A standards-based portal for integrated land administration information

A case study of the Netherlands

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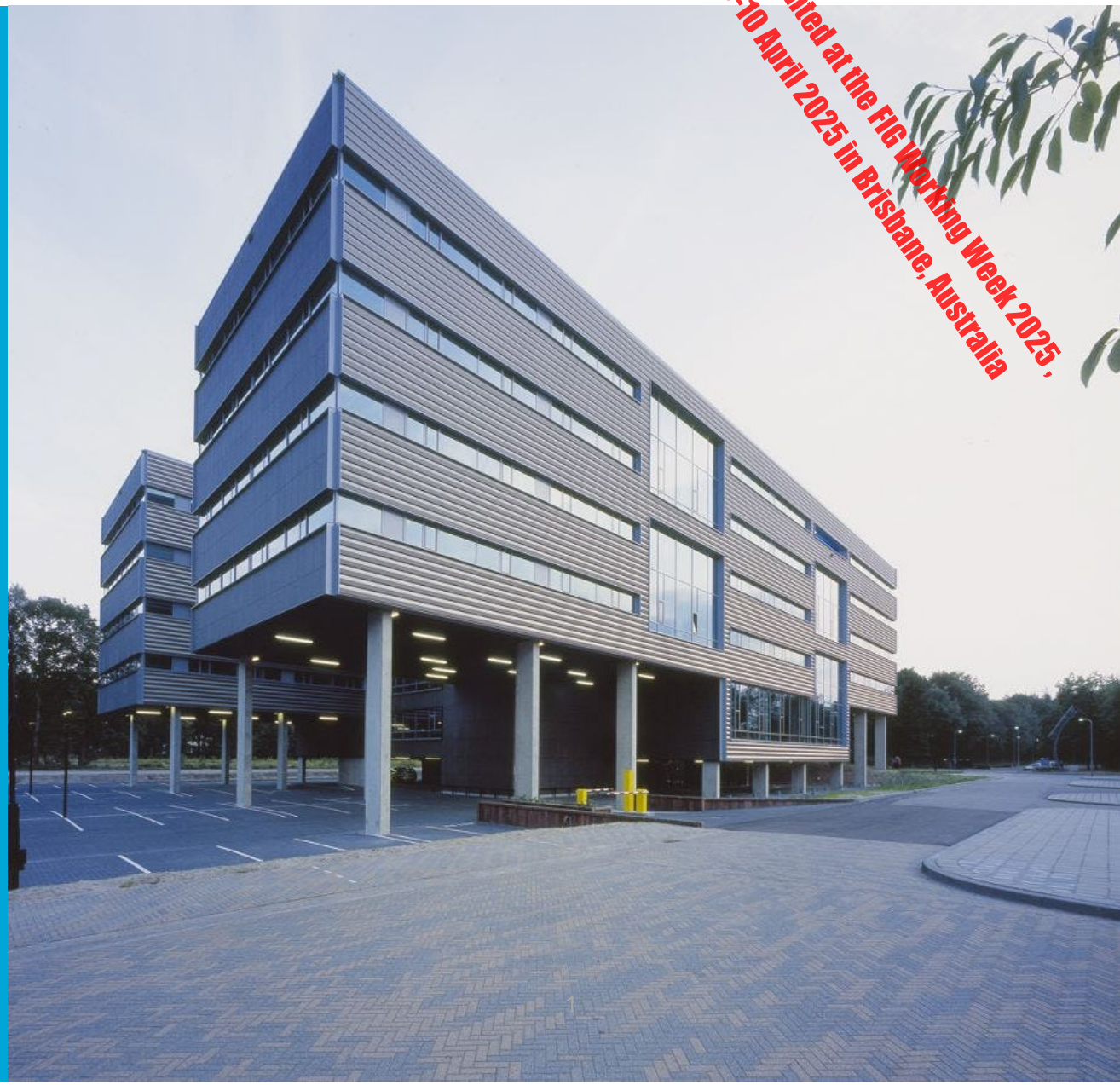
FIG Working Week, 9 April 2025, Brisbane, Australia

TU Delft kadaster



Presented at the FIG Working Week 2025,
6-10 April 2025 in Brisbane, Australia

Content

1. Introduction
2. Literature and contexual review
3. Design of prototype
4. Results
5. Conclusion

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Introduction

Problem statement

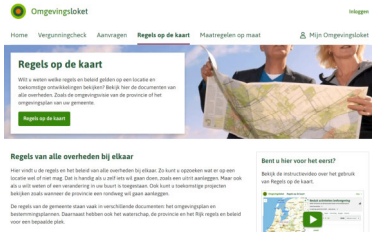
BAG

BRP

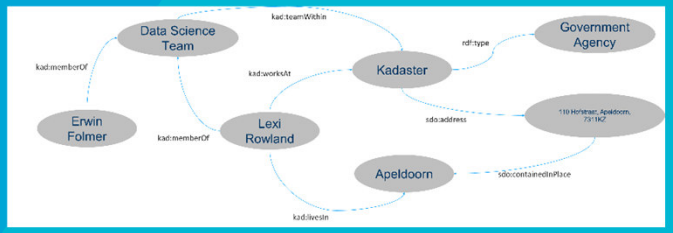
BRK

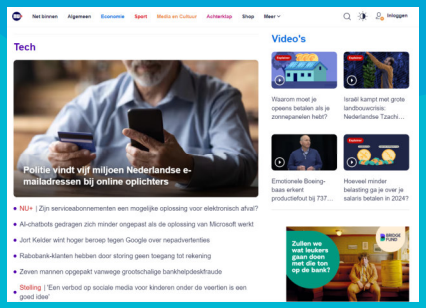
For a given address, who is the owner of the building and the parcel and are there any spatial plans to which the building plan needs to apply and are there public law restrictions to which the plan should comply?

Ruimtelijke Plannen

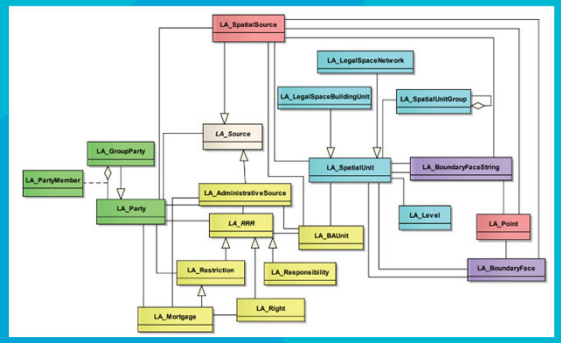


BRK-PB





This study examines the benefits and drawbacks of a **linked data portal** based on the **Land Administration Domain Model (LADM)** Edition II concepts.



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Literature and contextual review

Land administration in the Netherlands

- Land registration
- Valuation information
- Spatial plan information

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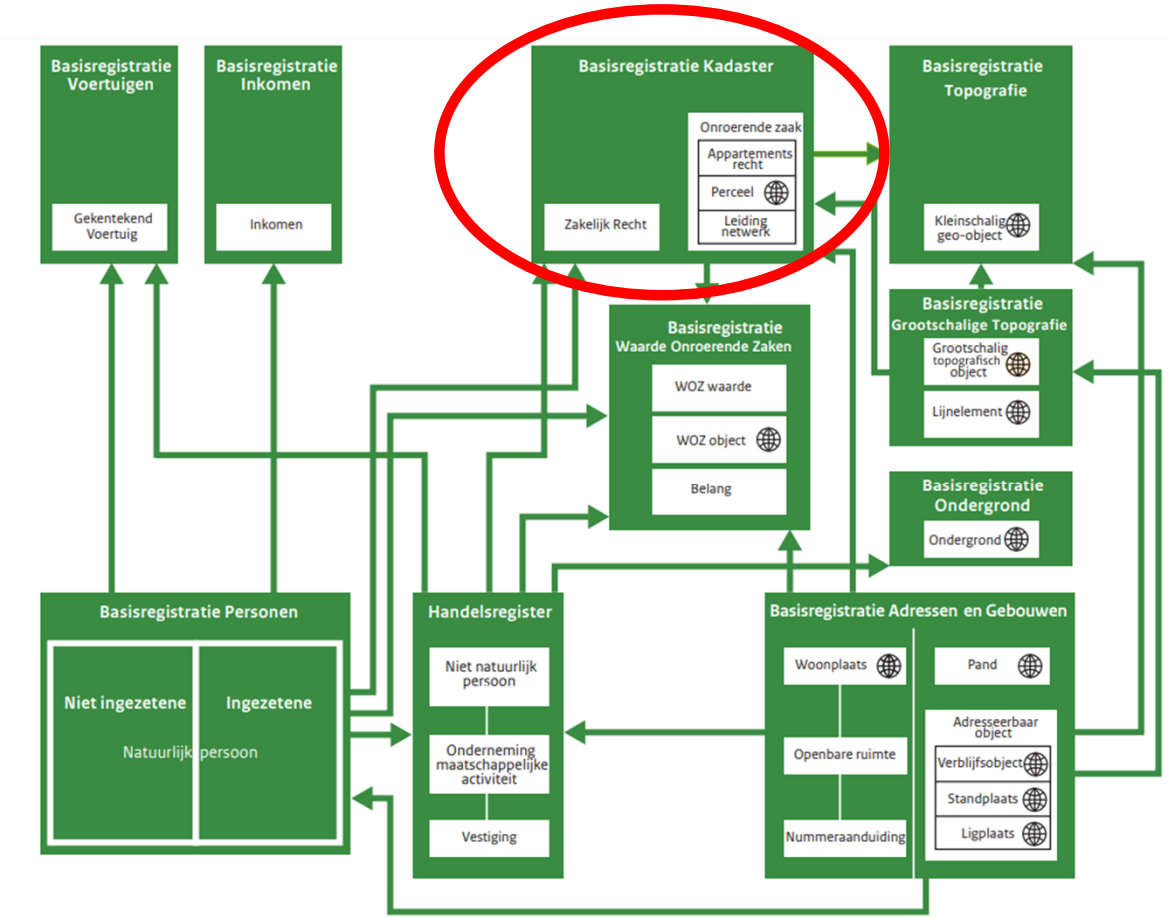

Base registers in the Netherlands (Overheid, 2020)

