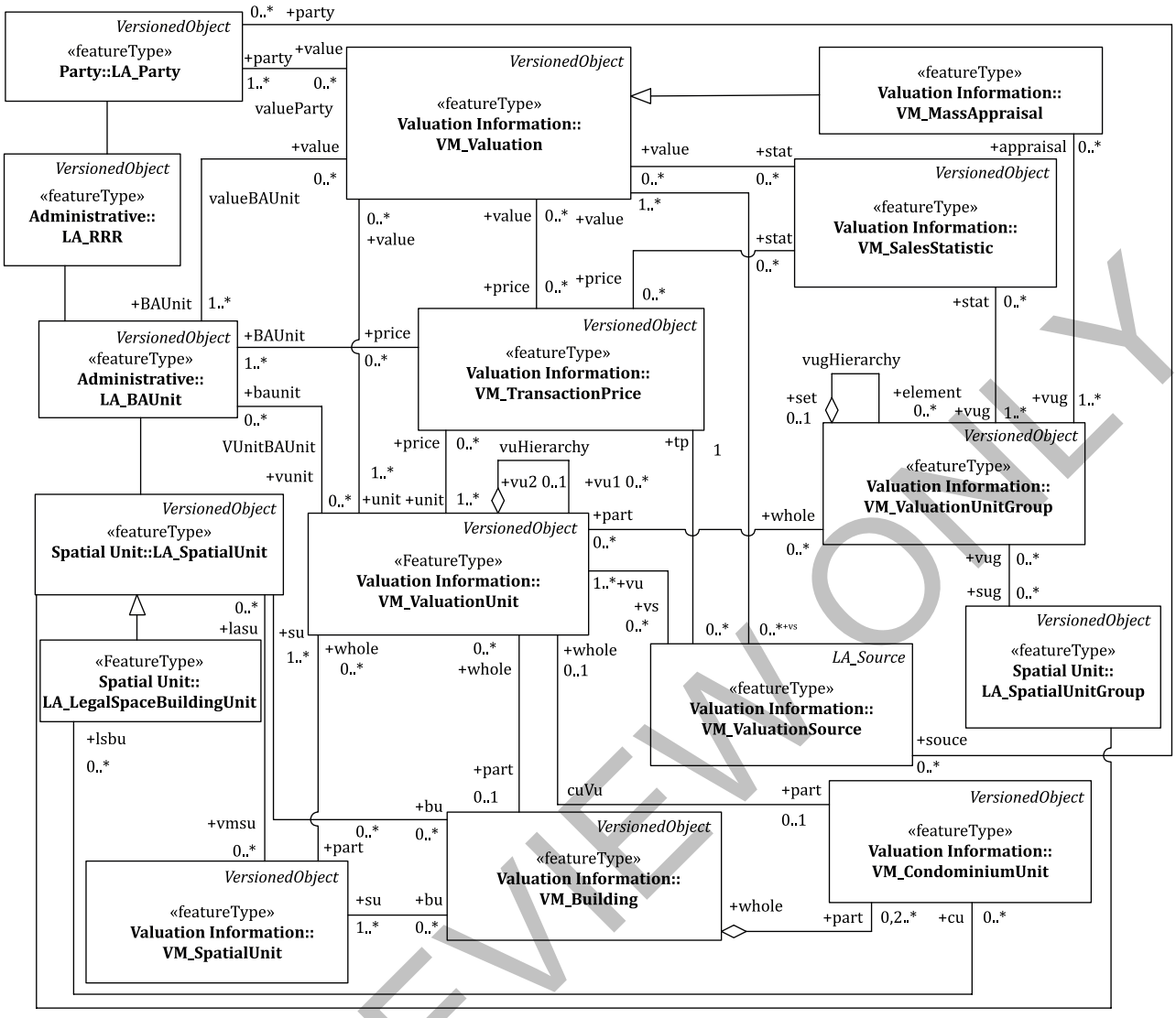

Figure 3 — Classes of the LADM valuation information and its relationships with core LADM (ISO 19152-1 and ISO 19152-2)

7.2 VersionedObject and LADM valuation information

LADM valuation information consists of ten basic classes, all directly or indirectly inheriting from VersionedObject (except for VM_ValuationSource); see ISO 19152-1:2024, 6.3.1 for the details on the VersionedObject class. Figure 4 shows the relationship between VersionedObject and LADM valuation information.

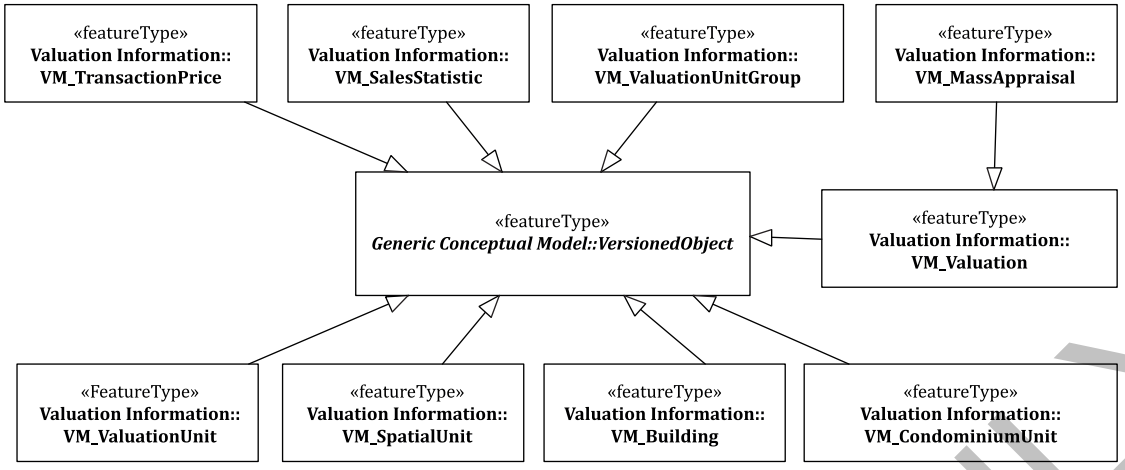

Figure 4 — VersionedObject and LADM valuation information package classes

7.3 Classes of LADM valuation information

7.3.1 General

1) **ValuationInformationManagement**

https://standards.isotc211.org/19152/-4/1/req/valuation/informationmanagement

Requirement 1: Appropriate valuation information management systems (e.g. a registry or a database) can be developed by public authorities (e.g. municipality, local governments, state) for the fair and timely valuation of tenure rights in order to promote broader social, economic, environmental and sustainable development objectives. Input (e.g. legal, locational, physical and environmental characteristics of valuation units and transaction prices) and output (e.g. value and valuation procedures) data in property valuation processes shall be identified, compiled, recorded, managed and maintained in such systems for effective valuation.

2) **LinkedPublicRegistries**

https://standards.isotc211.org/19152/-4/1/req/valuation/linkedpublicregistries

Requirement 2: Uniform and accurate valuation of property units requires correct, complete and up-to-date property data. The fundamental elements underpinning property valuation are public registries, which accommodate regular data maintenance and updating of property characteristics, ownership details and transaction information. An effective land administration infrastructure shall link valuation registries to other distributed public registries such as cadastre, land registry, property price registry, address, spatial planning, topographic and building and dwelling registries.

3) **ValuationUnitRegistration**

https://standards.isotc211.org/19152/-4/1/req/valuation/valuationunitregistration

Requirement 3: Effective valuation information management shall support the registration of each valuation unit and its required characteristics. The classification of valuation units and the required characteristics of each valuation unit need to be explicitly specified for each valuation process. The required characteristics may be obtained through either:

1) an existing registry; or

2) the valuation information registry itself.

A valuation information registry may be developed at the local, regional or national level.

7.3.2 VM_ValuationUnit

An instance of class VM_ValuationUnit is a valuation unit. A valuation unit is associated with zero or more [0..*] instances of basic administrative units (BAunit). A valuation unit is associated with zero or more [0..*] instances of valuation. A valuation unit is associated with zero or more [0..*] instances of transaction price (i.e. a valuation unit can be subject to property transactions). A valuation unit is associated with zero or more [0..*] instances of valuation unit groups (i.e. a valuation unit can be associated with a district and also with a property market zone). A valuation unit is associated with zero or more [0..*] instances of spatial unit (i.e. a valuation unit can be associated with a parcel, as well as subparcels, see ISO 19152-1:2024). A valuation unit is associated with zero or one [0..1] instances of the building (i.e. a valuation unit can be associated with a building or a condominium building). A valuation unit is associated with zero or one [0..1] instances of a condominium unit (i.e. a valuation unit can be associated with a building unit, namely a condominium unit). See Figure 5. The example code list values of the spatial part of the valuation information package are shown in Figure 6.

The attributes of VM_ValuationUnit are shown in Table 4.

Table 4 — Attributes of VM_ValuationUnit

Attribute name	Type	Cardinality	Description
vuID	Oid	1	The identifier of the valuation unit.
type	VM_ValuationUnitType	1..*	The type of the valuation unit.
ExtAddressID	Oid	0..1	The external link to address of the valuation unit, see ExtAddress class in ISO 19152-2.
neighbourhoodType	VM_NeighborhoodType	0..1	The type of neighbourhood in which the valuation unit is located.
utilityServices	CharacterString	0..*	The description of the utility services (e.g. gas, electricity) utilized by the valuation unit.

NOTE 1 A valuation unit can be only a land parcel, only a building, land parcel(s) with or without building(s) together as land property, or a condominium unit consisting of building part(s) (e.g. condominium main part, condominium accessory part, joint access facility).

NOTE 2 If a valuation unit is only a land parcel, then building and condominium units are not specified. If a valuation unit is only a building, then parcel and condominium units are not specified. If a valuation unit is a condominium property, then the parcel, building and condominium unit are specified, as required by the legislation in each jurisdiction.

NOTE 3 The basic registration unit of cadastral systems (e.g. a cadastral parcel) can differ from the basic units of valuation processes. Class VM_ValuationUnit represents the basic units in valuation processes.

NOTE 4 The attribute utilityServices can include any information required, including identification of the measurement device.

EXAMPLE Valuation units are demonstrated in instance diagrams; see Figures C.1 to C.3.

Annex B presents an extension of the model (i.e. the profiles) for the presentation of 2D and 3D spatial analyses (i.e. valuation unit analysis) that are carried out for property valuation processes. A set of illustrative examples using instance-level cases for valuation is provided in Annex C.

7.3.3 VM_ValuationUnitGroup

An instance of class VM_ValuationUnitGroup is a valuation unit group. VM_ValuationUnitGroup is associated with zero or more [0..*] instances of valuation unit, see Figure 5. A valuation unit group is associated with one or more [1..*] instances of sale statistics and mass appraisal.

The attributes of VM_ValuationUnitGroup are shown in Table 5.

Table 5 — Attributes of VM_ValuationUnitGroup

Attribute name	Type	Cardinality	Description
vugID	Oid	1	The identifier of the valuation unit group.
valuationGroupName	CharacterString	0..1	The name of the valuation unit group.

NOTE Valuation units can be grouped according to zones (e.g. administrative divisions, market zones) that have similar environmental and economic characteristics. Valuation units can also be categorized according to types of valuation units (e.g. commercial, residential, agricultural).

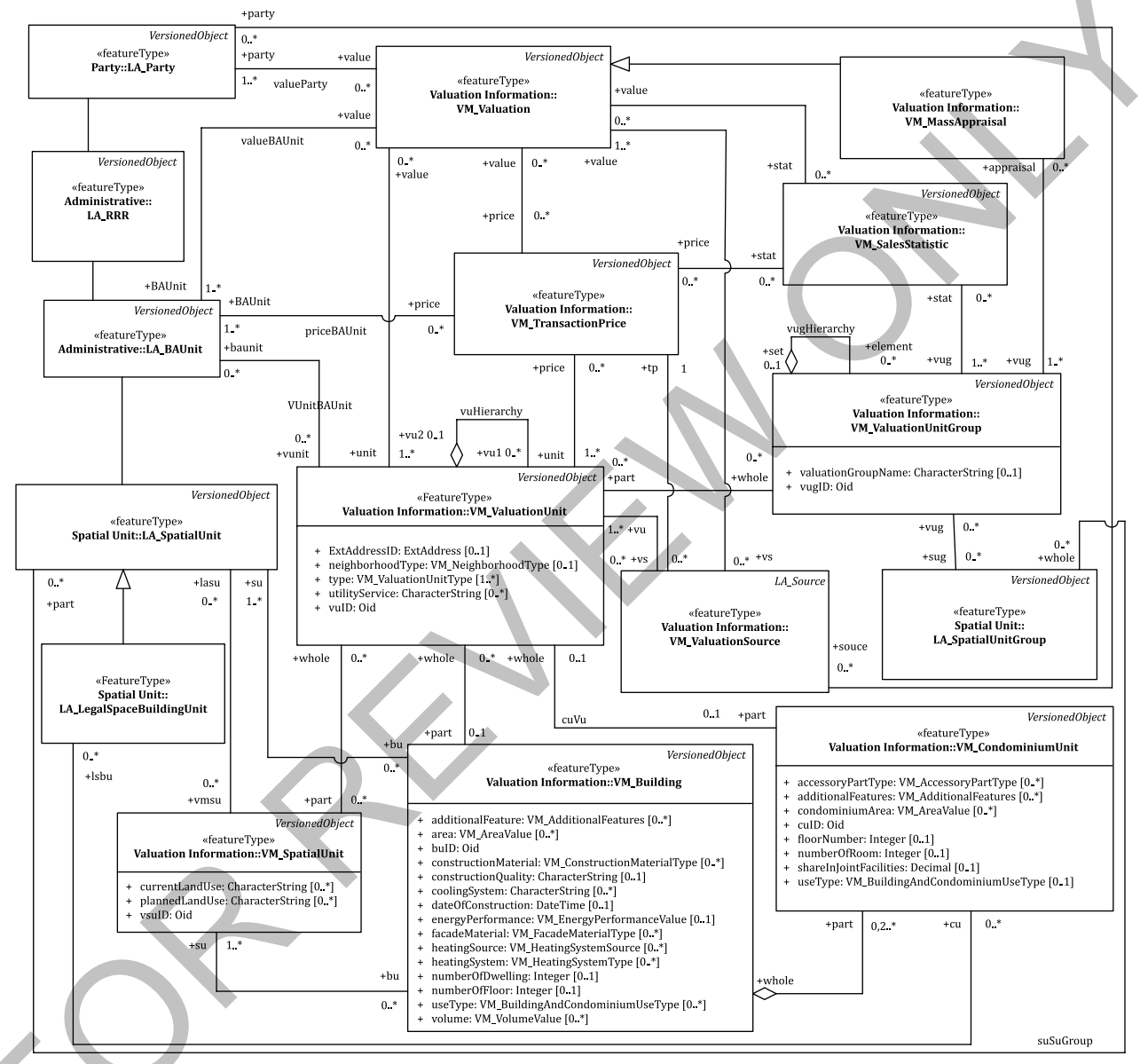

Figure 5 — Content of spatial part of LADM valuation information package and associations with core LADM (ISO 19152-1 and ISO 19152-2)