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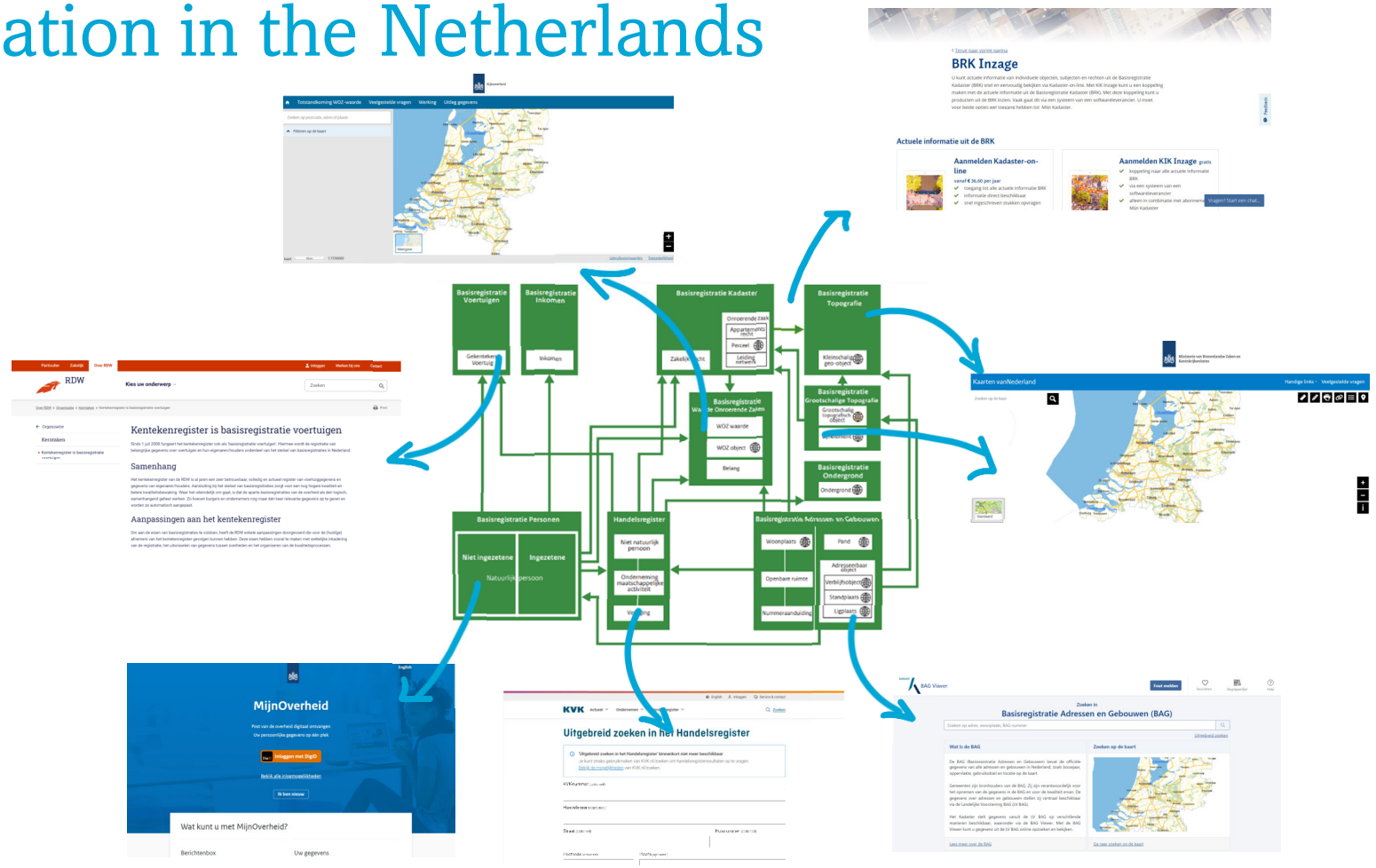
Land administration in the Netherlands

- Land registration
- Valuation information
- Spatial plan information



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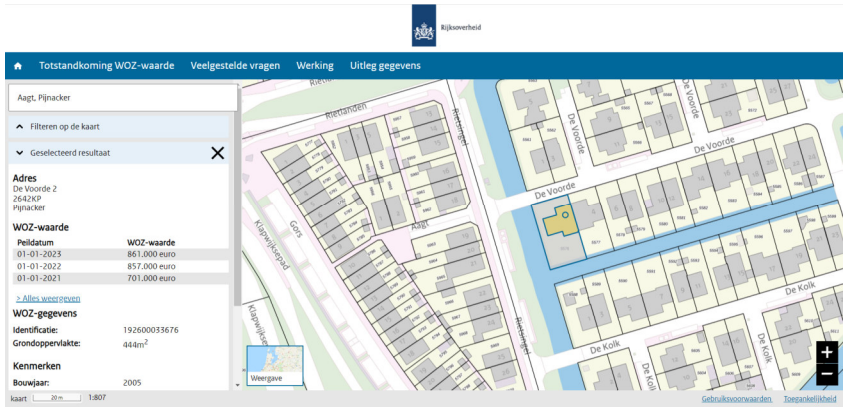
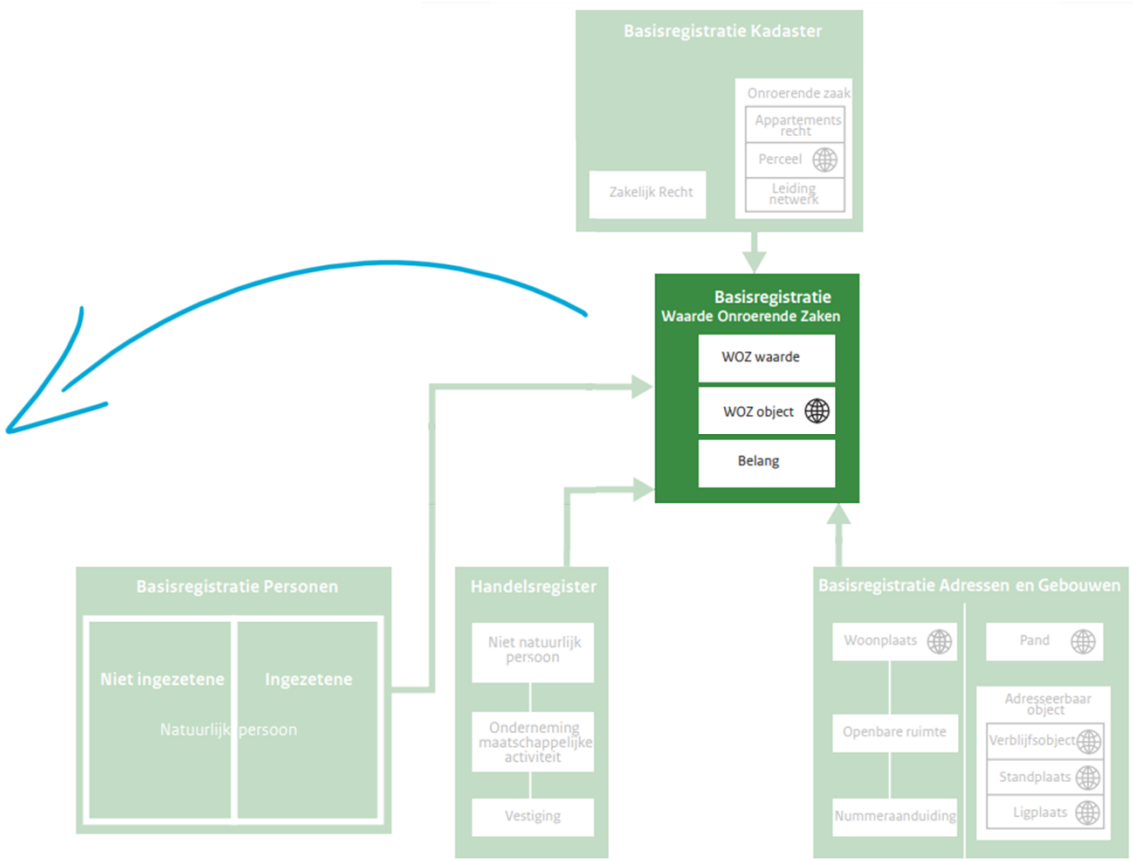


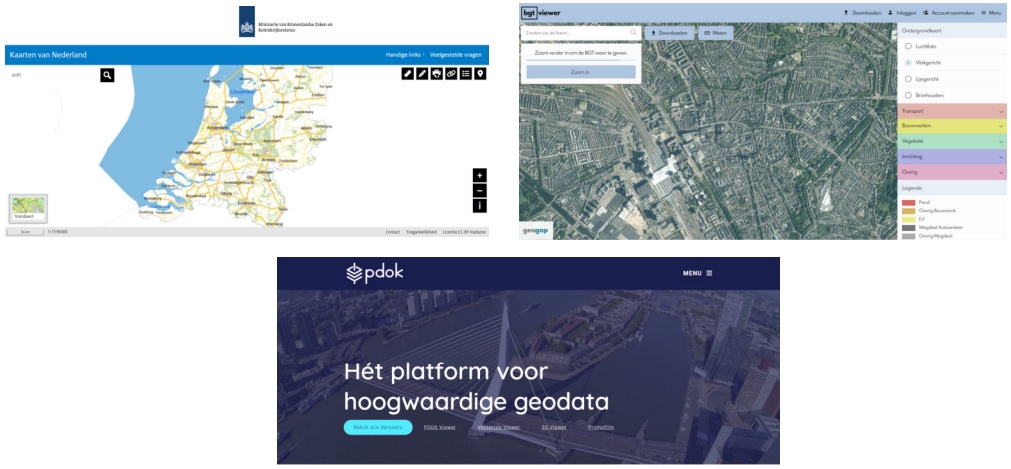
Wozwaardeloket portal (WOZ-waardeloket, n.d.)



Base registers in the Netherlands (Overheid, 2020)

Land administration in the Netherlands

- Land registration
- Valuation information
- Spatial plan information



Ruimtelijkeplannen, BGTviewer and PDOK portals (Ruimtelijkeplannen, n.d.) (BGTviewer, n.d.) (PDOK, n.d.)