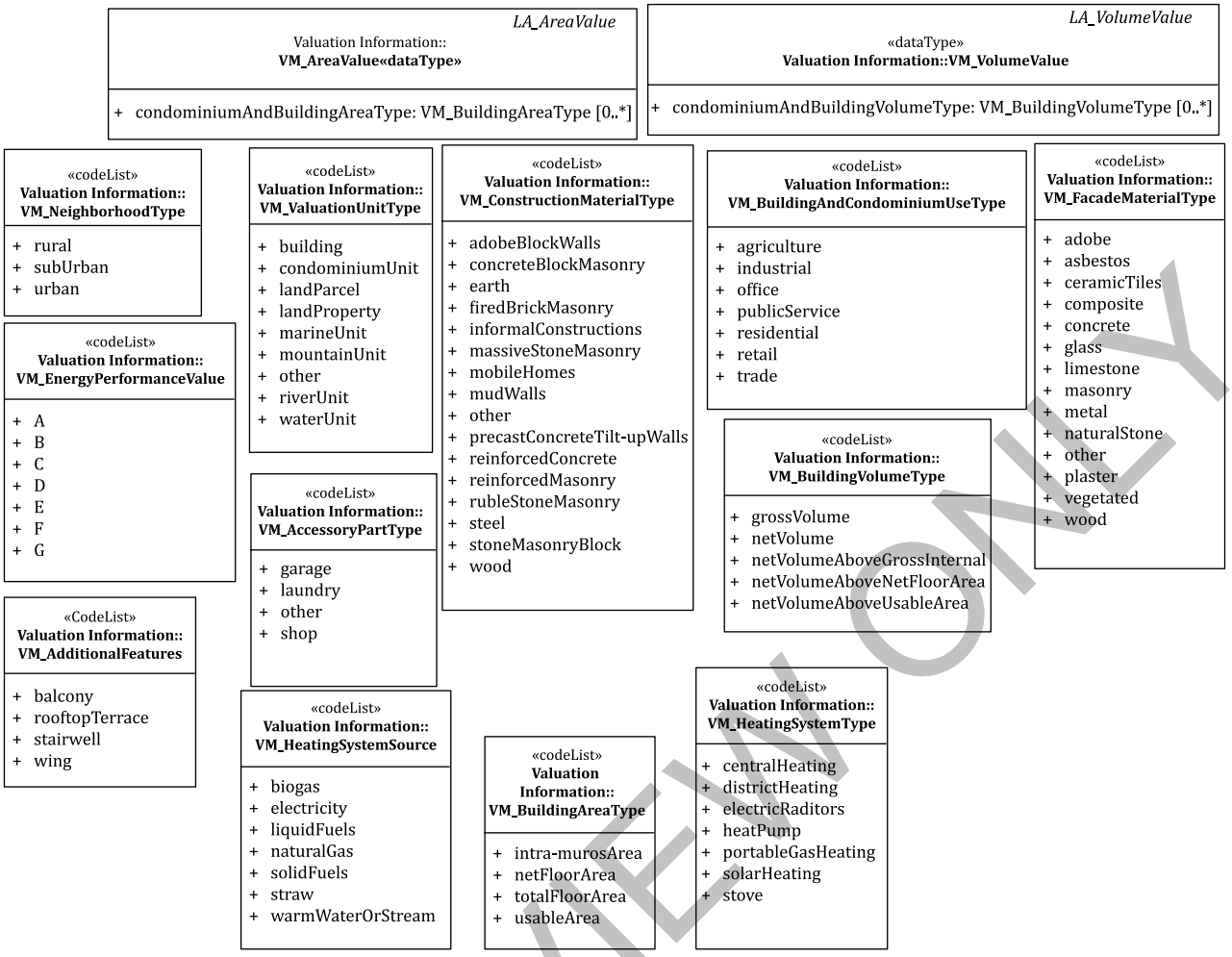

Figure 6 — Code lists of spatial part of the LADM valuation information package

7.3.4 VM_SpatialUnit

An instance of class VM_SpatialUnit is a valuation spatial unit. VM_SpatialUnit is associated with zero or more [0..*] instances of class VM_Building; see Figure 5. A spatial unit defined in this document is associated with zero one or more [0..*] instances of spatial units defined in the core LADM (i.e. ISO 19152-1 and ISO 19152-2).

The attributes of VM_SpatialUnit are shown in Table 6.

Table 6 — Attributes of VM_SpatialUnit

Attribute name	Type	Cardinality	Description
vsuID	Oid	1	The identifier of the valuation spatial unit.
currentLandUse	CharacterString	0..*	Existing land use type(s) of the spatial unit.
plannedLandUse	CharacterString	0..*	Planned land use type(s) of the spatial unit.

NOTE 1 Existing and planned land use characteristics of the valuation spatial unit can be expressed through the classification given in ISO/TS 19144-3, ISO 19144-2, the Hierarchical INSPIRE Land Use Classification System (HILUCS),[30] and/or the Coordination of information on the environment (CORINE) inventory,[47] etc.

NOTE 2 Planned land use characteristics can be derived from the LADM spatial plan information package (ISO 19152-5, LADM_SP). In LADM_SP, SP_PlanBlock (e.g. a group of spatial units) and SP_PlanUnit (e.g. spatial unit or part of spatial unit) classes can provide information to property valuation activities. An association relationship is specified between the SP_PlanUnit and VM_SpatialUnit classes; see Figure 9.

7.3.5 VM_Building

Class VM_Building is introduced to manage and maintain property valuation-related characteristics of buildings (e.g. condominium building, single-family building, multi-family building, etc.). VM_Building is associated with one or more [1..*] instances of class LA_SpatialUnit. A building is associated with zero or more [0..*] instances of class VM_ValuationUnit; see Figure 5 and Figure 6.

The attributes of VM_Building are shown in Table 7.

Table 7 — Attributes of VM_Building

Attribute name	Type	Cardinality	Description
buID	Oid	1	The identifier of the building.
area	VM_AreaValue	0..*	The area of the building.
volume	VM_VolumeValue	0..*	The volume of the building.
constructionMaterial	VM_ConstructionMaterialType	0..*	The type of construction material of the building.
constructionQuality	CharacterString	0..1	The construction quality of the building.
dateOfConstruction	DateTime	0..1	The date of finished state of the building (construction).
energyPerformance	VM_EnergyPerformanceValue	0..1	Energy performance value of the building.
facadeMaterial	VM_FacadeMaterialType	0..*	The type of facade material of the building.
heatingSource	VM_HeatingSystemSource	0..*	The type of heating source of the building.
heatingSystem	VM_HeatingSystemType	0..*	The type of heating system of the building.
numberOfDwelling	Integer	0..1	Number of dwellings in the building.
numberOfFloor	Integer	0..1	Number of floors in the building.
useType	VM_BuildingAndCondominiumUseType	0..*	The type of use of the building.
additionalFeatures	VM_AdditionalFeatures	0..*	Additional feature that can affect the value.
coolingSystem	CharacterString	0..*	The type of cooling system of the building. NOTE Different cooling systems exist for buildings, e.g. via an air network, via a cold water or chilled water network, by direct contact between the air to be cooled and the evaporator of the refrigerating machine.

7.3.6 VM_CondominiumUnit

An instance of class VM_CondominiumUnit is a condominium unit. VM_CondominiumUnit is associated with zero or more [0..*] instances of class LA_LegalSpaceBuildingUnit. VM_CondominiumUnit is associated with zero or one [0..1] instances of valuation unit; see Figure 5 and Figure 6.

The attributes of VM_CondominiumUnit are shown in Table 8.

Table 8 — Attributes of VM_CondominiumUnit

Attribute name	Type	Cardinality	Description
accessoryPartType	VM_AccessoryPartType	0..*	The type of accessory part of the building.
condominiumArea	VM_AreaValue	0..*	The floor area of the condominium unit.
cuID	Oid	1	The identifier of the condominium unit.
floorNumber	Integer	0..1	The floor number of the condominium unit.
numberOfRoom	Integer	0..1	The number of rooms of the condominium unit.
shareInJointFacilities	Decimal	0..1	The share in joint facilities of the condominium unit.
additionalFeatures	VM_AdditionalFeatures	0..*	Additional feature that can affect the value.
useType	VM_BuildingAndCondominiumUseType	0..*	The type of usage of the building.

NOTE VM_CondominiumUnit is adapted from the OGC's LandInfra standard to specify buildings that contain condominium units established according to condominium schemes.

4) **ValuationProcedure**

https://standards.isotc211.org/19152/-4/1/req/valuation/valuationprocedure

Requirement 4: Valuation information management systems shall support the determination of the value of each valuation unit in accordance with published procedures, where possible, based on market values and/or computer-assisted mass appraisal systems.

7.3.7 VM_Valuation

An instance of class VM_Valuation is an output of a valuation process. Valuation is a process to estimate the value of any administrative unit/spatial unit. A valuation is associated to instances of class LA_Party (e.g. representing valuer, assessor, etc.). An assessed value produced through a valuation process pertains to an amount that a local or central government has designated for a specific property and specific purpose(s). A valuation is associated with one or more [1..*] instances of class LA_BAUnit. A valuation is associated with one or more [1..*] instances of a valuation unit. A valuation is associated with zero or more [0..*] instances of transaction price (i.e. transaction prices utilized in a valuation process). A valuation is associated with zero or more [0..*] instances of class VM_SalesStatistic; see Figure 7. The example code list values of the value of the valuation information package are shown in Figure 8.

The attributes of VM_Valuation are shown in Table 9.

Table 9 — Attributes of VM_Valuation

Attribute name	Type	Cardinality	Description
vID	Oid	1	The identifier of the valuation.
assessedValue	Currency	1	The assessed (estimated) value of a valuation unit (ISO 4217 shall be used for list of currencies in the ISO 19103 currency).
dateOfValuation	DateTime	1	The exact date of the valuation.
purposeOfValuation	CharacterString	0..1	The purpose of the valuation.
statusOfAppeal	VM_StatusOfAppeal	0..1	The status of appeal to the valuation.
valuationApproach	VM_ValuationApproach	0..1	The valuation approach used in the valuation process.
valuationReportID	Oid	0..*	The identifier of the valuation report of the valuation (see VM_ValuationSource).
valueType	VM_ValueType	0..*	The type of value.

Annex D provides an overview of the relationships between this document and international standards and guidelines for property valuation. An approach to the valuation of unregistered land is detailed in Annex E.

7.3.8 VM_MassAppraisal

An instance of class VM_MassAppraisal is a mass appraisal. VM_MassAppraisal is a subclass of class VM_Valuation; see Figure 7 and Figure 8.

The attributes of VM_MassAppraisal are shown in Table 10.

Table 10 — Attributes of VM_MassAppraisal

Attribute name	Type	Cardinality	Description
analysisType	VM_MassAppraisalAnalysisType	0..1	The statistical analysis type used in the mass appraisal.
estimatedValue	Currency	0..1	The estimated value of a valuation unit by the mass appraisal.
mathematicalModel	CharacterString	0..1	The mathematical model utilized/created in the mass appraisal.
performanceIndicator	VM_MassAppraisalPerformance	0..1	The indicator for evaluating mass appraisal performance.

5) **TransactionPricesAndStatistics**

https://standards.isotc211.org/19152/-4/1/req/valuation/transactionpricesandstatistics

Requirement 5: An effective land administration system for valuation information management shall support the registration of transaction prices and the publication of sales statistics regularly.

7.3.9 VM_TransactionPrice

An instance of class VM_TransactionPrice is a transaction price. A transaction price is associated with zero or more [0..*] instances of valuation processes and sales statistics. Class VM_TransactionPrice is associated with one or more [1..*] instances of VM_ValuationUnit and LA_BAUnit, see Figure 7 and Figure 8.

The attributes of VM_TransactionPrice are shown in Table 11.

Table 11 — Attributes of VM_TransactionPrice

Attribute name	Type	Cardinality	Description
tpID	Oid	1	The identifier of the contract or declaration of the transaction.
dateOfContractOrDeclaration	DateTime	0..1	The exact date of contract or declaration of the transaction.
transactionPrice	Currency	0..1	The transaction price of a valuation unit at a certain time.
typeOfTransaction	VM_TypeOfTransaction	0..1	The type of the transaction.

7.3.10 VM_SalesStatistic

A sales statistic is associated to zero or more [0..*] instances of transaction prices and valuation processes. Sales statistics are produced through analysis of transaction prices. A sales statistic is associated to zero or more [0..*] instances of valuation unit groups since the sales statistics may be based on spatial (e.g. residential condominium units in a municipality) or thematic clusters (e.g. parcels used for agricultural purposes); see Figure 7 and Figure 8.

The attributes of VM_SalesStatistic are shown in Table 12.

Table 12 — Attributes of VM_SalesStatistic

Attribute name	Type	Cardinality	Description
ssID	Oid	1	The identifier of the analysis of the sales statistic.
averagePricePerSquareMeter	Currency	0..1	The calculated average transaction or valuation price per square metre.
dateOfAnalysis	DateTime	0..1	The date of the sales statistic.
basePriceIndex	Decimal	0..1	The base index value.
dateOfBasePriceIndex	DateTime	0..1	The date of the calculated base price index.
priceIndex	Decimal	0..1	The base value of the price index.
dateOfPriceIndex	DateTime	0..1	The date of the calculated price index.

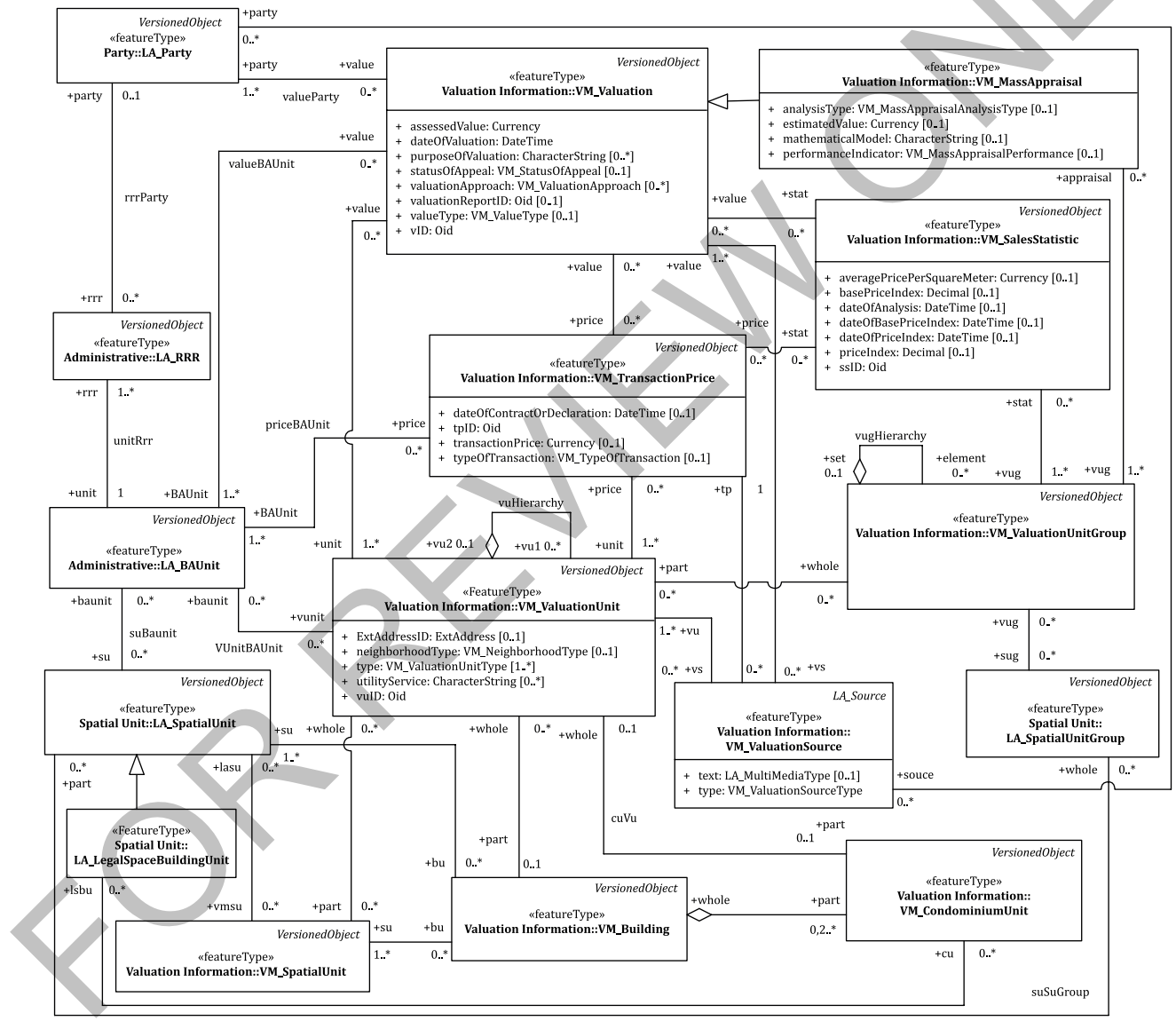

Figure 7 — Content of valuation part of LADM valuation information package and associations with core LADM classes (ISO 19152-1 and ISO 19152-2)

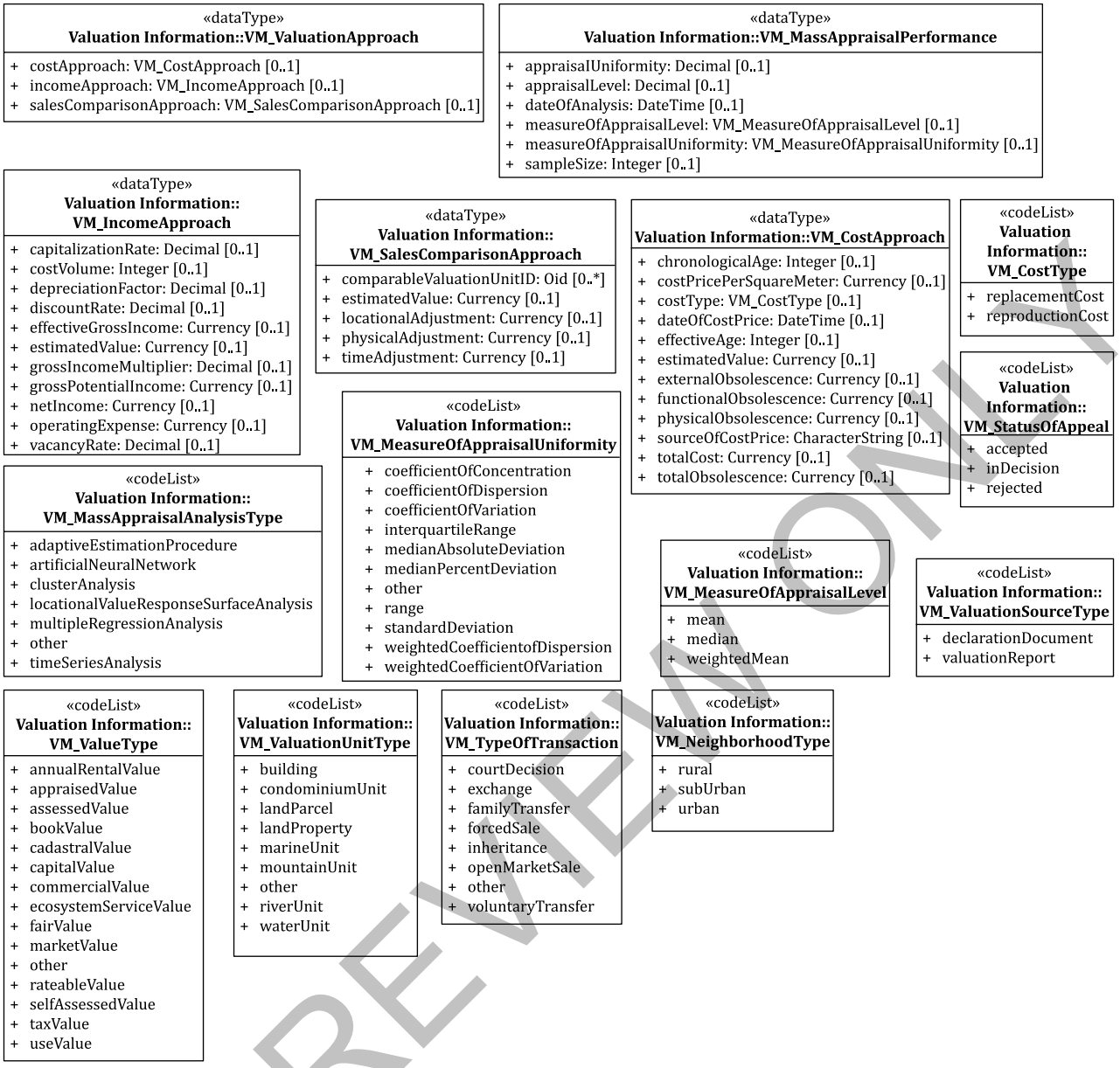

Figure 8 — Code lists of valuation part of the LADM valuation information package

6) **ValuationSourceDocument**

https://standards.isotc211.org/19152/-4/1/req/valuation/valuationsourcedocument

Requirement 6: All valuation information management systems shall support making use of the VM_ValuationSource class to support references to source documents (e.g. sale contracts and valuation reports).

7.3.11 VM_ValuationSource

An instance of class VM_ValuationSource is a valuation source. A valuation source is associated with zero or more [0..*] instances of class LA_Party; see Figure 7 and Figure 8. This relationship indicates which source document is created by which party. VM_ValuationSource is associated with one or more [1..*] instances of classes VM_ValuationUnit and VM_Valuation. A valuation source is associated with one instance [1] of VM_TransactionPrice; see Figure 7.

The attributes of VM_TransactionPrice are shown in Table 13.

Table 13 — Attributes of VM_ValuationSource

Attribute name	Type	Cardinality	Description
text	MultiMediaType	0..1	The media type of the source.
type	VM_ValuationSourceType	1	The type of the source.

7.3.12 Data types for valuation information package

The Valuation information package has seven data types:

1) VM_AreaValue,
2) VM_VolumeValue,
3) VM_ValuationApproach,
4) VM_SalesComparisonApproach,
5) VM_CostApproach,
6) VM_IncomeApproach,
7) VM_MassAppraisalPerformance.

The generic data type VM_AreaValue is introduced in order to support the registration of the various types of building floor area values (see Annex F and Annex H). The generic data type VM_VolumeValue is specified in order to support the registration of various types of building volume values (see Annex F). The generic data type VM_ValuationApproach is introduced to support various types of valuation approaches (see Annex F). The generic data type VM_SalesComparisonApproach is specified for recording the input and output data related to the sales comparison approach (see Annex F). The generic data type VM_CostApproach is introduced for recording the input and output data related to the cost approach (see Annex F). The generic data type VM_IncomeApproach is specified for registering the input and output data related to the income approach (see Annex F). The generic data type VM_MassAppraisalPerformance is introduced to provide support for registering the information on mass appraisal performance analysis (see Annex F).

The attributes of VM_AreaValue are shown in Table 14.

Table 14 — Attributes of VM_AreaValue

Attribute name	Type	Cardinality	Description
areaSize	Area	1	Area size of the condominium unit or building (see ISO 19103).
type	LA_AreaType	1	The type of area recorded.
condominiumAndBuildingAreaType	VM_BuildingAreaType	1	The type of building or condominium unit floor area.

The attributes of VM_VolumeValue are shown in Table 15.

Table 15 — Attributes of VM_VolumeValue

Attribute name	Type	Cardinality	Description
volumeSize	Volume	1	Volume size of the condominium unit or building (see ISO 19103).
type	LA_VolumeType	1	The type of volume recorded.
condominiumAndBuildingVolumeType	VM_BuildingVolumeType	1	The type of building or condominium unit volume.

The attributes of VM_ValuationApproach are shown in Table 16.

Table 16 — Attributes of VM_ValuationApproach

Attribute name	Type	Cardinality	Description
salesComparisonApproach	VM_SalesComparisonApproach	0..1	Input and output data related to sales comparison approach.
incomeApproach	VM_IncomeApproach	0..1	Input and output data related to income approach.
costApproach	VM_CostApproach	0..1	Input and output data related to cost approach.

The attributes of VM_SalesComparisonApproach are shown in Table 17.

Table 17 — Attributes of VM_SalesComparisonApproach

Attribute name	Type	Cardinality	Description
comparableValuationUnitID	Oid	0..*	Selected comparable valuation unit's identifiers.
estimatedValue	Currency	0..1	Estimated value by sales comparison approach.
locationalAdjustment	Currency	0..1	Calculated locational adjustment value.
physicalAdjustment	Currency	0..1	Calculated physical adjustment value.
timeAdjustment	Currency	0..1	Calculated time adjustment value.

The attributes of VM_CostApproach are shown in Table 18.

Table 18 — Attributes of VM_CostApproach

Attribute name	Type	Cardinality	Description
chronologicalAge	Integer	0..1	Chronological age of the building (the number of years that have elapsed since building construction was complete).
costPricePerSquareMeter	Currency	0..1	Cost price per square metre of the building.
costType	VM_CostType	0..1	The type of cost (i.e. replacement cost and reproduction cost).
dateOfCostPrice	DateTime	0..1	The date of the cost price.
effectiveAge	Integer	0..1	Effective age of the building.
estimatedValue	Currency	0..1	The estimated value by cost approach.
externalObsolescence	Currency	0..1	A loss of utility caused by economic or locational factors external to the valuation unit that results in a loss of value.
functionalObsolescence	Currency	0..1	A loss of utility resulting from inefficiencies in the subject valuation unit compared to its replacement that results in a loss of value.
physicalObsolescence	Currency	0..1	A loss of utility due to the physical deterioration of the valuation unit or its components resulting from its age and normal usage that results in a loss of value.
sourceOfCostPrice	CharacterString	0..1	The source of cost price.
totalCost	Currency	0..1	The calculated total cost.
totalObsolescence	Currency	0..1	The calculated total obsolescence.

The attributes of VM_IncomeApproach (VM_IncomeCapitalizationApproach) are shown in Table 19.

Table 19 — Attributes of VM_IncomeApproach

Attribute name	Type	Cardinality	Description
capitalizationRate	Decimal	0..1	The conversion of a periodic income to an equivalent capital value.
depreciationFactor	Decimal	0..1	The percentage rate at which a valuation unit is depreciated across the estimated productive life of the unit.
discountRate	Decimal	0..1	The rate of return used to convert a future monetary sum or cash flow into present value.
effectiveGrossIncome	Currency	0..1	The effective gross income (e.g. gross rent).
estimatedValue	Currency	0..1	The estimated value by income approach.
grossIncomeMultiplier	Decimal	0..1	The capitalization technique that uses the ratio between the sale price of a valuation unit and its potential gross income or its effective gross income.
netIncome	Currency	0..1	The net income in income approach (e.g. net rent)
operatingExpenses	Currency	0..1	The operating expenses in income approach.
costVolume	Integer	0..1	The total cost volume.
vacancyRate	Decimal	0..1	The vacancy rate used in income approach.
grossPotentialIncome	Currency	0..1	The gross potential income.

The attributes of VM_MassAppraisalPerformance are shown in Table 20.

Table 20 — Attributes of VM_MassAppraisalPerformance

Attribute name	Type	Cardinality	Description
appraisalUniformity	Decimal	0..1	The appraisal uniformity (equity) of the mass appraisal.
appraisalLevel	Decimal	0..1	The common, or overall, ratio of appraised values to market values. Three concepts are usually of interest: the level required by law, the true or actual level, and the computed level, based on a ratio study.
dateOfAnalysis	DateTime	0..1	The exact date of analysis.
measureOfAppraisalLevel	VM_MeasureOfAppraisalLevel	0..1	The measure of appraisal level.
measureOfAppraisalUniformity	VM_MeasureOfAppraisalUniformity	0..1	The measure of appraisal uniformity.
sampleSize	Integer	0..1	The sample size in the mass appraisal.

Code lists as a basis for describing flexible enumeration are presented in Annex F. Annex G presents a series of country profiles. Annex H outlines how International Property Measurement Standards (IPMS) can be used within the context of this document.

7) **ValueDissemination**

https://standards.isotc211.org/19152/-4/1/req/valuation/valuedissemination

Requirement 7: Valuation procedures, processes and results shall be transparently shared with the general public. Timely and effective dissemination to the general public of property values, as well as input information related to valuation processes, is an essential part of a transparent and efficient valuation system. For this purpose, web-map-based dissemination is preferred, and in the case of stratified ownership (e.g. apartments), 3D web-maps can be preferable.

7.4 LADM valuation information package and ISO 19152-5

The LADM valuation information package uses the LA_BoundaryFaceString and LA_BoundaryFace classes defined in ISO 19152-2 to provide a geometric representation of the valuation units; see Figure 9. Boundaries of a valuation unit and a BAUnit can be shared or not shared. Furthermore, a relationship is specified between the classes VM_ValuationUnit and SP_PlanUnit (see ISO 19152-5) to associate valuation processes with the output of the planning process; see Figure 9. LA_BAUnit is associated to LA_SpatialUnit, VM_ValuationUnit and SP_PlanUnit. This becomes visible if Figure 3 and 9 are combined.

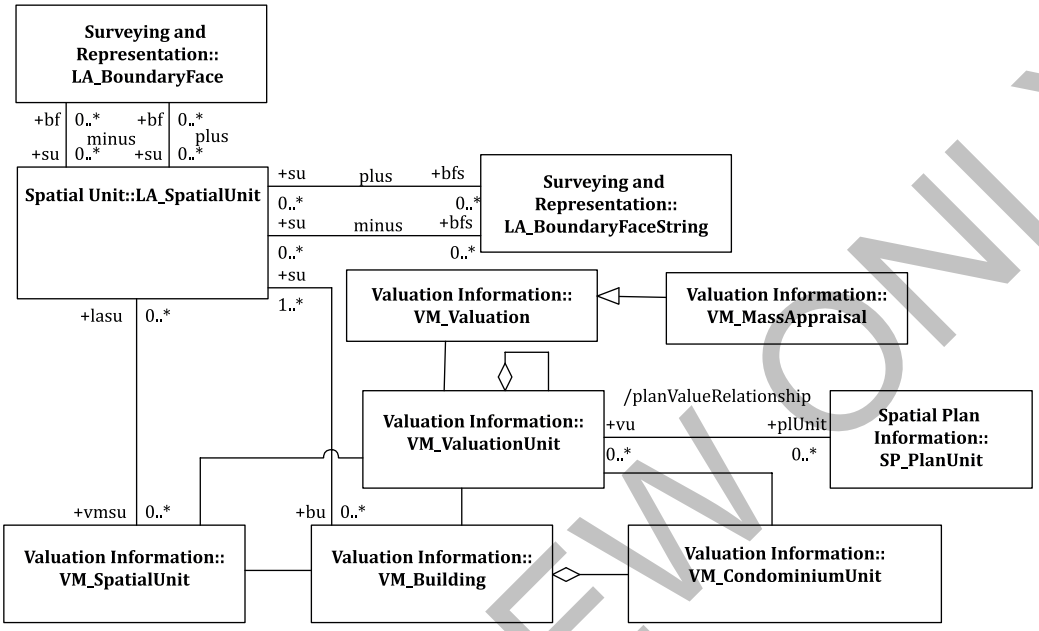

Figure 9 — Relationships between the valuation unit, plan unit and spatial unit

Annex A
(normative)

Abstract test suite

A.1 Introduction

A.1.1 Use of the abstract test suite described in this annex shall conform to ISO 19105. The LADM valuation information package specifies a conceptual schema. Actual use of the LADM valuation information package 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 valuation information package in terms of level. Testing whether a specific data set is conformant means checking the data set content against the corresponding conformant LADM valuation information package application schema.

A.1.2 This test suite specifies the requirements to be met by the implementation under test in order to be conformant to this document. For each test, the metadata conformity element takes one of the following values:

a) Conformant (conformant). The resource is fully conformant with the cited specification;

b) Not Conformant (notConformant). The resource does not conform to the cited specification;

c) Not evaluated (notEvaluated). Conformance has not been evaluated.