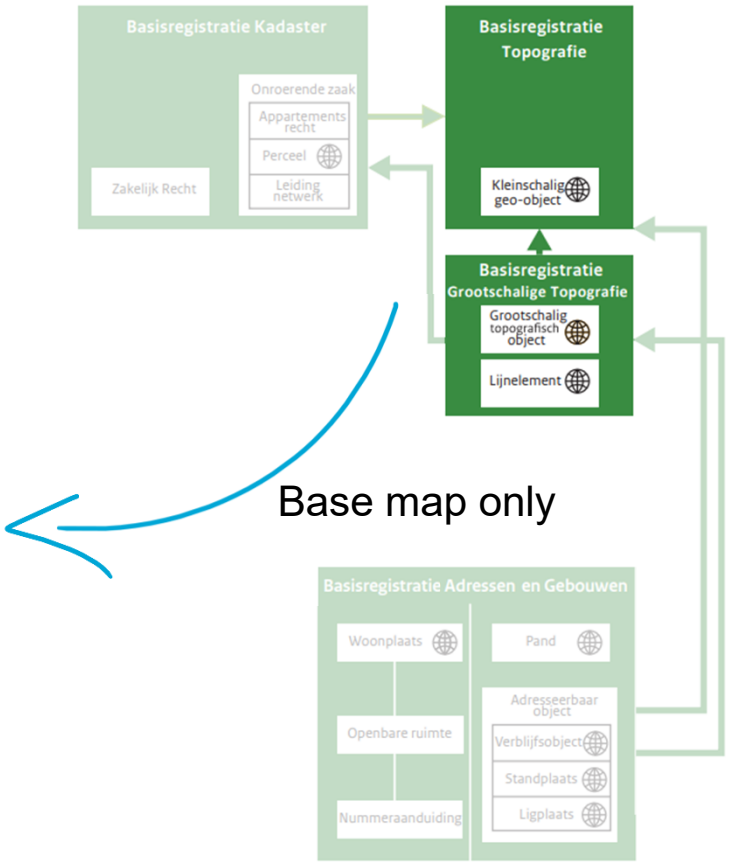
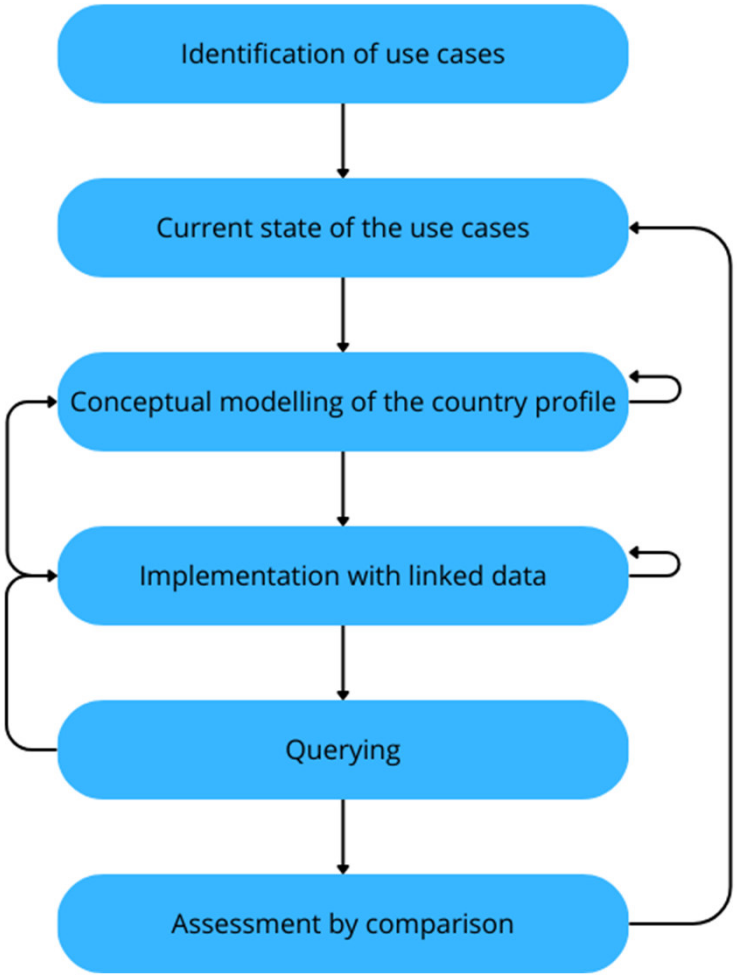


Figure. Base registers in the Netherlands

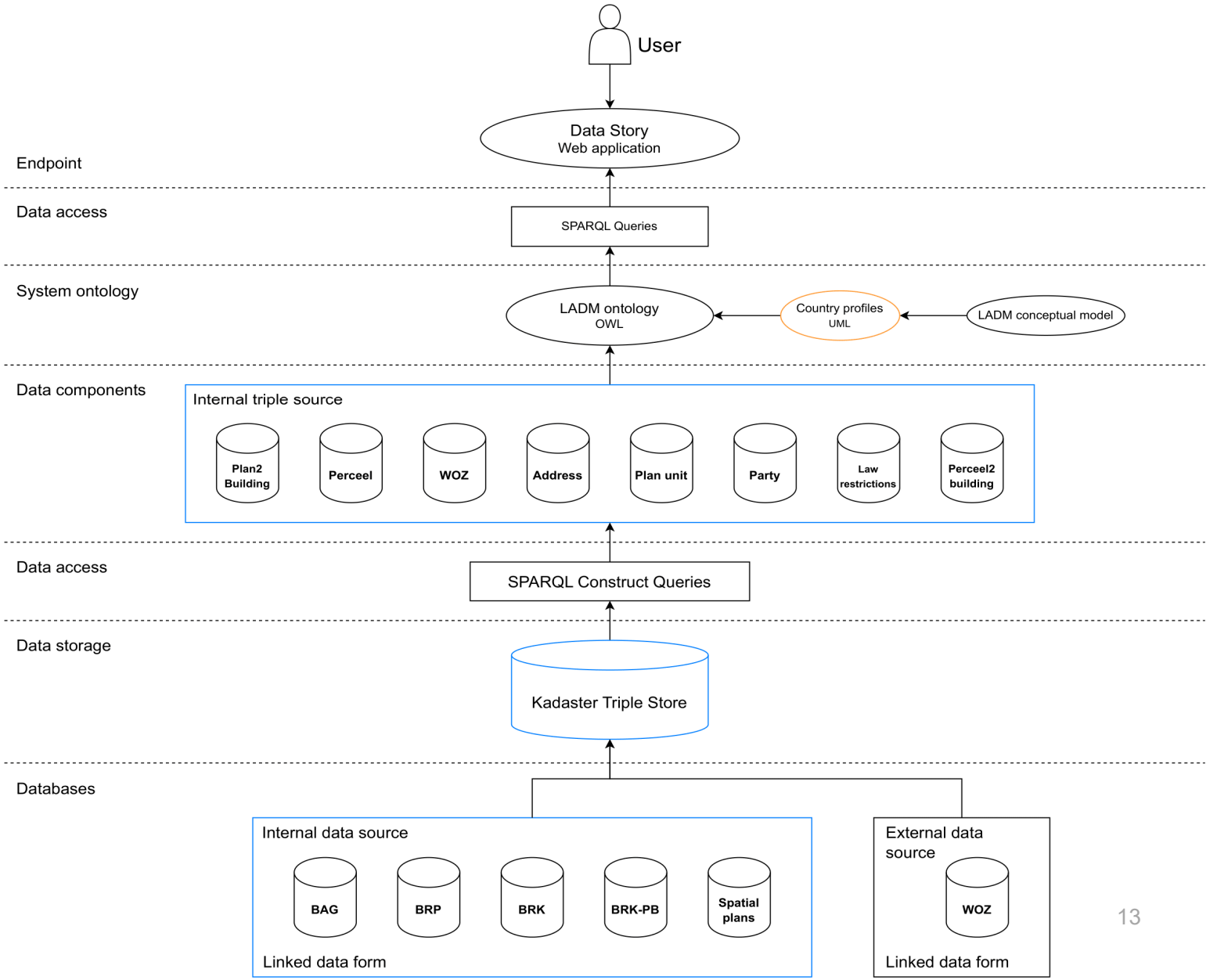
3

Design of Prototype

Steps


Identification of use cases
Current state of the use cases
Conceptual modelling of the country profile
Implementation with linked data
Querying
Assessment by comparison

System architecture



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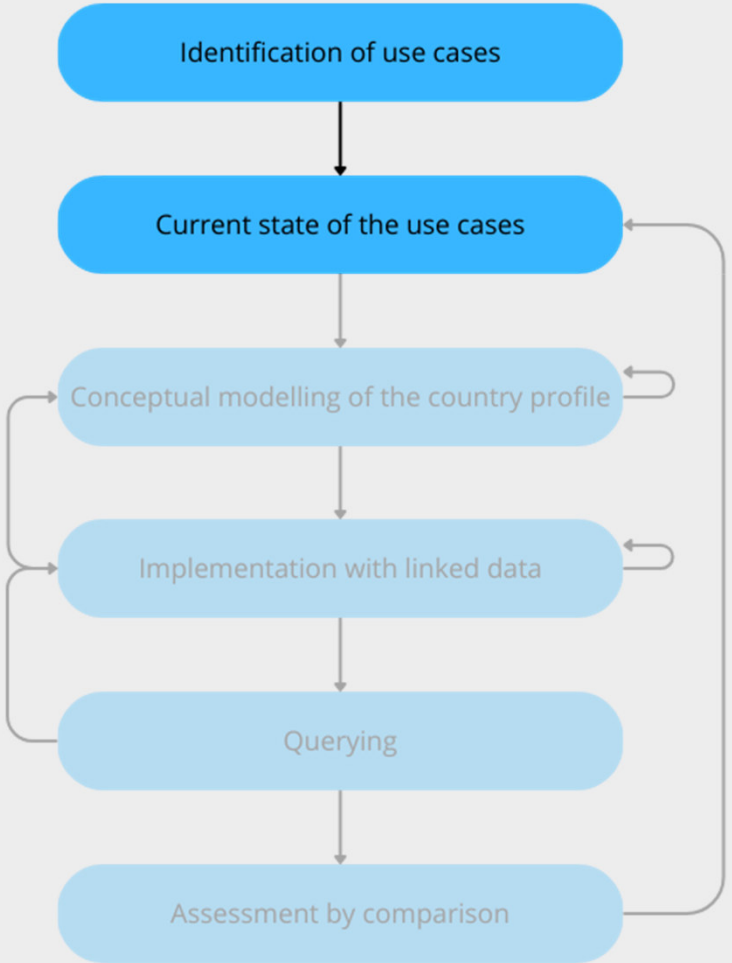
Results