A.1.3 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. The positive results of the test method can be documented in different ways:

a) show the inheritance (or realization) structure between the LADM valuation information package and the tested model (elements); or

b) show mapping of elements (or realization) between the LADM valuation information package and the tested model.

The test shall be documented in accordance with Clause A.2.

In order to realize this conformance test explicitly and completely, knowledge and understanding are 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

Table A.1 describes the content of the valuation information test.

Table A.1 — Valuation information test

Conformance test	https://standards.isotc211.org/19152/-4/1/conf/valuation/allContent
Reference	All normative statements in requirements class https://standards.isotc211.org/19152/-4/1/req/valuation (see Clause 6 and Clause 7)
Test purpose	Verify that effective land administration systems for valuation information conform to the UML model and additional requirements related to the elements in the UML model.
Test method	Examine the application schema of the implementation under test, including class, attribute(s) and associations. Identify the individual class and their attributes and associations to other classes. Verify that each such element is in conformance with multiplicity and data type as expressed in the UML model. For each individual class, check for additional requirements beyond the semantics in the model. Verify that each such element meets specified criteria.
Test type	Basic.

Annex B
(informative)

3D profiles for spatial analysis

This annex presents profiles to represent spatial analysis conducted for valuation. Traditional cadastral systems generally provide only two-dimensional (2D) legal and geometric information about property units. However, today's valuation practices would benefit significantly from three-dimensional (3D) information in order to better estimate and explain the values of property units.

This document includes 3D legal and physical characteristics of property units required for property valuation. However, the core model does not include external characteristics that can potentially dramatically change property values. The most commonly used locational and environmental characteristics employed in valuation models are distance, view, noise, slope, environmental amenities and risks.[34]

NOTE The methodological framework provided in ISO 14008 can be used for the monetary valuation of environmental impacts and related environmental aspects.

Since it is time-consuming and costly to collect these characteristics on-site, 3D data sources, together with GIS analyses, can be used to derive environmental and locational characteristics. However, performing some of the same GIS analyses repeatedly for the same properties to derive characteristics can cause a loss of time and labour. Recording critical aspects of the analysis (e.g. parameters used, input data and output data) in property valuation registries can solve this issue. Three profiles of LADM valuation information are created to address this issue.

Figure B.1 depicts the profile developed for spatial units of the analysis (i.e. land parcels). An external attribute is added to the VM_ExternalSpatialUnit to represent externalities of parcel type of valuation units. The distance and view information are widely used for the valuation of land parcels. Therefore, critical aspects of these externalities are detailed in the VM_ExternalCharacteristic data type; see Figure B.4.

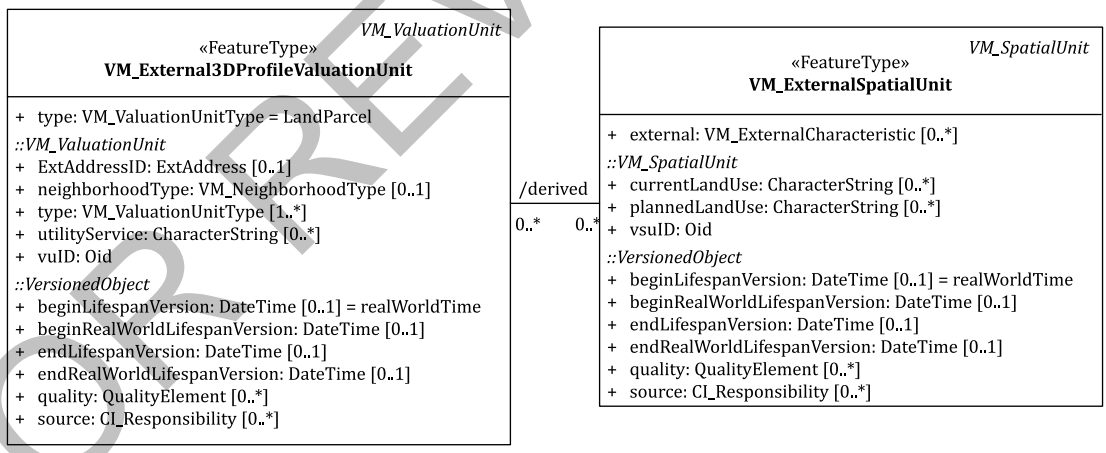

Figure B.1 — Extended spatial analysis profile for valuation information — Spatial unit

The second profile developed is for condominium units; see Figure B.2. The distance, view, noise and insolation characteristics of condominium units generally have a significant impact on values. In order to represent and record these characteristics of the condominium unit, similarly to the spatial unit profile, the VM_ExternalCharacteristic data type is used.

Similar profiles can be developed for other types of valuation units (e.g. buildings) to manage derived characteristics.

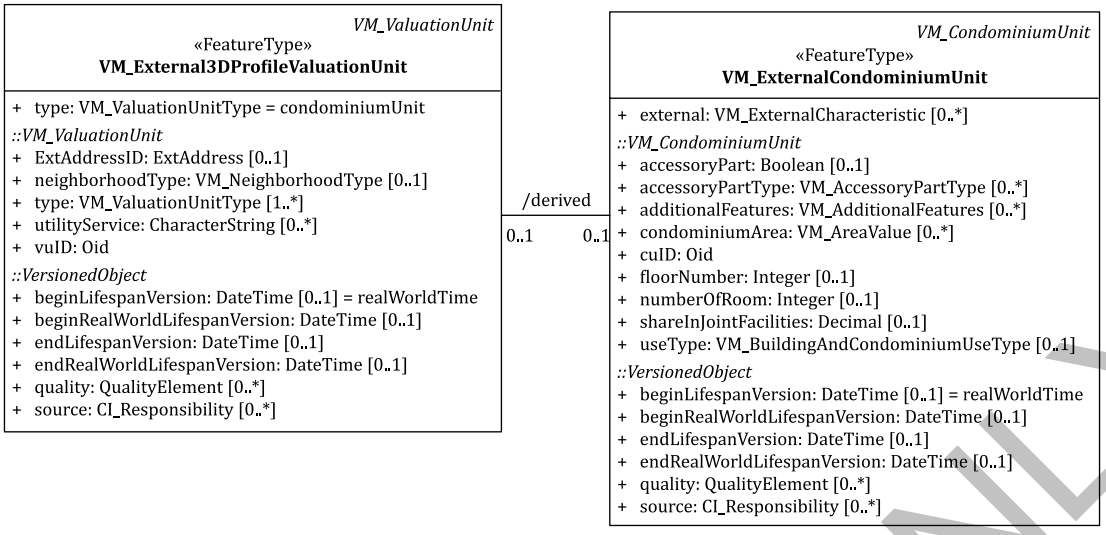

Figure B.2 — Extended spatial analysis profile for valuation information — Condominium unit

The last profile is developed for the valuation unit groups; see Figure B.3. The reason for creating such a profile is that it does not make sense to record some property characteristics at the valuation unit levels, such as environmental amenities (e.g. park, tennis court, green spaces), environmental and locational risks (e.g. flood risk, contaminations, crime rates), slope and aspect. These characteristics are meaningful for large areas, such as administrative areas (e.g. districts, municipalities, provinces) or valuation zones. Therefore, the VM_ValuationUnitGroup class is detailed with an attribute named "external", which is further detailed in the VM_ExternalGroupCharacteristics data type.

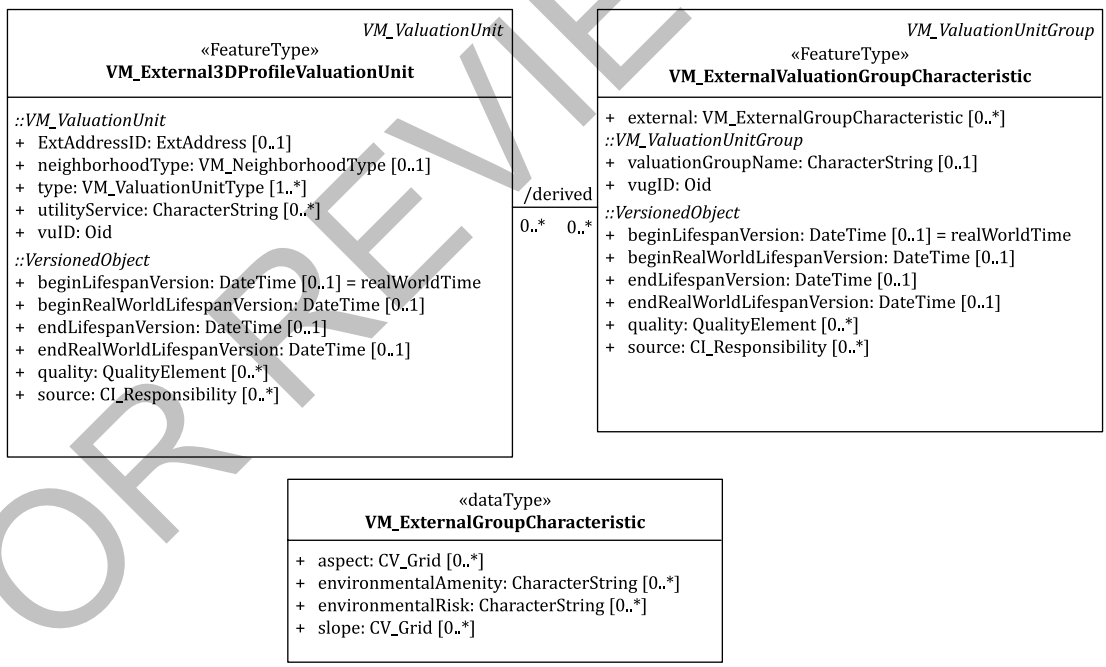

Figure B.3 — Extended spatial analysis profile for valuation information — Valuation unit group

Using the developed profiles, the results of both 2D and 3D GIS analyses of view, distance and noise can be recorded in valuation registries together with the defined input parameters and information on utilized datasets. VM_ViewCharacteristic, VM_DistanceCharacteristic and VM_NoiseCharacteristic data type classes can be used for this purpose; see Figure B.4. For example, the description characteristic in the VM_ViewCharacteristic class is included for recording information about the algorithm and utilized datasets (e.g. digital terrain model, digital surface model, lidar, production method, resolution, data quality, observer point or line) in the visibility analysis. The measured characteristic represents how the visibility of properties is

measured (e.g. viewshed, view angle, field inspection). Since there is an indefinite number of view types (e.g. water bodies, green areas, mountains) and quality types (e.g. restricted view, panoramic view, wide view), a code list is not created for typeOfView and qualityOfView characteristics. The landUsePercentageOfView characteristic represents the visible land-use area percentages of properties. Moreover, the number of characteristics is specified related to observers (i.e. observerOffset, observerElevation, and outerRadius).

The VM_DistanceCharacteristic class has four characteristics to record:

a) the typesOfDistance (e.g. pedestrian way, beeline distance, Euclidean distance, walking distance, shortest path for car navigation);

b) the distance in metres;

c) the distanceTo indicating proximity to a certain point from the property (e.g. distance to the city centre, distance to view, etc.), and

d) the description (e.g. utilized datasets and data quality).

NOTE Since an indefinite number of distances can be used in property valuation activities, a code list for the distanceTo characteristic has not been created.

The VM_NoiseCharacteristic class includes typeOfNoise (e.g. airport and highway), noiseLevel in dB, and description (e.g. utilized datasets, methodology, and data quality) characteristics concerning noise propagation analysis.

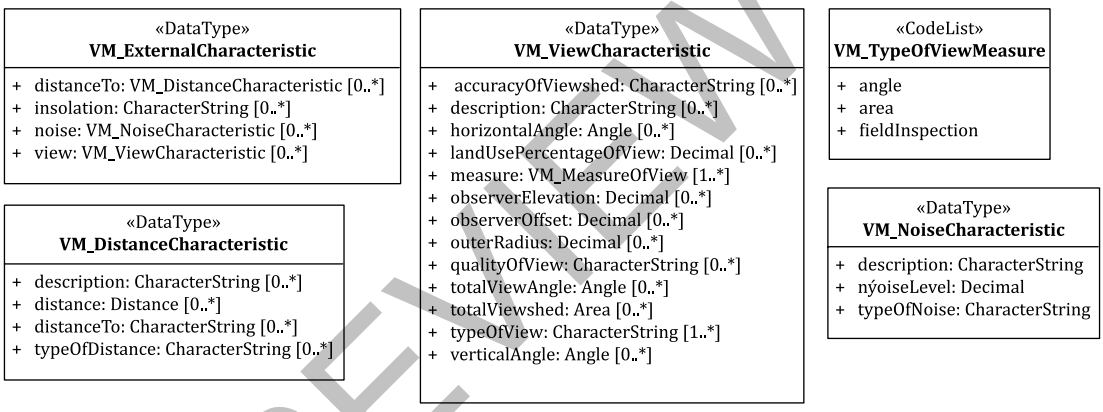

Figure B.4 — Extended spatial analysis profile for valuation information — Code lists for spatial and condominium unit

Annex C
(informative)

Instance level cases

C.1 General

This annex illustrates the flexibility and functionality of this document by showing its use in real-world cases. The content of this annex is based on ISO 19109, ISO 19110, ISO 19126 and ISO 19131.

C.2 Land parcel valuation for taxation — Turkey (Figure C.1)

This example demonstrates a public valuation conducted for determining the tax value of a land parcel for recurrent taxation. The subject of valuation is a parcel, which is a bottom land for agricultural use in this case. The area of the parcel is inherited from LA_SpatialUnit.

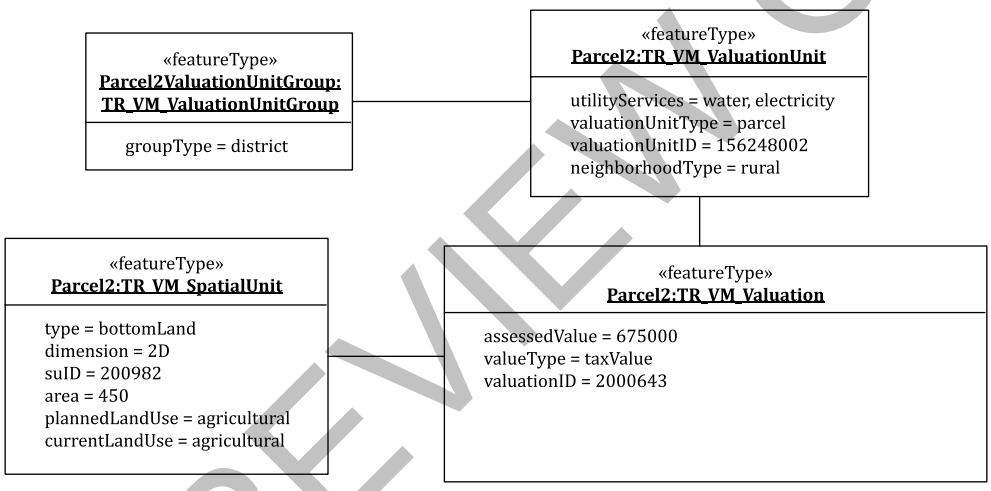

Figure C.1 — Land parcel valuation for taxation — Turkey

C.3 Condominium unit valuation for taxation — Turkey (Figure C.2)

This example demonstrates determinations of tax value of a condominium unit for recurrent taxation. The tax value of a condominium property is calculated by summing the assessed value of the land parcel and the estimated value of the condominium unit.

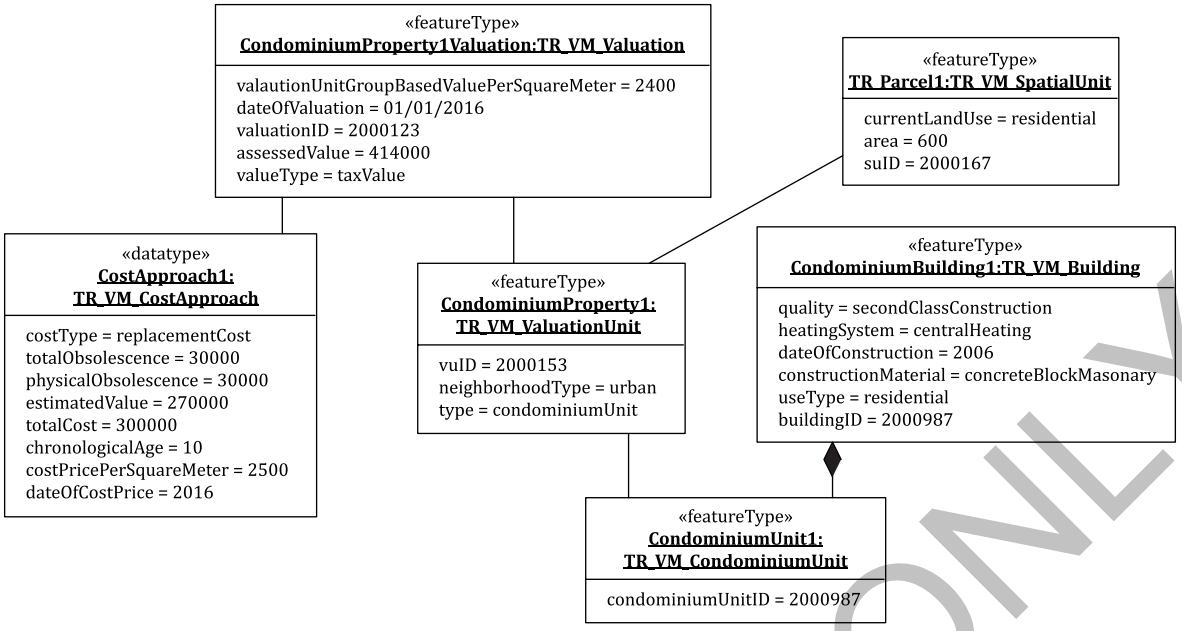

Figure C.2 — Condominium unit valuation for taxation — Turkey

C.4 Tax valuations — Spain (Figure C.3)

This example demonstrates tax valuations on condominium rights in Spain. An owner of a building unit and related common and individual parts is subject to a total tax amount computed from sub-areas under uniform fiscal categories of use.

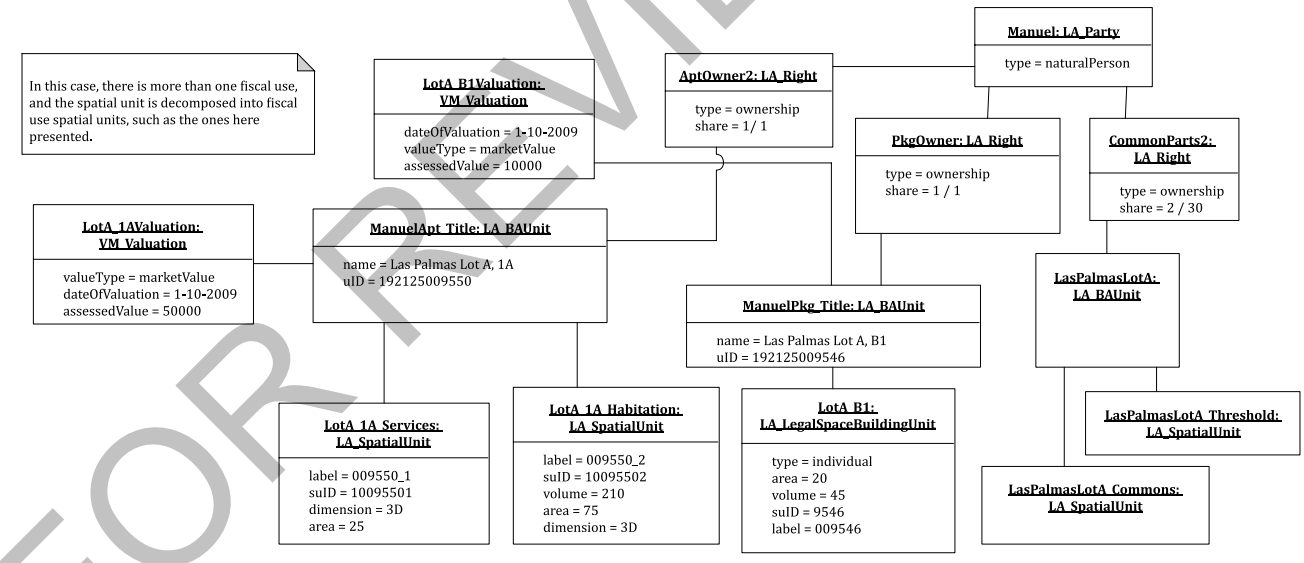

Figure C.3 — Tax valuations — Spain

Annex D
(informative)

International valuation standards, guidelines and LADM

This annex aims to list the international valuation standards and guidelines that are used when developing the valuation information package.

This document's valuation information package reuses as far as possible the terms and definitions contained in the international valuation standards published by international organizations such as the International Association of Assessing Officers (IAAO), the International Valuation Standards Council (IVSC), the Royal Institution of Chartered Surveyors (RICS), the European Group of Valuers' Associations (TEGoVA).

Several guiding references related to the value function of LA have been published in recent years. The guiding references and a brief summary of their key related points are shown in the following list. The development of this document has taken account of these international guidelines, particularly in the formulation of the requirements.

— The Land Administration Guidelines of the United Nations Economic Commission for Europe (UNECE) includes a section examining the value of land, methods whereby value can be determined, and the nature of land and property markets.[44]

— The voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT) of the Food and Agriculture Organization of the United Nations (FAO) provides a set of recommendations for the governance of the administration of the value function.[19]

— Valuing land tenure rights of FAO includes a technical guide on valuing land tenure rights in line with VGGT.[18]

— The Valuation of Unregistered Land presents a practical approach for the valuation of unregistered land.[45]

— The Fit-for-purpose land administration guiding principles of GLTN also includes some recommendations for supporting developing countries in designing their specific strategy for implementing fit-for-purpose LA.[21]

— The New Urban Agenda states that developing and using basic land inventory information, such as cadastral, valuation, and land and housing price records, is necessary for assessing changes in values (see Clause 104). It also notes the need for the use of geospatial information systems to share and exchange information, including the standardization and dissemination of timely and reliable data, including value (see Clause 156, Clause 157 and Clause 159).[43]

Annex E
(informative)

Valuation of unregistered land

E.1 Introduction

Reference [45] was prepared by the United Nations Human Settlements Programme (UN-Habitat) together with FIG, RICS, and GLTN in order to present a practical approach for the valuation of unregistered land.It is designed to aid the implementation of Reference [37], prepared by GLTN for UN-Habitat, in combination with Reference [31] of the International Valuation Standards Council (IVSC).

This annex proposes that Reference [45] can be realized through an extension of the existing Social Tenure Domain Model (STDM) model with information related to social market value and transaction price. The possible use cases for the valuation of unregistered land can include compulsory purchase and compensation (expropriation), (large scale) acquisition, insurance, city densification and extension, slum upgrading, fair resettlement and compensation, natural resources extraction, mortgage, sale, lease, inheritance, road developments and formal urban extensions, community facilities, refugee camps, cultural heritage projects, settlement of disputes where financial outcomes are one part of the agreement, land readjustment, land pooling, resettlement of people after disaster and conflict, unregistered easement, etc.

In order to implement Reference [45], the report template included in "Annex 1: Template for the Valuation of Unregistered Land Rights" is used to model a proposed extension (i.e. social market value, transaction classes) to STDM. When developing the extension, the following design rules apply.

— The extension should include both the market and the social market value. Social market values need to be taken into account, as value is a socially constructed phenomenon. Valuation systems should consider non-market values such as social, cultural, religious, spiritual and environmental values as applicable.

— Established methods of valuing registered land can be used (e.g. the direct comparison method, the capitalization of rental value tools, the hypothetical development approach, the summation method, the residual approach, the depreciated replacement cost approach, and mass valuation/appraisal) but alternative valuation methods and concepts should be further considered, such as speaking valuations, visible boundaries and the use of a value-based financial instrument with land readjustment. Further methods as proposed from the FAO technical guide on valuation methods include choice modelling, contingent, participatory approaches, citizens jury, and numeraire. All of these methods can be captured through a code list, including the methods used for registered land and the methods used to value unregistered land.

— Following the International Valuation Standards of IVSC definition of market value for the valuation of unregistered land, every valuation should be at a past or present date, namely the valuation date and the date of inspection.

— If possible and if agreed by the beneficiary, the internal and external market transactions can be recorded in the extension. Some transactions can be completed on the internal market with other community members. Some transactions are completed in the external market to developers and people moving into the community. There can be two levels of market prices. The valuation should be clear on which of these "separate markets" is being valued. To capture the information related to the transactions, a separate class from value (i.e. social market value) is needed.[38]

E.2 Summary of proposed attributes of the "social market value" class and "transaction" class

E.2.1 Social market value class

— Social Market Value (Currency): the value of a property or a property unit estimated under certain assumptions at a particular moment of time.

— Market Value (Currency): the value of a property or a property unit estimated under certain assumptions at a particular moment of time.

— ValuationMethod (Codelist): list includes valuation methods for unregistered and registered land.

— ImprovementsAndUse (CharacterString): describes the improvements and use at the spatial unit level, environmental value, social value and spiritual and religious value at the spatial unit level.

— valuationDate (DateTime): the exact date of the valuation.

— dateOfInspection (DateTime): the exact date of inspection (or data collection).

— valuationSource (URI): sources (e.g. valuation report, sale declaration document, transaction documents) used in the valuation process.

— purposeOfValuation (CharacterString): the purpose of the valuation that also specifies the types of value such as market value, social value, tax value, compensation value, etc.

E.2.2 Transaction class

— Reason (Codelist): the list includes reasons for the transaction of the unregistered land (e.g. payment of medical bills, food, education, etc.).

— TransactionPrice (Currency): the value of the transaction.

— TransactionDate (DateTime): the exact date of the transaction.

— TransactionSource (URI): sources of internal and external market transactions used in the valuation process.

E.2.3 Spatial unit class

— LandUse (Codelist): the list includes different land uses.

See Figure E.1 for the proposed STDM extension for the valuation of unregistered land. STDM is extended to include the social market value and transaction classes and their attributes. In addition, the land use attribute is proposed to be added to the existing spatial unit class of STDM.[38]

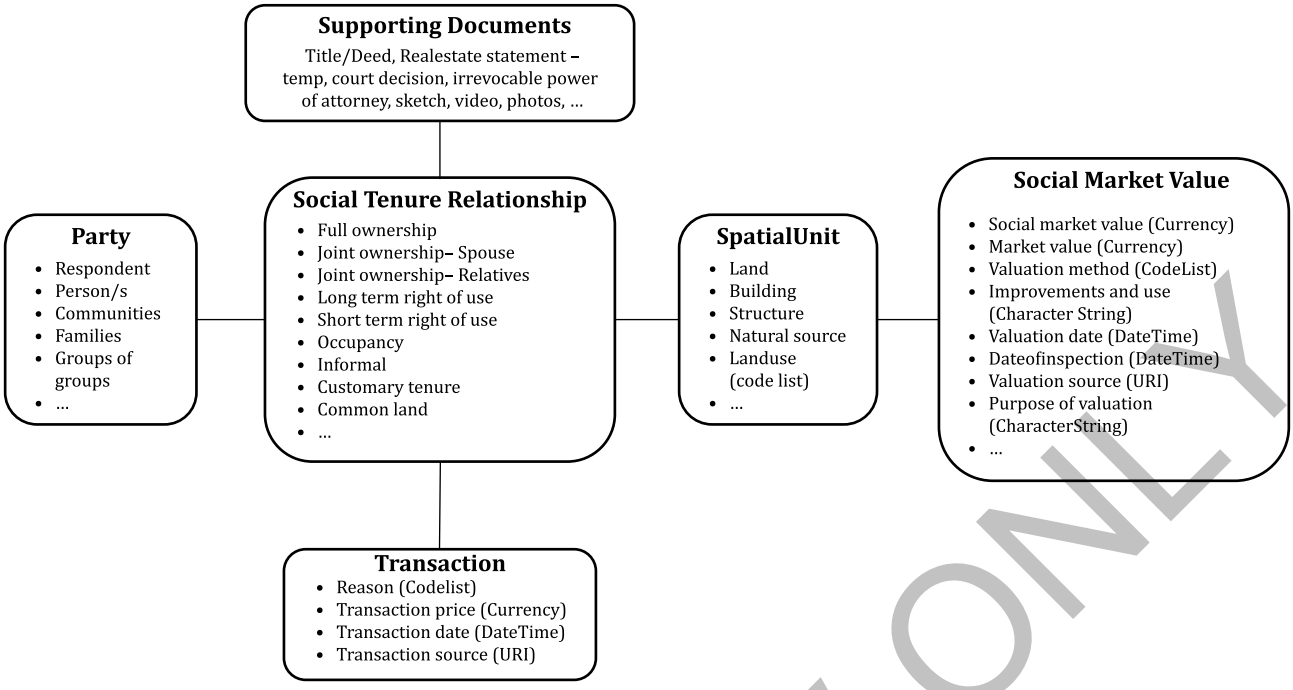

Figure E.1 — STDM valuation of unregistered land

Annex F
(informative)

Code lists

F.1 Code lists of LADM valuation information

Code lists are used to describe a more open and flexible enumeration. Code lists are useful for expressing a long list of potential values. The code lists included in the LADM valuation information package aim to allow the use of local, regional or national terminology. It can be necessary for user communities to define and manage additional values when implementing this document.