Use cases

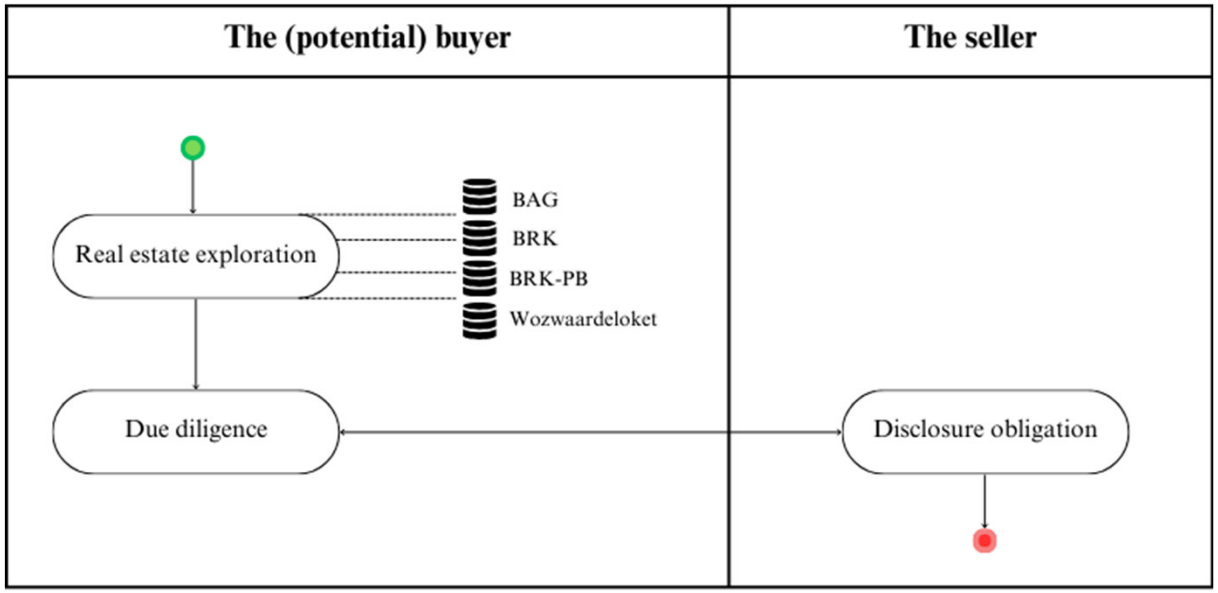
Two use cases are identified to assess the impact of the implementation of LADM in the Netherlands

Current state of the use cases is modelled as process models



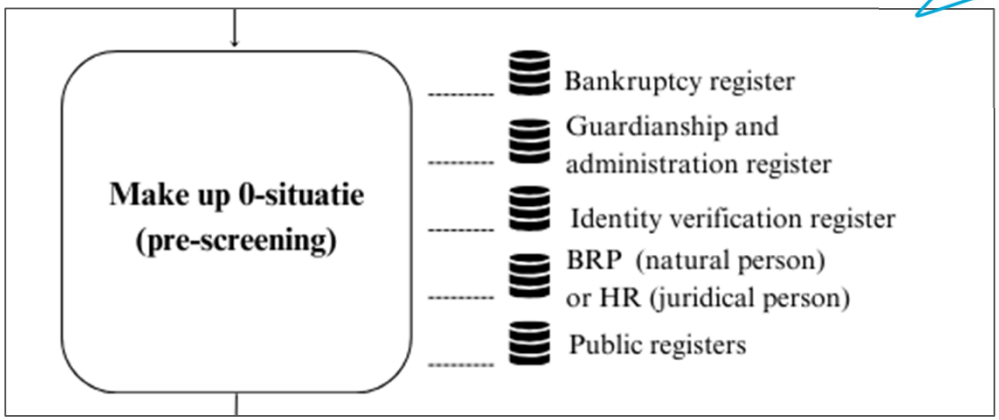
Use case 1: Real estate transaction (1/2)

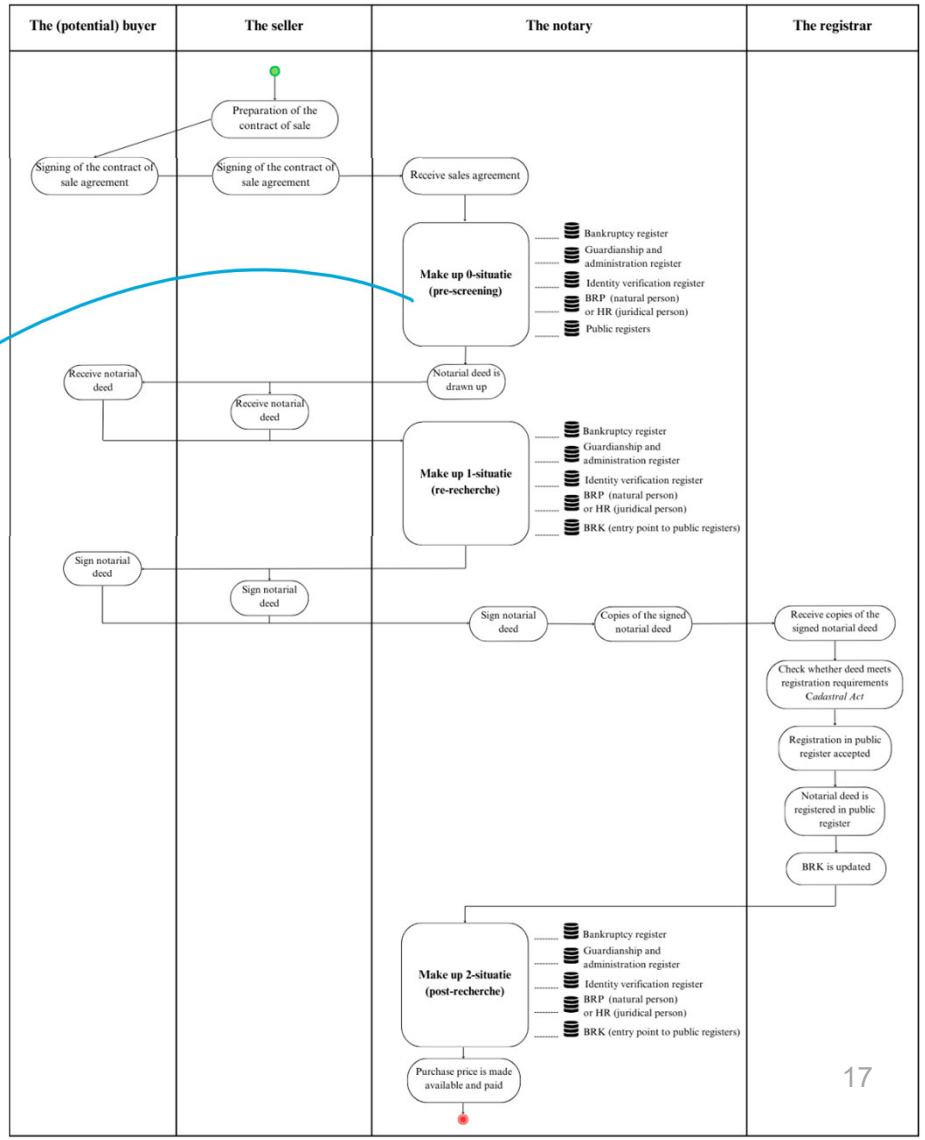
- The preliminary phase: Information sources in real estate transaction



Real estate transaction (2/2)

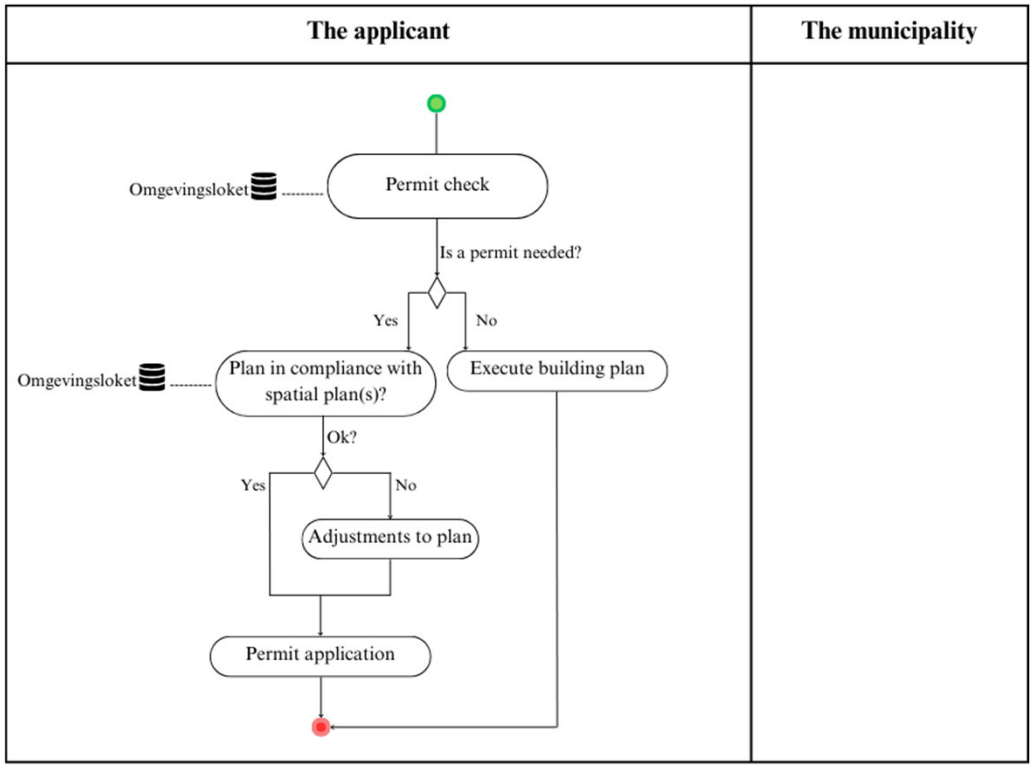
- The sequential phase: Sale and transfer of the real estate





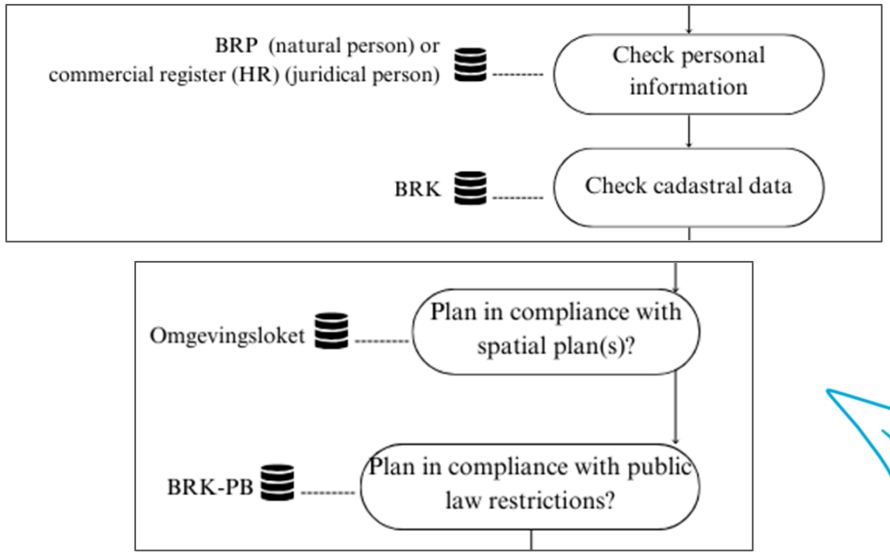
Use case 2: Building permit (1/2)