Figures F.1 and F.2 show possible examples of values for these code lists. The values in the code lists are mostly derived from the questionnaire conducted for this purpose[48] and the immovable property valuation thesaurus (IPVT).[16]

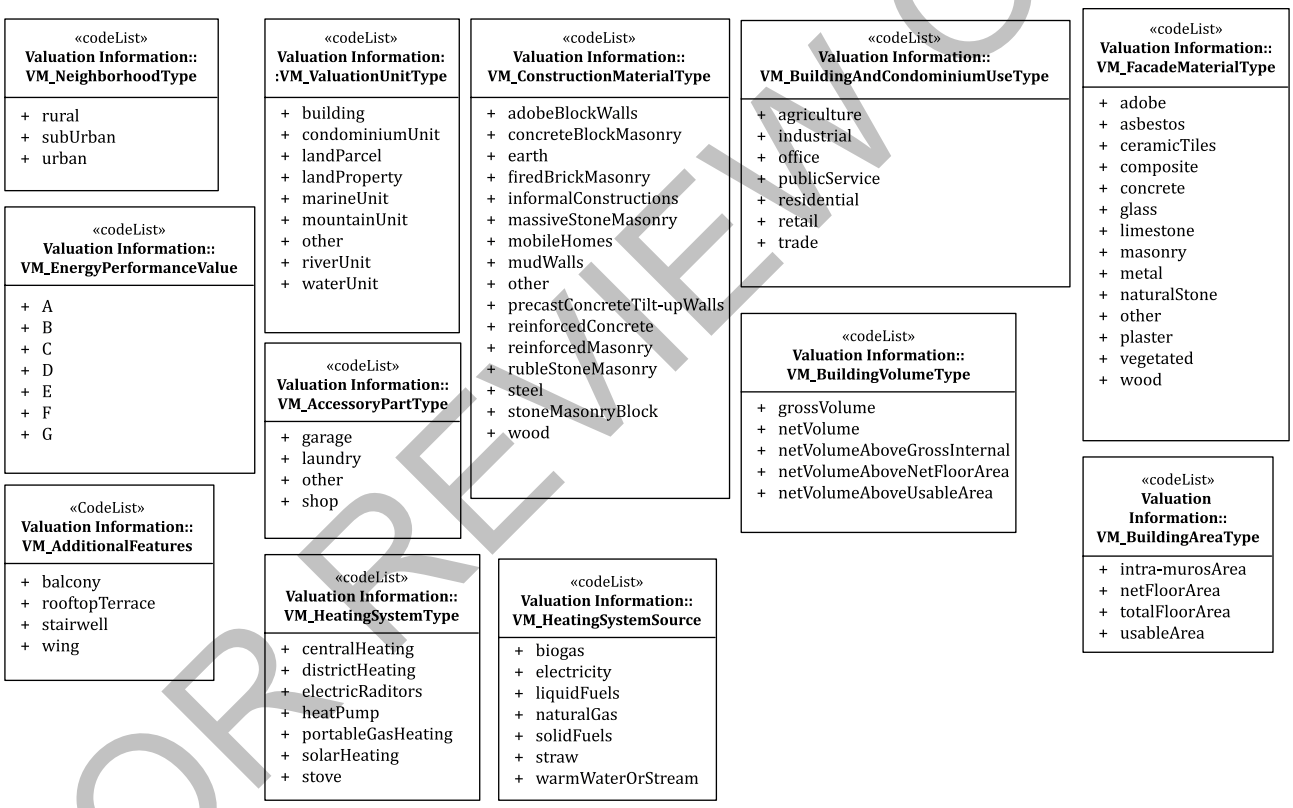

Figure F.1 — Code lists for the spatial part of the valuation information model

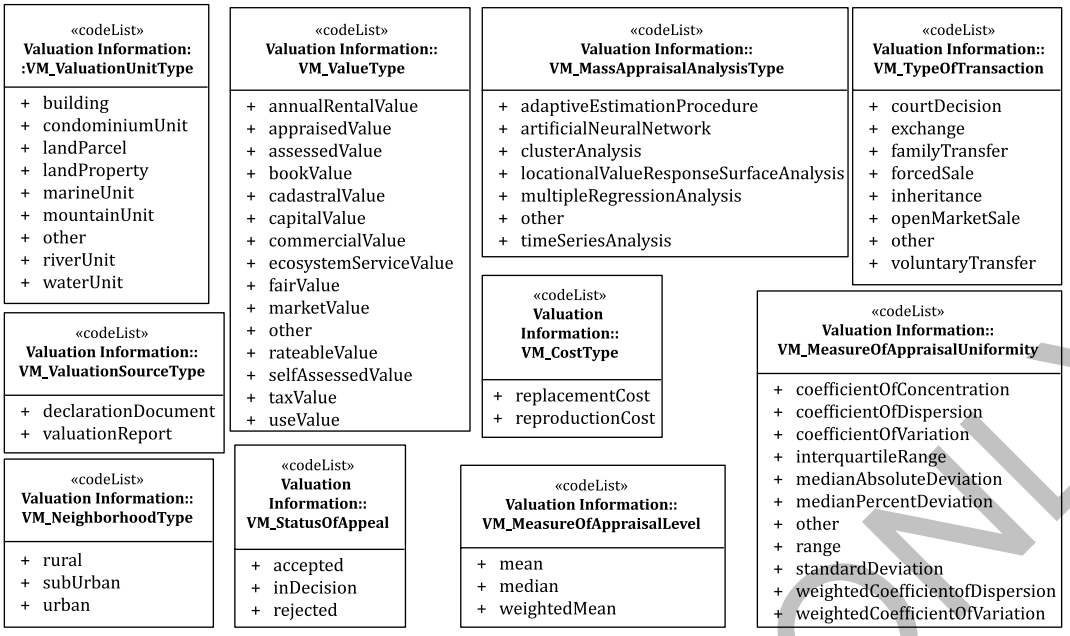

Figure F.2 — Code lists for the valuation part of the valuation information model

F.2 Description for code list values

Table F.1 presents the code list value-related information of the LADM valuation information package.

Table F.1 — The code list value-related information of the LADM valuation information package

Code List Name	Value	Description	Source of description
VM_AccessoryPartType (from VM_CondominiumUnit)	laundry	A laundry attached to one or more ownership units.	
	garage	A garage attached to one or more ownership units.	
	shop	A shop attached to one or more ownership units.	
	other	Other type of accessory part	
VM_BuildingAndCondominiumUseType (from VM_Building and VM_CondominiumUnit)	industrial	The real-world object is used for secondary sector activities (industrial).	Reference [28]
	office	The real-world object hosts offices.	Reference [28]
	trade	The real-world object hosts trade activities. EXAMPLE Shops, supermarkets, hotels, restaurants.	Reference [28]
	publicService	The real-world object hosts public services. Public services are tertiary services provided for the benefit of the citizens. Public services are often ruled by public governments or on behalf of them. EXAMPLE Schools, hospitals, governmental buildings, prisons, rescue stations, transport station. NOTE In case of a building hosting both offices and public services (e.g. a city hall), the building is preferably classified as public service.	Reference [28]
	retail	The real-world object is used for retail activities.	
	agriculture	The real-world object is used for agricultural activities.	Reference [28]
	residential	The real-world object is used for residential purpose.	Reference [28]

Table F.1 *(continued)*

Code List Name	Value	Description	Source of description
VM_BuildingAreaType (from VM_AreaValue)	netFloorArea	The area between (within) the enclosing elements.	ISO 9836
	usableArea	The usable area is that part of the net floor which corresponds to the purpose and use of the building.	ISO 9836
	intra-murosArea	The total floor area less the floor area taken up by the external walls (floor area of the building envelope).	ISO 9836
	totalFloorArea	The total area of all floor levels. Floor levels can be storeys which are either completely or partially under the ground, storeys above ground, attics, terraces, roof terraces, service floors or storage floors.	ISO 9836
VM_BuildingVolumeType (from VM_VolumeValue)	netVolumeAboveUsableArea	The product of the usable area and the height between the surface of the floor and the underside of the ceiling.	ISO 9836
	netVolumeAboveNetFloorArea	The net volume of a building obtained from the inner limiting faces.	ISO 9836
	grossVolume	The gross volume of a building obtained from the outer limiting faces.	ISO 9836
	netVolumeAboveGrossInternal	The net volume above the intra-muros area, which is the product of the intra-muros area and the height between the surface of the floor and the underside of the ceiling.	ISO 9836
	netVolume	The net volume of a building obtained from the inner limiting faces. The net volume is the product of the net floor area and the height between the surface of the floor and the underside of the ceiling.	ISO 9836
VM_ConstructionMaterialType (from VM_Building)	concreteBlockMasonry	Unreinforced concrete block masonry, with lime/cement mortar.	Reference [28]
	earth	Rammed earth or pneumatically impacted stabilized earth. Rammed earth construction is conducted by erecting wooden or metal forms for the walls and filling them with a moist cement stabilized earth mix which is compacted by pounding with hand tools (with conical or flat heads) or with a mechanical compactor. Metal rebar is often added to further increase ductility.	Reference [28]
	firedBrickMasonry	Unreinforced fired brick masonry. Buildings of this type have perimeter walls and possibly some interior walls, constructed of unreinforced fired brick blocks.	Reference [28]
	informalConstructions	Parts of slums/squatters. Informal constructions are non-engineered and are built by self-builders without any professional input (i.e. neither during the design phase, nor the construction phase).	Reference [28]
	massiveStoneMasonry	Massive stone masonry with lime/cement mortar.	Reference [28]
	mobileHomes	A structure designed or adapted for human habitation which is capable of being moved from one place to another (whether by being towed, or by being transported on a motor vehicle or trailer) and any motor vehicle so designed or adapted.	Reference [28]
	mudWalls	Walls made of stacked earth or poured earth. Stacked earth consists of forming balls of plastic soil, which are freshly stacked on each other. Poured earth walls are erected between formwork using a sandy material with coarse to fine granular particles. The ultimate finish can be natural, from the formwork, or sand-blasted.	Reference [28]
	precastConcreteTilt-upWalls	Precast wall panel construction.	Reference [28]
	reinforcedConcrete	Load resisting system made of reinforced concrete, i.e. a combination of steel reinforcement bars embedded in concrete that act together in resisting forces	Reference [28]
	reinforcedMasonry	Buildings with exterior walls consisting of grouted (with concrete) masonry (clay brick or concrete block masonry) with internal reinforcing steel rods.	Reference [28]
	rubbleStoneMasonry	Rubble stone is field stone; a masonry technique that incorporates any material found or recovered, such as dressed blocks, broken fragments, brick or flint.	Reference [28]

Table F.1 *(continued)*

Code List Name	Value	Description	Source of description
	steel	The load resisting system of the building is made of structural steel, which can be made composite with reinforced concrete at floor slabs.	Reference [28]
	stoneMasonryBlock	Consist of masonry buildings constructed with stone blocks cut from igneous, metamorphic or sedimentary rocks. This type of building is generally unreinforced and can be joined with lime/cement mortar.	Reference [28]
	wood	Load resisting system of the building made of wood, timber or lumber.	Reference [28]
	adobeBlockWalls	Also known as moulded earth; a building technique that involves the use of clay bricks (adobe) formed in moulds and (traditionally) dried in the sun.	Reference [28]
	other	Other types of material.	
VM_CostType (from VM_CostApproach)	reproductionCost	The current cost of creating a replica of the asset.	Reference [31]
	replacementCost	The cost to replace the damaged property with materials of like kind and quality, without any deduction for depreciation.	Reference [41]
VM_EnergyPerformanceValue (from VM_Building)	A	First class according to the energy performance of the building (i.e. the most efficient buildings for energy performance).	Reference [28]
	B	Second class according to the energy performance of the building.	Reference [28]
	C	Third class according to the energy performance of the building.	Reference [28]
	D	Fourth class according to the energy performance of the building.	Reference [28]
	E	Fifth class according to the energy performance of the building.	Reference [28]
	F	Sixth class according to the energy performance of the building.	Reference [28]
	G	Seventh and last class according to the energy performance of the building (i.e. the least efficient buildings for energy performance).	Reference [28]
VM_FacadeMaterialType (from VM_Building)	asbestos	Façade constructed out of asbestos.	Reference [28]
	ceramicTiles	Ceramic tiles of different colours and design are used for covering the façade of the building.	Reference [28]
	composite	Composite material, such as plastics, PVC and fibreglass are used to cover the façade of the building.	Reference [28]
	concrete	The surface of the façade is constructed out of reinforced concrete (with bars or fibres-other than asbestos).	Reference [28]
	glass	Known as structural glass, used for glazing the façade of buildings through the use of curtain wall systems, frameless glazing systems, polycarbonate sheeting or architectural flat glass.	Reference [28]
	limestone	The façade of the building is composed of limestone, a sedimentary rock composed largely of calcite and/or aragonite.	Reference [28]
	masonry	The façade consists of individual units made of fired clay brick or concrete block laid in and bound together by mortar.	Reference [28]
	metal	The surface of the building is covered with metal in the form of galvanized steel with paint, aluminium with paint, stainless steel, zinc, lead or copper.	Reference [28]
	naturalStone	The façade is covered with natural stone, such as granite or marble, and can come in different colours and finishing.	Reference [28]
	vegetated	The façade is covered with vegetation and a growing medium, planted over a waterproofing membrane.	Reference [28]
	wood	The façade of the building is covered with wood, timber or lumber.	Reference [28]
	other	Other type of facade material.	

Table F.1 *(continued)*

Code List Name	Value	Description	Source of description
	plaster	The façade material is plaster.	
	adobe	Use of a particular type of masonry for the façade, that involves the use of clay bricks (adobe) formed in moulds and (traditionally) dried in the sun.	
VM_HeatingSystemSource (from VM_Building)	biogas	The heating source is biogas.	Reference [28]
	electricity	The heating source is electricity distributed from a power plant.	Reference [28]
	liquidFuels	The heating source is solid fuel. Solid fuels include wood, charcoal, peat, coal, tablets and pellets made from wood.	Reference [28]
	naturalGas	The heating source is fossil gas distributed by pipeline.	Reference [28]
	solidFuels	The heating source is solid fuel. Solid fuels include wood, charcoal, peat, coal, tablets and pellets made from wood.	Reference [28]
	straw	The heating source is solid biofuels from straw and agricultural waste.	Reference [28]
	warmWaterOrStream	The heating source used by the building or building unit is hot water or stream.	Reference [28]
VM_AdditionalFeatures (from VM_Building)	balcony	Platform that is built on the upstairs outside wall of a building, with a wall or rail around it. Access to the balcony is provided from an upstairs room.	Reference [50]
	stairwell	The space in a building in which the stairs are built.	Reference [50]
	wing	Part of a large building that sticks out from the main part, e.g. the east wing.	Reference [50]
	rooftopTerrace	An outdoor space which lies on the roof of a building.	
VM_HeatingSystemType (from VM_Building)	centralHeating	Central heating system performed at building or at building unit level.	Reference [28]
	districtHeating	Central heating system, based on district heating.	Reference [28]
	electricRaditors	Heating is performed by electric radiators.	Reference [28]
	heatPump	The heating is performed by a heat pump that transfers thermal energy from an air source or geothermal source.	Reference [28]
	portableGasHeating	Heating is performed by a portable device using liquefied petroleum gas.	Reference [28]
	solarHeating	The heating is performed by a Solar collector heating the air or liquid based heating system.	Reference [28]
	stove	Heating is performed by a stove.	Reference [28]
VM_MassAppraisalAnalysisType (from VM_MassAppraisal)	adaptiveEstimationProcedure	A computerized, iterative, self-referential procedure using proper ties for which sales prices are known to produce a model that can be used to value properties for which sales prices are not known.	Reference [24]
	timeSeriesAnalysis	A family of techniques that can be used to measure the cyclical movements, random variations, seasonal variations, and secular trends observed over a period of time.	Reference [23]
	clusterAnalysis	A statistical technique for grouping cases (for example, properties) based on specified variables such as size, age, and construction quality. The objective of cluster analysis is to generate groupings that are internally homogeneous and highly different from one another.	Reference [23]
	locationalValueResponseSurfaceAnalysis	A mass appraisal technique that involves creating value influence centres, computing variables to represent distances (or transformations thereof) from such points and using the variables in a multiple regression or other model to capture location influences. Implementation of the technique is enhanced by the use of a geographic information system. Some geographic information systems permit the value influence centres to be displayed and measured as a three- dimensional grid surface, the results of which can be likewise used in calibration techniques to arrive at the contribution of location based on the model specification.	Reference [23]

Table F.1 *(continued)*

Code List Name	Value	Description	Source of description
	artificialNeuralNetwork	A collection of mathematical models that emulate some of the observed properties of biological nervous systems and draw on the analogies of adaptive biological learning. An artificial neural network has several key elements: input, processing (calibration), and output. Other names associated with neural networks include connectionism, parallel distributed processing, neuro-computing, natural intelligent systems, and machine learning algorithms.	Reference [23]
	multipleRegressionAnalysis	A particular statistical technique, similar to correlation, used to analyze data in order to predict the value of one variable (the dependent variable), such as market value, from the known values of other variables (called "independent variables"), such as lot size, number of rooms, etc. If only one independent variable is used, the procedure is called simple regression analysis and differs from correlation analysis only in that correlation measures the strength of the relationship, whereas regression predicts the value of one variable from the value of the other. When two or more variables are used, the procedure is called multiple regression analysis.	Reference [24]
	other	Other type of mass appraisal analysis.	
VM_MeasureOfAppraisalLevel (from VM_MassAppraisalPerformance)	mean	A measure of central tendency. The result of adding all the values of a variable and dividing by the number of values.	Reference [24]
	median	A measure of central tendency. The value of the middle item in an uneven number of items arranged or arrayed according to size; the arithmetic average of the two central items in an even number of items similarly arranged; a positional average that is not affected by the size of extreme values.	Reference [24]
	weightedMean	Sum of the appraised values divided by the sum of the sale prices (or independent estimates of market value), which weights each ratio in proportion to the sale price (or independent estimate of market value).	Reference [24]
VM_MeasureOfAppraisalUniformity (from VM_MassAppraisalPerformance)	coefficientOfConcentration	The percentage of observations falling within a specified percentage (e.g. 15 %) of a measure of central tendency.	Reference [24]
	coefficientOfDispersion	COD – the average deviation of a group of numbers from the median expressed as a percentage of the median. In ratio studies, the average percentage deviation from the median ratio.	Reference [24]
	coefficientOfVariation	COV – a standard statistical measure of the relative dispersion of the sample data about the mean of the data; the standard deviation expressed as a percentage of the mean.	Reference [24]
	interquartileRange	The result obtained by subtracting the first quartile from the third quartile. By definition, 50 % of the observations fall within the interquartile range.	Reference [24]
	medianAbsoluteDeviation	The median of the absolute deviations from the median. In a symmetrical distribution, the measure approximates one half of the interquartile range.	Reference [24]
	medianPercentDeviation	The median of the absolute percent deviations from the median; calculated by dividing the median absolute deviation by one-hundredth of the median.	Reference [24]
	range	The maximum value of a sample, minus the minimum value.	Reference [24]
	standardDeviation	The statistic calculated from a set of numbers by subtracting the mean from each value and squaring the remainders, adding together all the squares, dividing by the size of the sample less one, and taking the square root of the result. When the data are normally distributed, the percentage of observations can be calculated within any number of standard deviations of the mean from normal probability tables.	Reference [24]
	weightedCoefficientofDispersion	The coefficient of dispersion when the absolute differences between individual assessment ratios and the measure of central tendency (for example, median ratio) are weighted on the basis of sale price.	Reference [24]

Table F.1 *(continued)*

Code List Name	Value	Description	Source of description
	weightedCoefficientOfVariation	The coefficient of variation when the squared differences between individual assessment ratios and the arithmetic mean ratio are weighted on the basis of sale price.	Reference [24]
	other	Other type of appraisal uniformity.	
VM_NeighborhoodType (from VM_ValuationUnit)	urban	Connected with a town or city.	Reference [50]
	rural	Connected with or like the countryside.	Reference [50]
	subUrban	In or connected with a suburb.	Reference [50]
VM_StatusOfAppeal (from VM_Valuation)	accepted	Appeal is accepted and value will be re-estimated.	
	rejected	Appeal is rejected.	
	inDecision	Appeal is in decision.	
VM_TypeOfTransaction (from VM_TransactionPrice)	inheritance	The transaction reason is inheritance.	
	forcedSale	The transaction reason is forced sale.	
	familyTransfer	The transaction is completed between family members.	
	voluntaryTransfer	The transaction is voluntary.	
	exchange	The transaction reason is exchange.	
	courtDecision	The transaction reason is court decision.	
	openMarketSale	The transaction is completed through open market sale.	
	other	Other.	
VM_ValuationSourceType (from VM_ValuationSource)	declarationDocument	Declaration document related to a sale, rental agreement, etc. that can be used as source in valuation processes.	
	valuationReport	A document detailing the scope, key assumptions, valuation methods and conclusions of an assignment, providing a professional opinion of value supported by a recognized basis or bases of valuation.	Reference [41]
VM_ValuationUnitType (from VM_ValuationUnit)	landProperty	Land parcel(s) with/without building(s) together as land property is the identified as the basic unit of valuation.	
	condominiumUnit	Condominium unit consisting of building part(s) (e.g. condominium main part, condominium accessory part, joint access facility) and a share in land parcel(s). A CondominiumUnit is a concurrent ownership of real property that has been divided into private and common portions. The privately owned part is made up of clearly demarcated parts of a building (BuildingPart), as specified by a CondominiumScheme. CondominiumUnit owners are members of a mandatory owners' association. Moreover, each CondominiumUnit has a share in the common parts of the property which are also clearly demarcated.	Reference [13]
	building	The basic unit of valuation is only building.	
	landParcel	The basic unit of valuation is only parcel (spatial unit, VM_SpatialUnit). A LandParcel is a part of the surface of the Earth. To specify ownership, LandParcel is a type of LandPropertyUnit. A LandParcel can have different states, among others to accommodate the situation where the LandParcel is an accessory part of condominium ownership. The shape and location of a LandParcel is specified by a single SpatialUnit.	Reference [13]
	mountainUnit	Mountain unit required for natural resource asset management practices.	
	marineUnit	Marine unit required for natural resource asset management practices.	
	waterUnit	Water unit required for natural resource asset management practices.	
	riverUnit	River unit required for natural resource asset management practices.	
	other	Other type of valuation unit.	

Table F.1 *(continued)*

Code List Name	Value	Description	Source of description
VM_ValueType (from VM_Valuation)	assessedValue	A value set on real estate and personal property by a government as a basis for levying taxes.	Reference [24]
	annualRentalValue	Annual rental value.	
	marketValue	The estimated amount for which the property may exchanged on the valuation date between a willing buyer and a willing seller in an arm's-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently and without being under compulsion.	Reference [41]
	useValue	1) The value of property in a specific use. 2) Property entirely used for a specific purpose or use that can entitle the property to be assessed at a different level than others in the jurisdiction. Examples of properties that can be assessed at use value under the statutes include agricultural land, timberland and historical sites.	Reference [24]
	taxValue	The value specifically determined for taxation of properties in some countries, such as South Korea and Turkey.	References [48] and [33]
	appraisedValue	The estimate of the value of a property before application of any fractional assessment ratio, partial exemption, or other adjustments.	Reference [24]
	fairValue	The price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between identified willing market participants possessing full knowledge of all the relevant facts, making their decision in accordance with their respective objectives.	Reference [41]
	bookValue	Book value is a type of value used in property taxation for commercial purposes in some countries, such as Poland.	References [48] and [33]
	cadastralValue	Cadastral value is a type of value used in property taxation in some countries, such as Spain.	References [48] and [33]
	capitalValue	Capital value is a type of value used in property taxation in some countries, such as India.	References [48] and [33]
	rateableValue	Rateable value is a type of value used in property taxation for non-domestic hereditaments in some countries, such as the United Kingdom.	References [48] and [33]
	commercialValue	Commercial value is a type of value used in property taxation for commercial properties in some countries, such as Costa Rica.	References [48] and [33]
	selfAssessedValue	Self-assessed value is a type of value used in property taxation in some countries, such as Bolivia.	References [48] and [33]
	ecosystemServiceValue	A value used to represent the ecological benefits of land resources (especially natural resources). This value is used as an important value index to measure the performance of land management activities in many countries.	
	other	Other type of value.	

Annex G
(informative)

Country profiles

This annex highlights six country profiles of the LADM valuation information. In addition to the country profiles presented here, China[46] and Croatia[42] have also developed country profiles for LADM_VM.

Figure G.1 presents the Cyprus country profile of the LADM valuation information package developed in Reference [17].

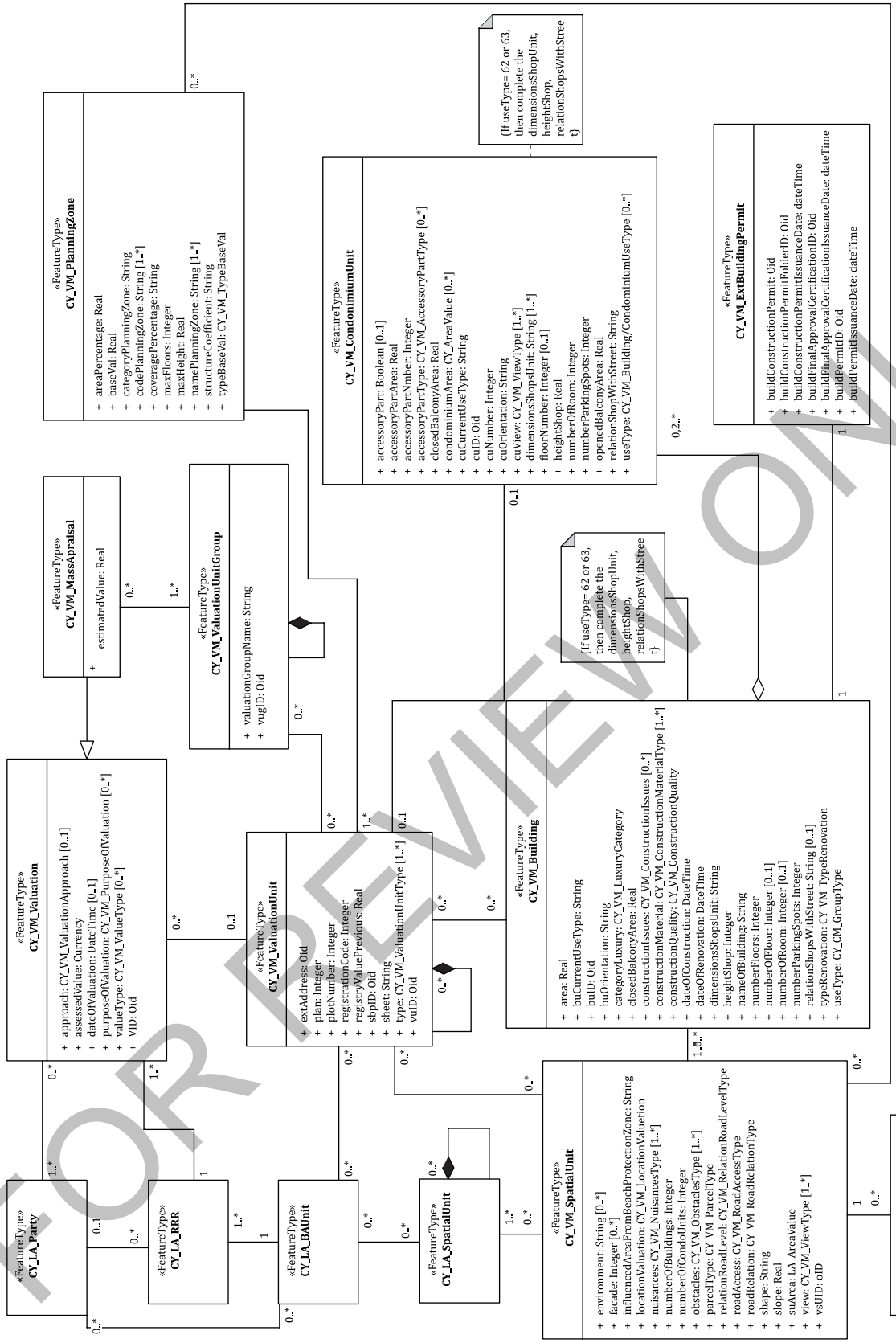

Figure G.1 — LADM_VM country profile for Cyprus

Figure G.2 presents the Mongolia country profile of the LADM valuation information package developed in Reference [14].

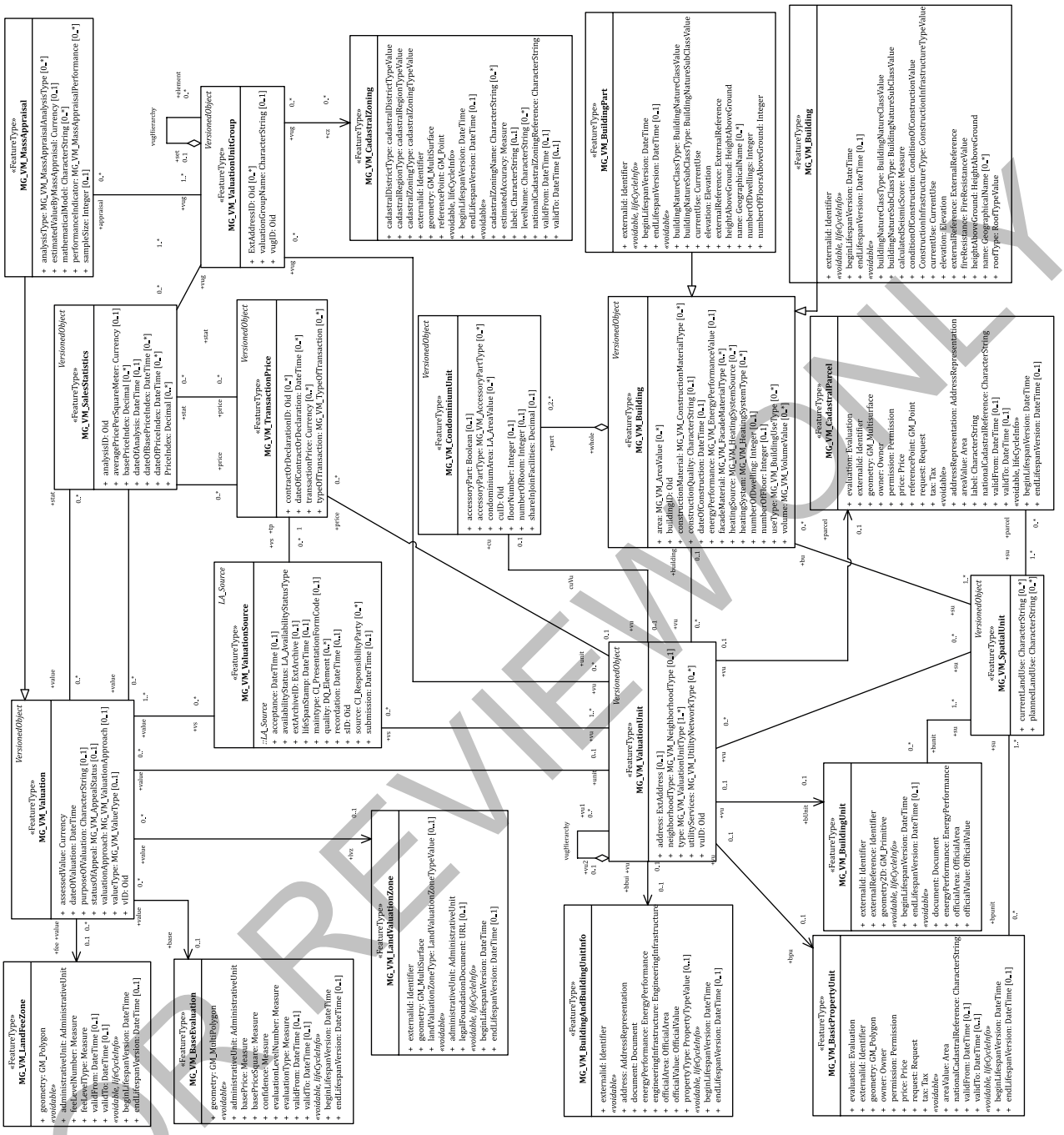

Figure G.2 — LADM_VM country profile for Mongolia

Figure G.3 presents the Montenegro country profile of the LADM valuation information package developed in Reference [39].