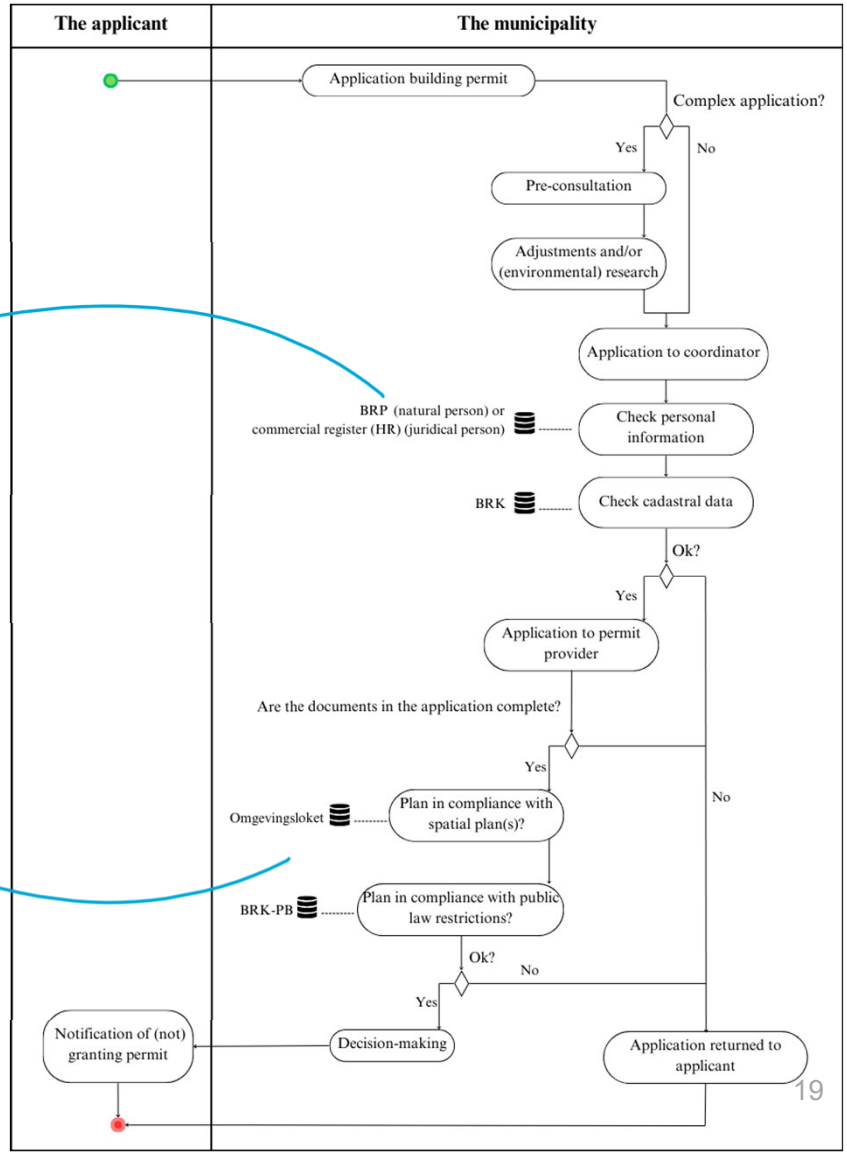
- Preliminary phase: Information sources in preparation of a building plan and the application for a building permit



Building permit (2/2)

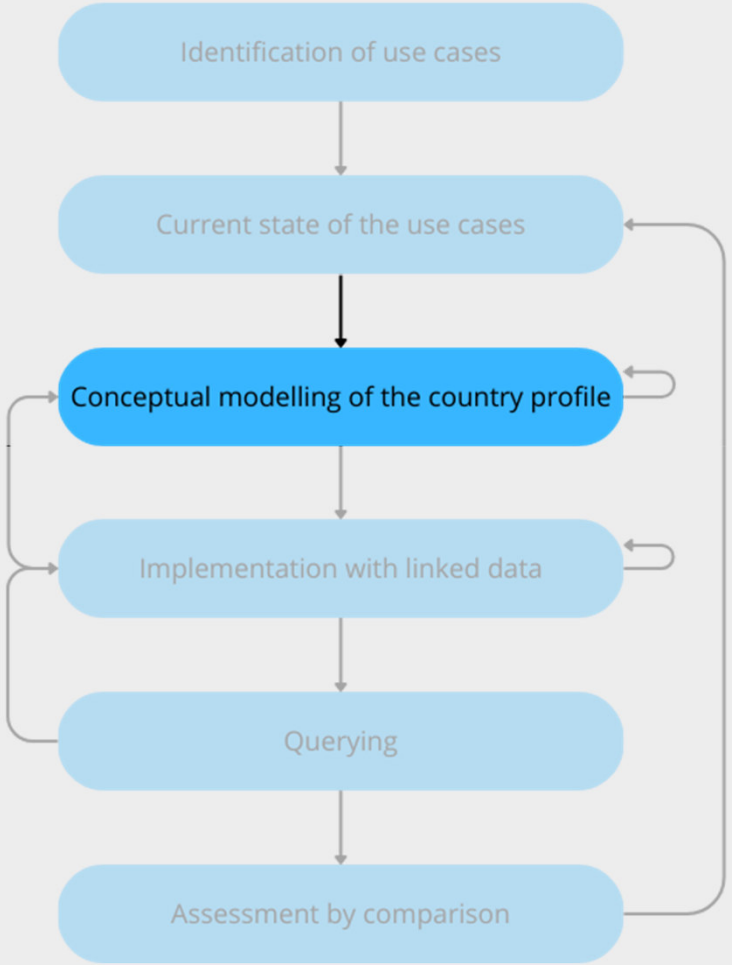
- Sequential phase: Application for a building permit





Country profile of the Netherlands

To adapt the LADM to the country-specific needs of the Netherlands

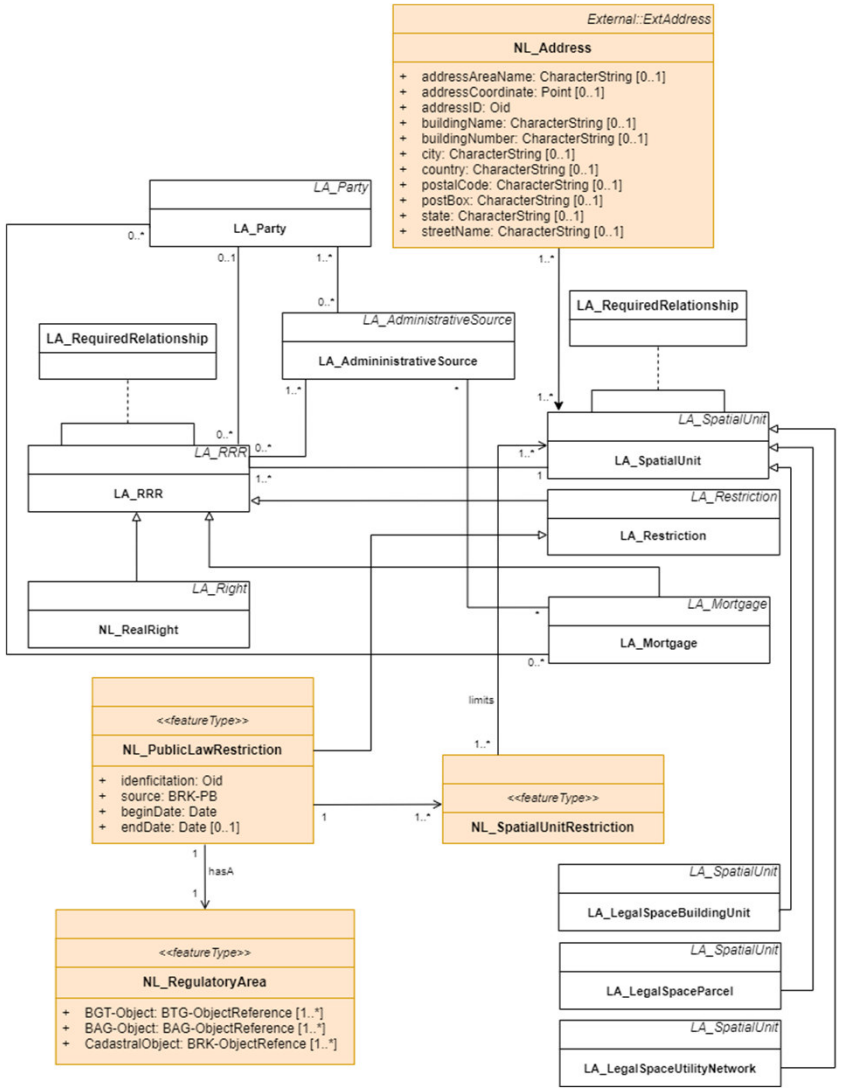


Core LADM

- Part 1 – Generic Conceptual Model
- Part 2 – Land registration

Adjustment:

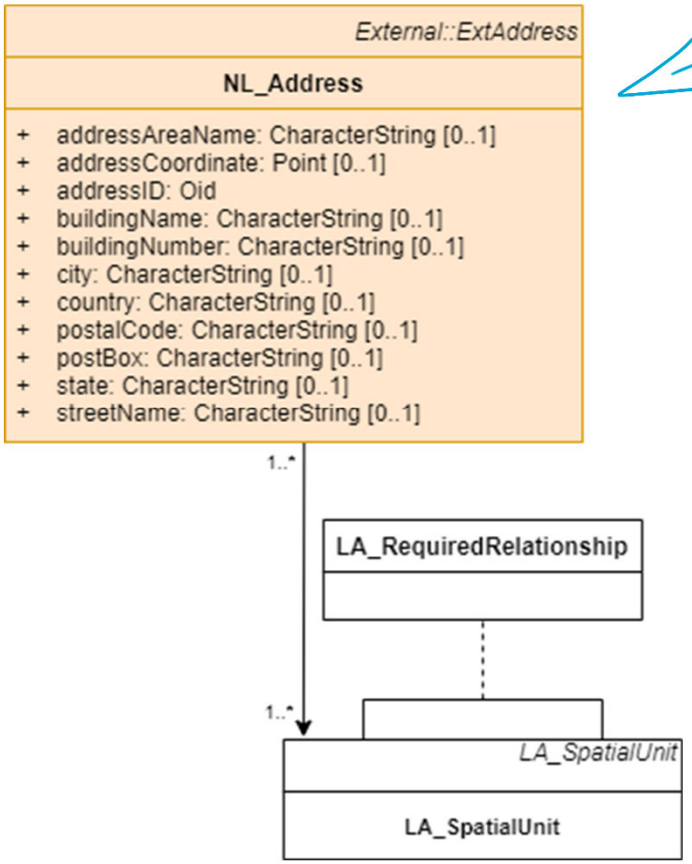
- Merging of the classes LA_BAUnit and LA_SpatialUnit