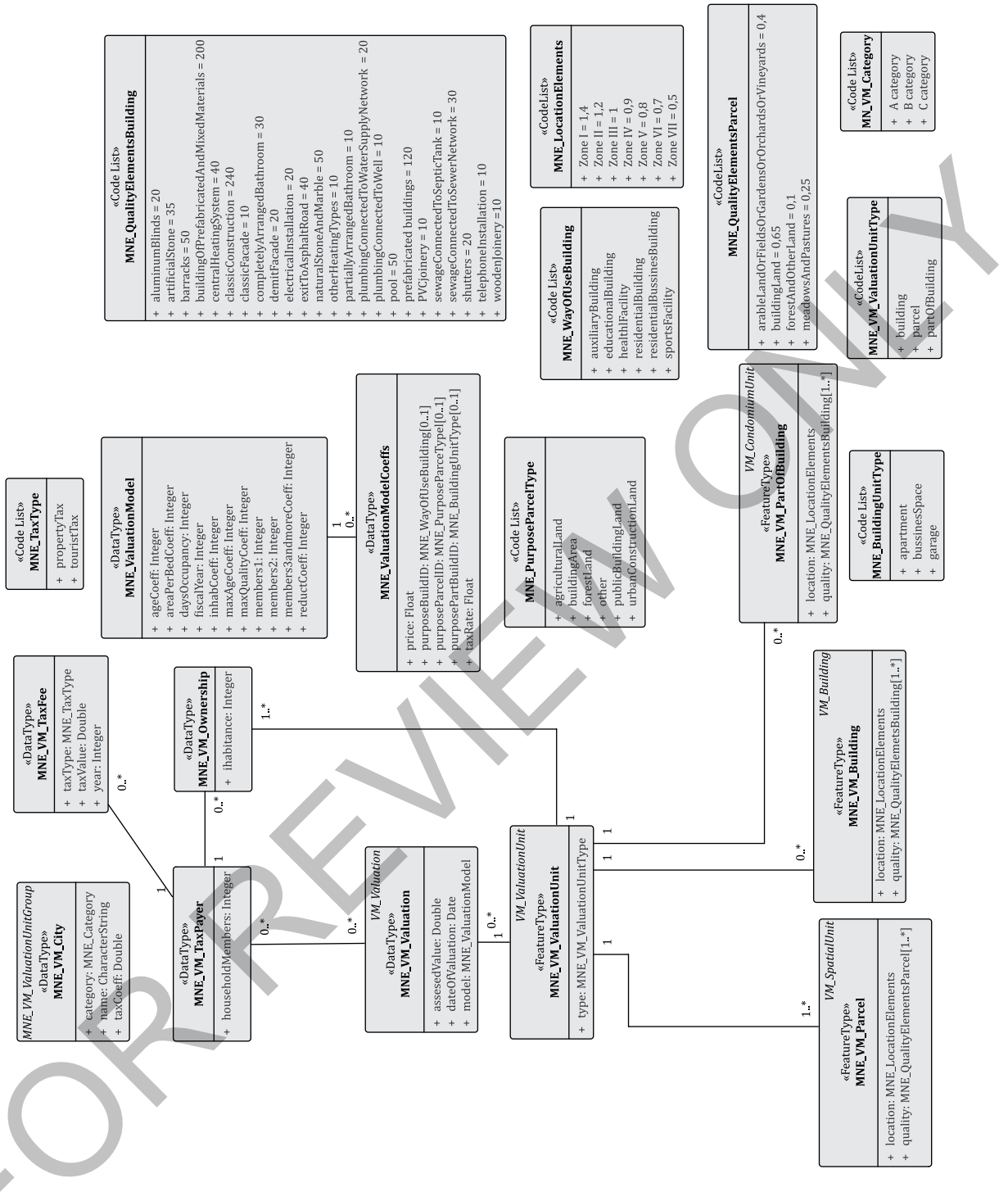

Figure G.3 — LADM_VM country profile for Montenegro

Figure G.4 presents the Serbia country profile of the LADM valuation information package developed in Reference [40].

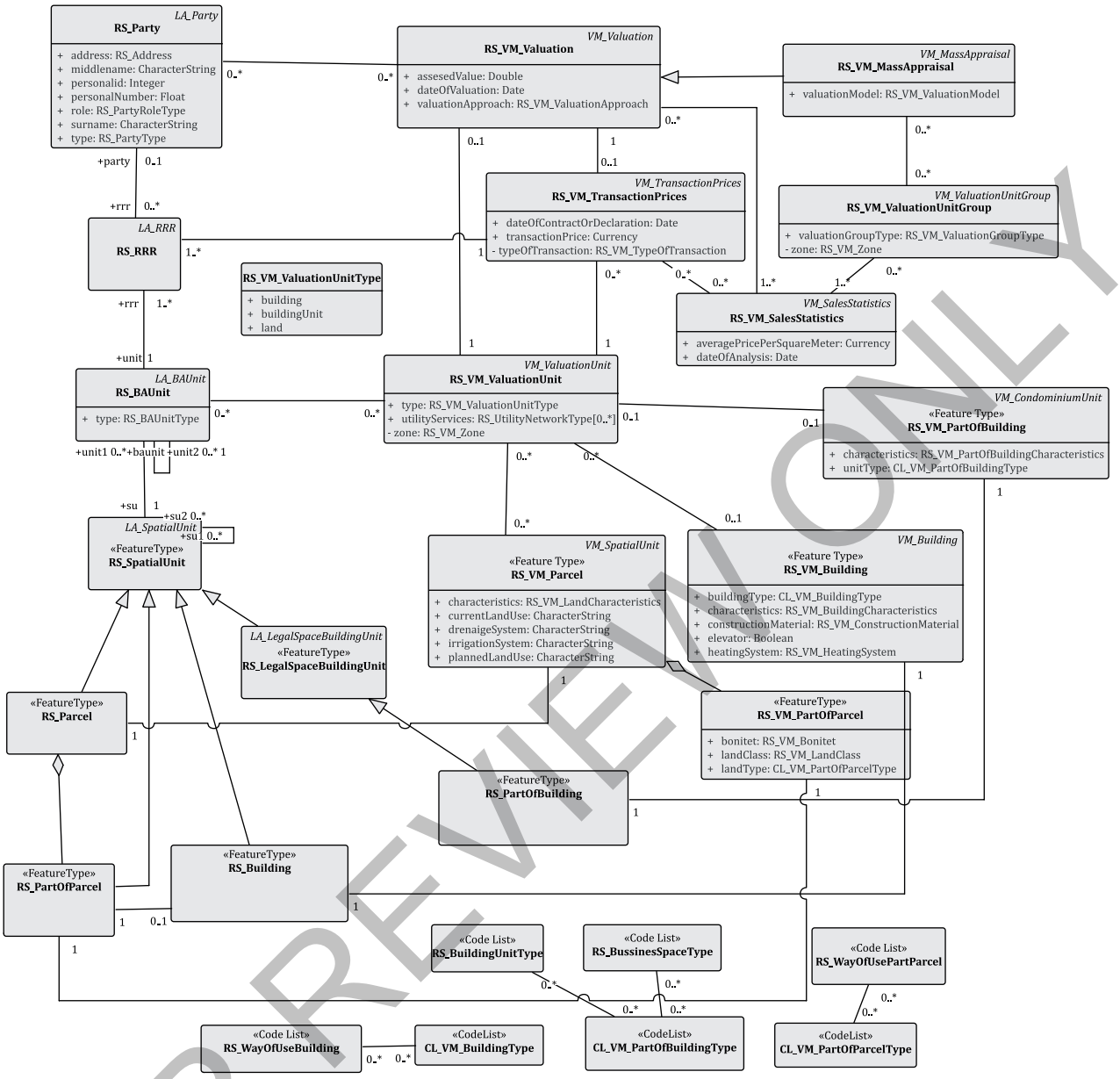

Figure G.4 — LADM_VM country profile for Serbia

Figure G.5 presents the Turkey country profile of the LADM valuation information package developed in Reference [35].

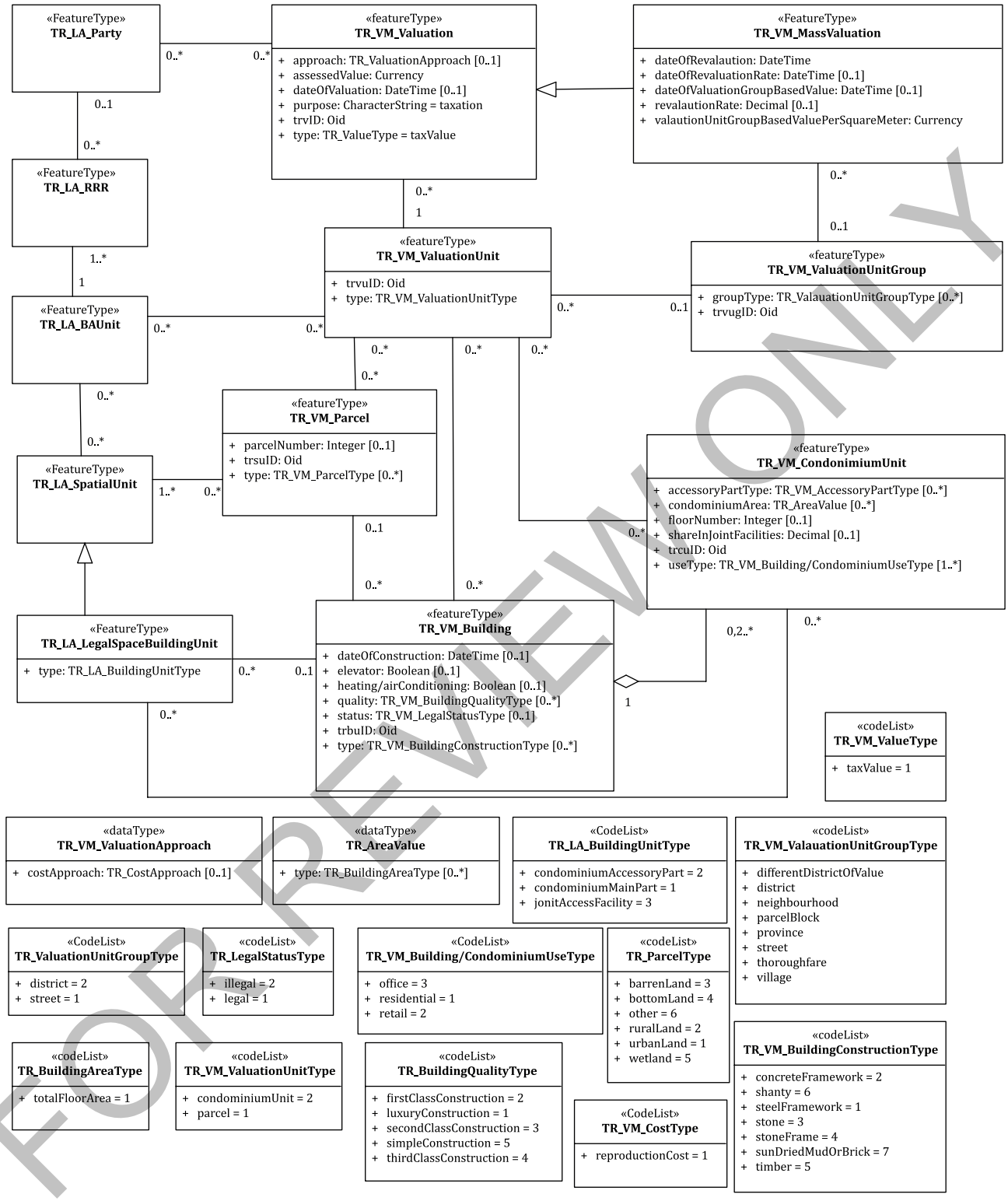

Figure G.5 — LADM_VM country profile for Turkey

Figure G.6 presents the Netherlands country profile of the LADM valuation information package developed in Reference [32].

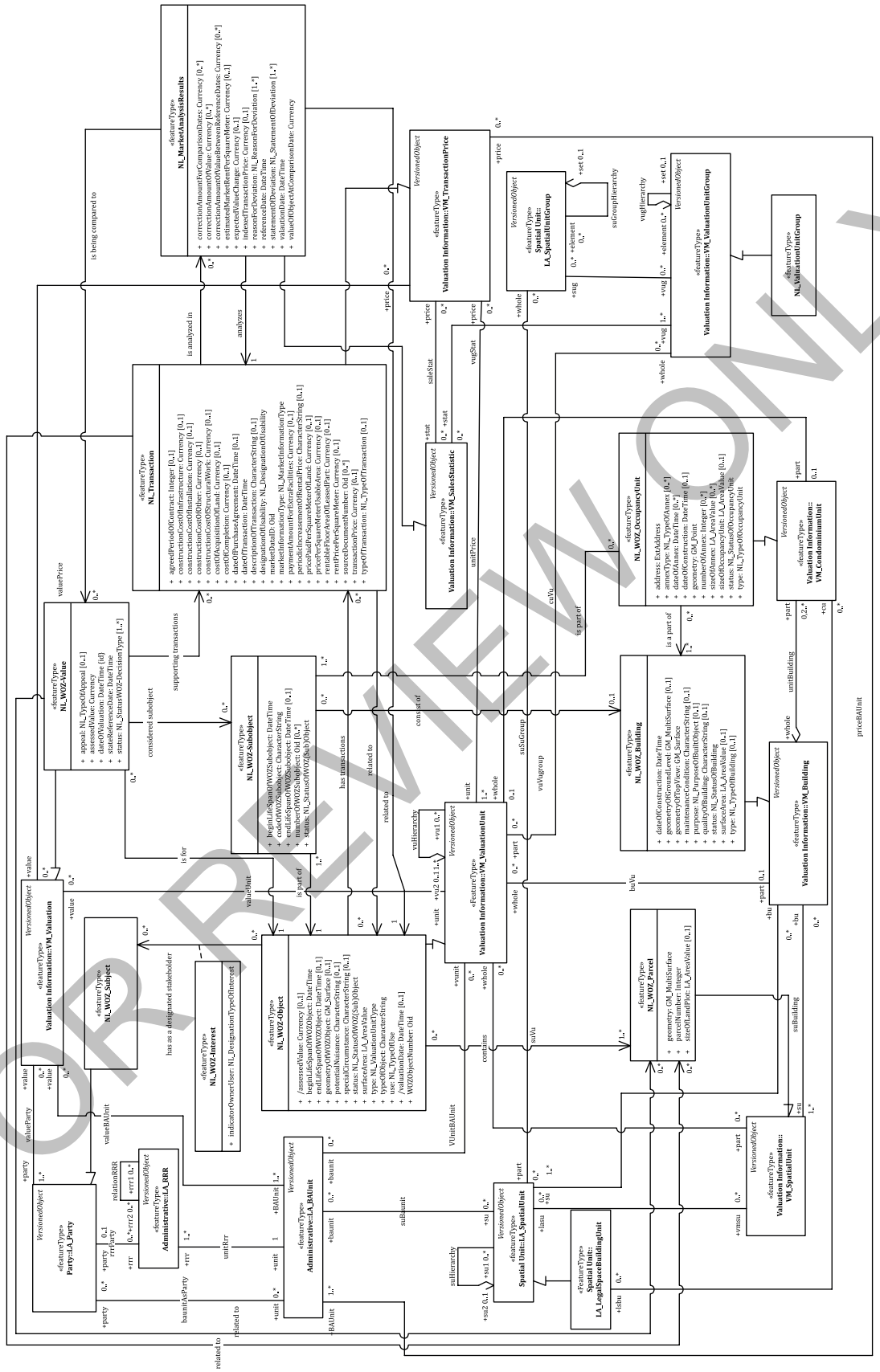

Figure G.6 — LADM_VM country profile for the Netherlands

Annex H
(informative)

International property measurement standards and LADM valuation information package

The size of a building's floor area and volume are crucial to the valuation process as they can dramatically affect value. The terms and definitions for building floor area and volume used in this document are adapted from ISO 9836[1)]; see VM_BuildingAreaType and VM_BuildingVolumeType code lists.

In implementing this document, the terms and definitions relating to building floor area sizes as set out in Reference [12] may be used interchangeably. The total floor area defined in ISO 9836 can be quite similar to the “IPMS 1” area defined in Reference [12]. In addition, the intra-muros area defined in ISO 9836 can be quite similar to the “IPMS 2” area defined in Reference [12].

1) Withdrawn.

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