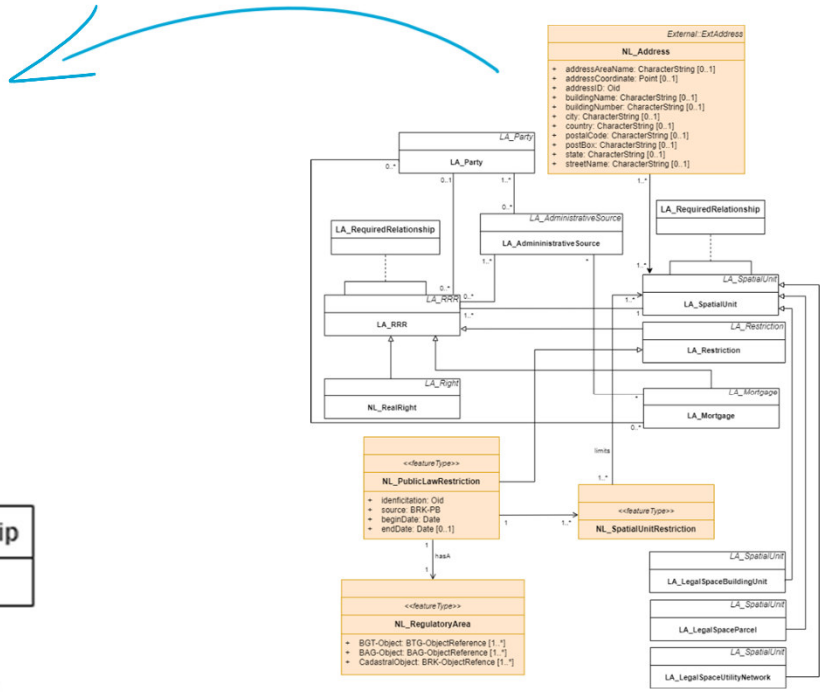


Core LADM

Added class:

- NL_Address



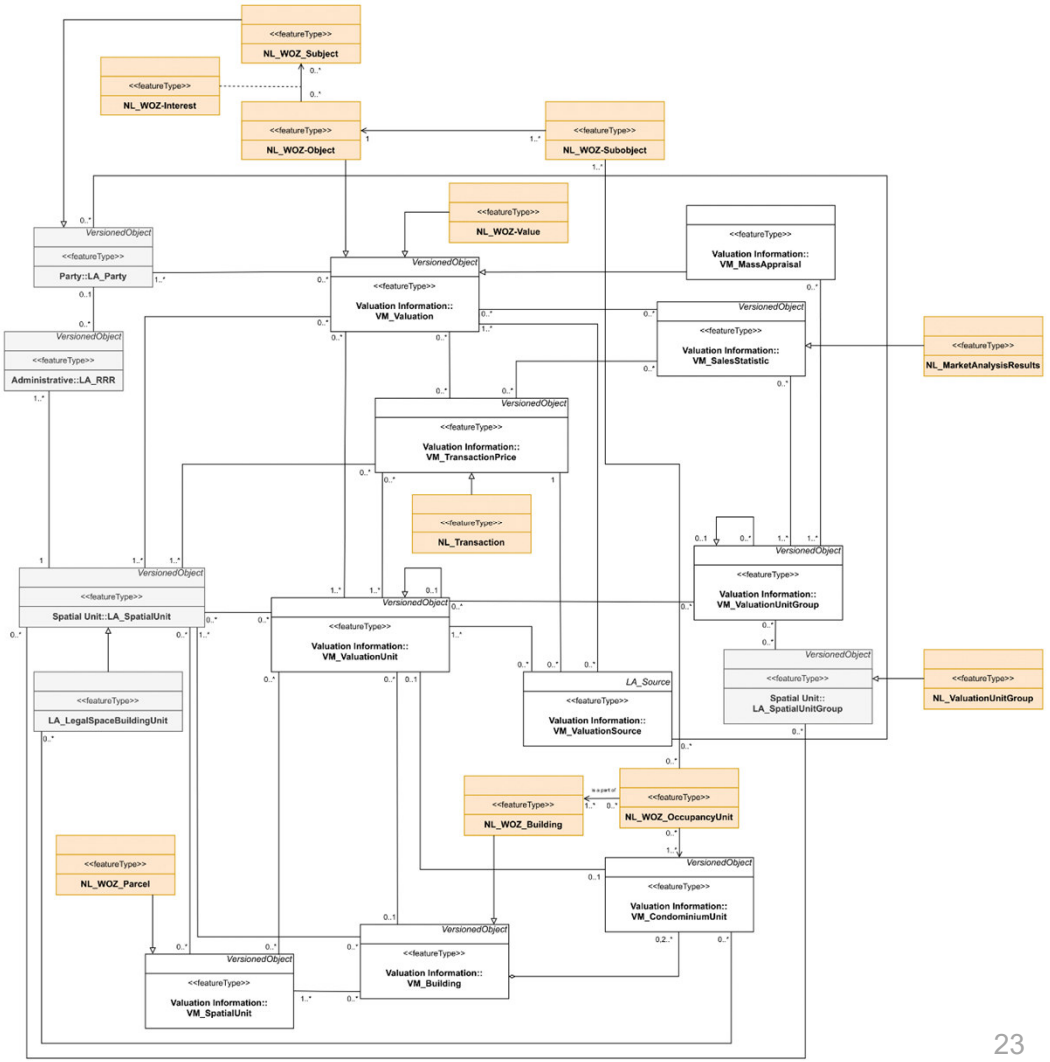


Valuation information

- Part 4 – Valuation information

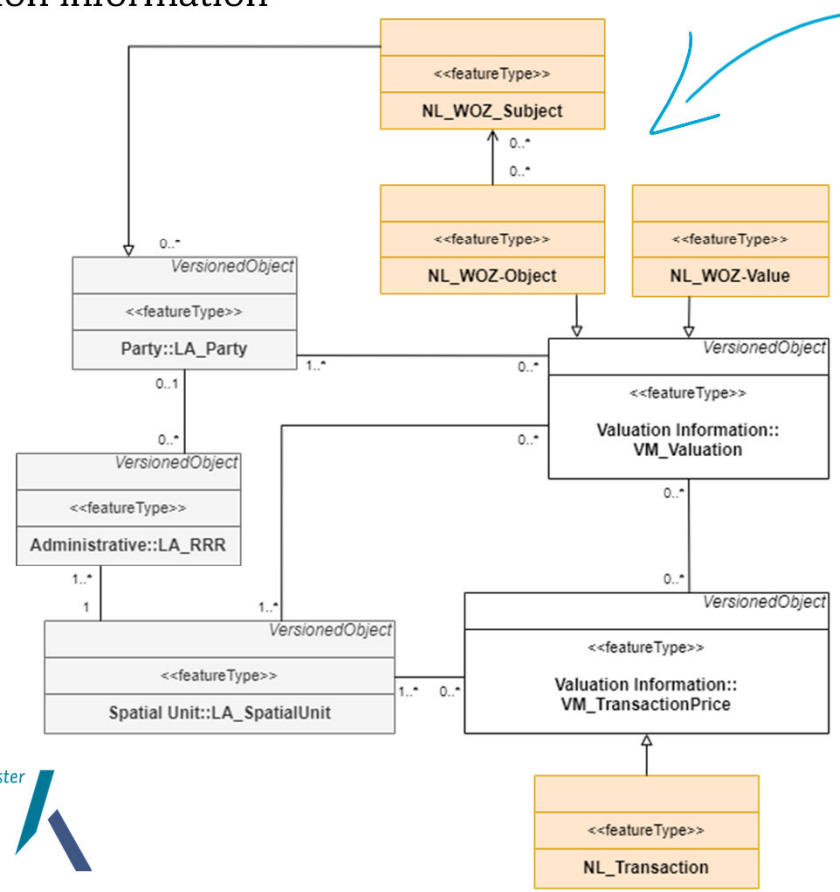
Adjustment:

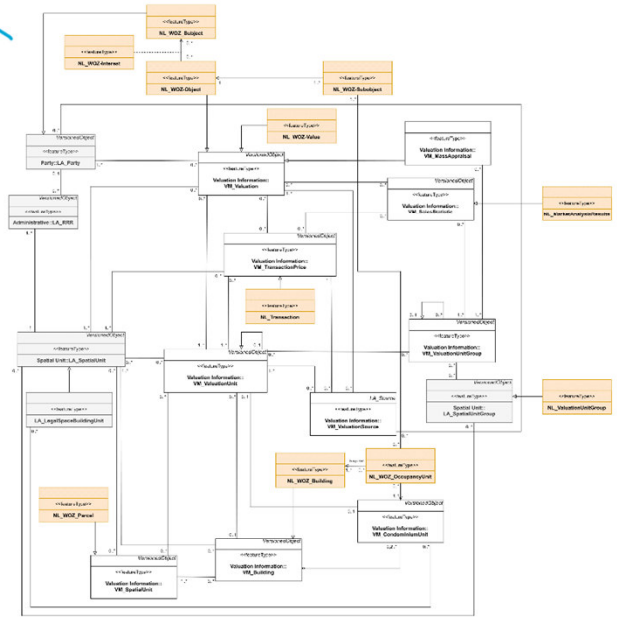
- Addition of class VM_ValuationSource and its relationships with VM_ValuationUnit, VM_Transactionprice, VM_Valuation and LA_Party



Valuation information

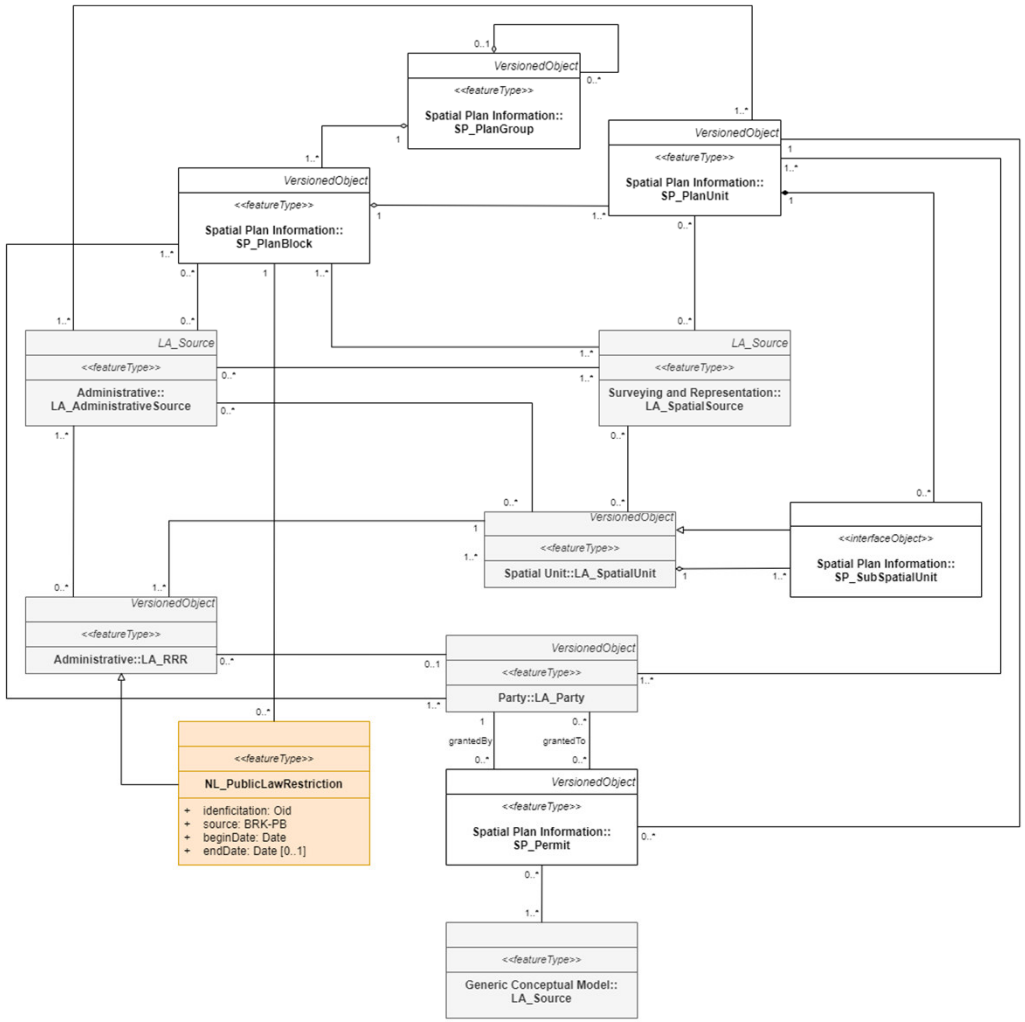
- Part 4 – Valuation information





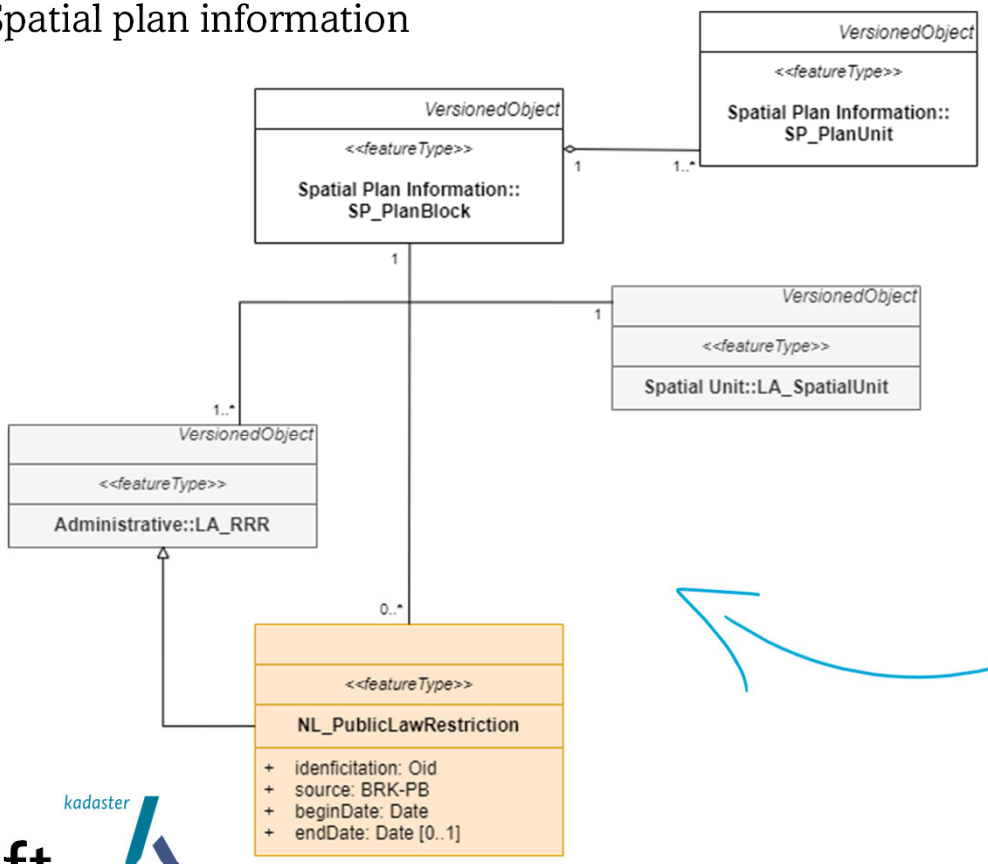
Spatial plan information

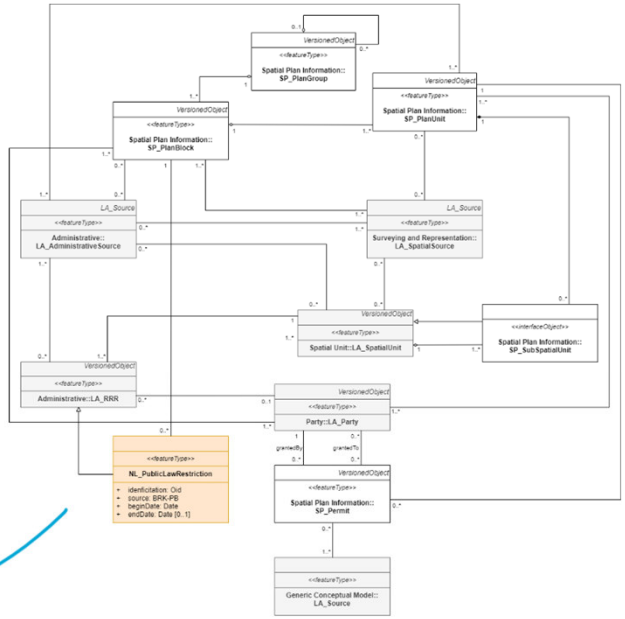
- Part 5 – Spatial plan information



Spatial plan information

- Part 5 – Spatial plan information





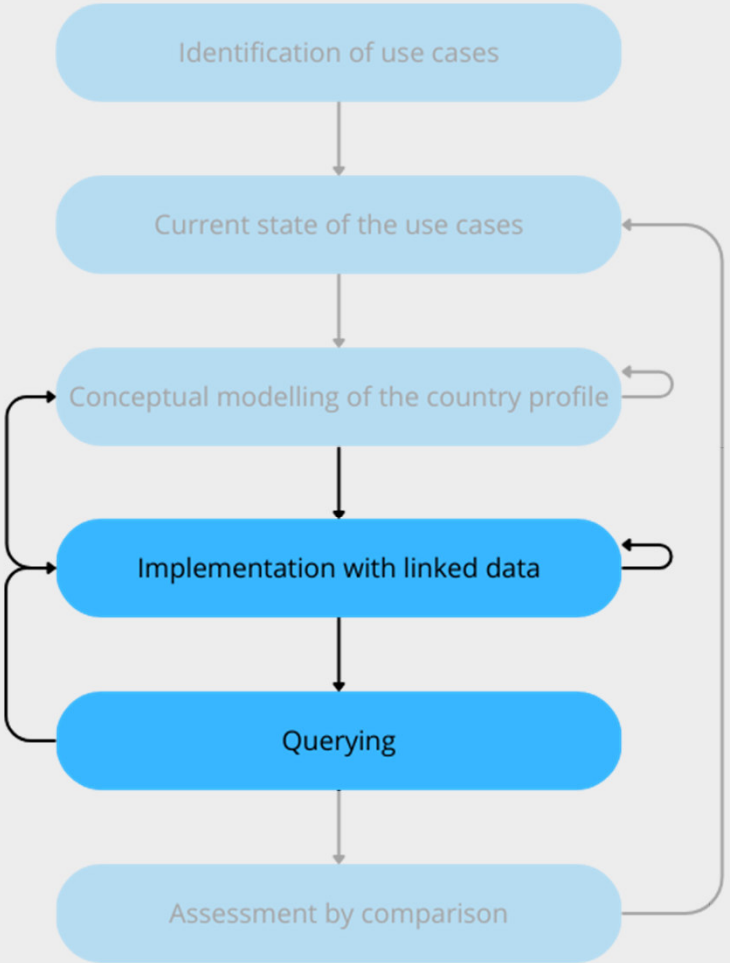
Datasets

Data from registers: BAG LV, BRP, Ruimtelijke plannen, BRK, BRK-PB and WOZ.

NL_Adress	LA_Party	LA_LegalSpaceParcel	NL_WOZ-value	NL_PublicLawRestriction	SP_PlanUnit
houseNumber	identifier	parcelName	WOZ-object number	publicLawIdentifier	spatialPlan
houseLetter	firstName	delimitation	WOZValue	regulatoryArea	designatedArea
houseNumberAddition	lastName	cadastralSize	dateOfValuation	publicLawRestriction	geometry
streetName	gender	placeNumberCoordinates		beginDate	
postalCode	bsn			endDate	
cityName	civilStatus				
purposeOfUse					
surfaceArea					
constructionYear					
geometry					

Implementation with linked data

To develop a prototype that demonstrates the implementation of LADM in the Netherlands, by querying the use cases.



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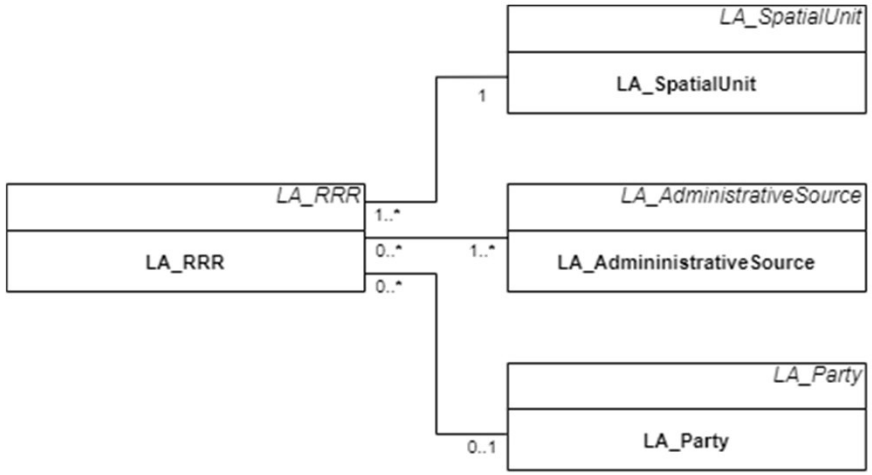
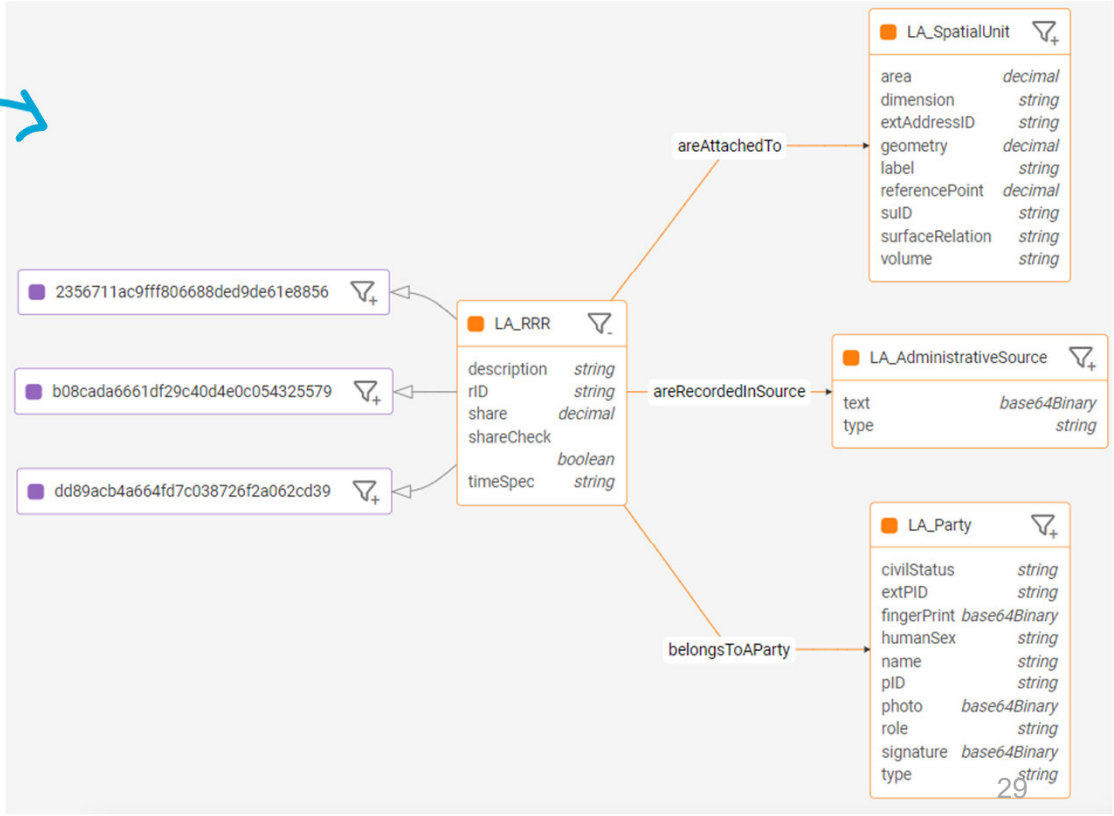
Ontology

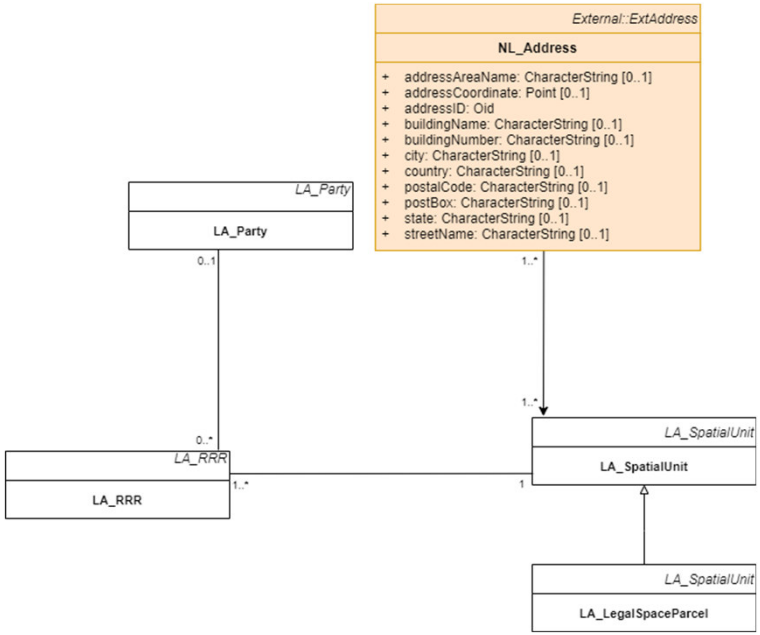
- Ontologies are a way to formally model a system's structure by representing its relevant entities and their relationships
- Web Ontology Language (OWL)





SPARQL queries

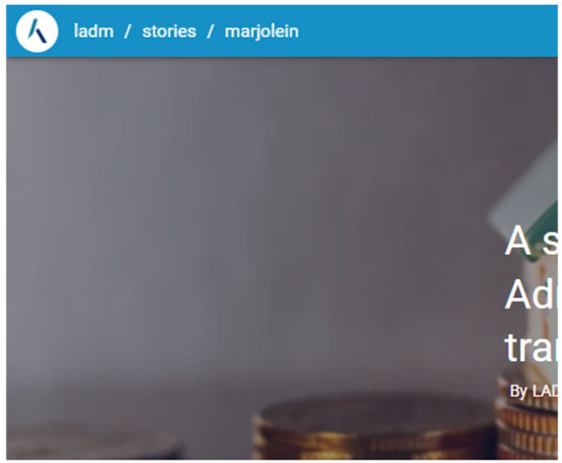
- Seeking for patterns in the triples




```
PREFIX graph: <https://data.labs.kadaster.nl/ladm/ladm-test/graphs/>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
PREFIX sor: <https://data.kkg.kadaster.nl/sor/model/def/>
PREFIX nen3610: <https://data.kkg.kadaster.nl/nen3610/model/def/>
PREFIX ladm: <https://data.labs.kadaster.nl/2024/ladm#>

SELECT distinct ?addressDetails ?bsn ?firstname ?lastname ?civilstatus
where {
  {
    ?adres
      ladm:NL_belongsToSpatialUnit ?buildingunit ;
      ladm:postalCode ?postcode ;
      ladm:streetName ?streetname ;
      ladm:cityName ?cityName ;
      ladm:houseNumber ?houseNumber .
    optional { ?adres ladm:NL_addressLetter ?houseletter }
    optional { ?adres ladm:NL_addressNumberAddition ?housenumberaddition }
  }

  ?buildingunit ladm:NL_belongsToSpatialUnit ?building .
  ?parcel ladm:NL_isAssociatedWith ?building .

  ?rrr
    ladm:NL_belongsToAParty ?party ;
    ladm:NL_areAttachedTo ?parcel .

  ?party
    a ladm:LA_Party ;
    ladm:NL_bsn ?bsn ;
    ladm:NL_firstName ?firstname ;
    ladm:NL_lastName ?lastname ;
    ladm:NL_gender ?gender ;
    ladm:civilStatus ?civilstatus .

  bind(concat(str(?streetname),' ',str(?houseNumber),
      if(bound(?houseletter), str(?houseletter), ''),
      if(bound(?housenumberaddition), concat('-', str(?housenumberaddition)), '
    '),
      ', ',str(?postcode),', ',str(?cityName)) as ?addressDetails )

}
  limit 5
```

Data story

- Real estate transaction
- Building permit



With thi
implem

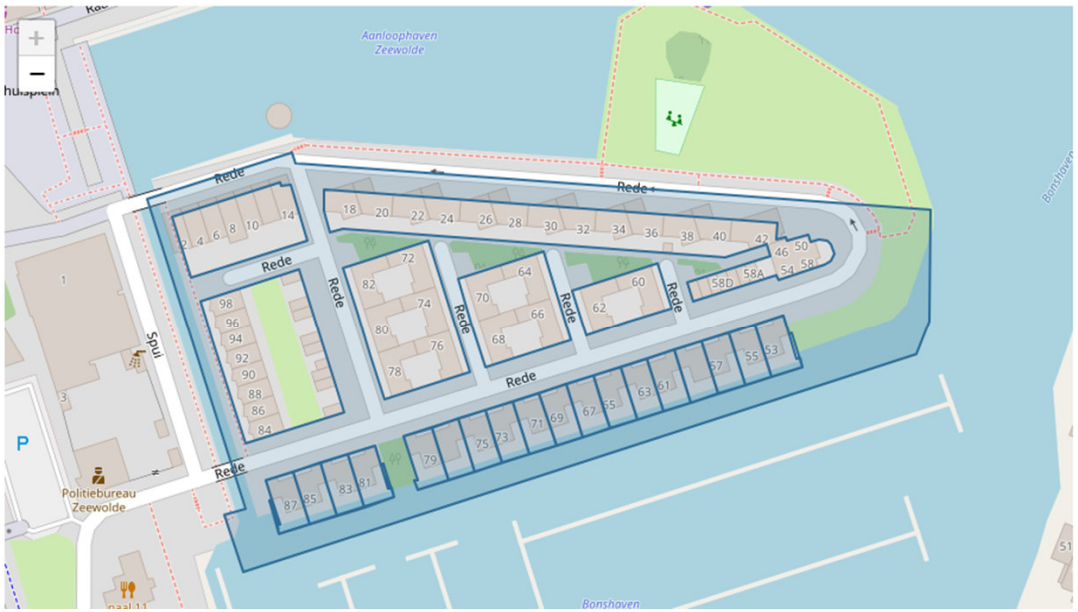
The following query shows parcel information on a map, as geometry. The input parameter allows the user to query address information within a, postal code.

Note that this query uses an API variable, namely, "postalcode". It is possible to configure such API variables on top of a SPARQL query. The postal code entered by a user is automatically inserted and executed by the SPARQL engine in the query. This makes it possible to modify the SPARQL query in certain parts without requiring detailed knowledge of the SPARQL query language. Just try entering a value yourself, and then click the "Run query" button to retrieve information for this destination.

Go to dataset Try this query yourself

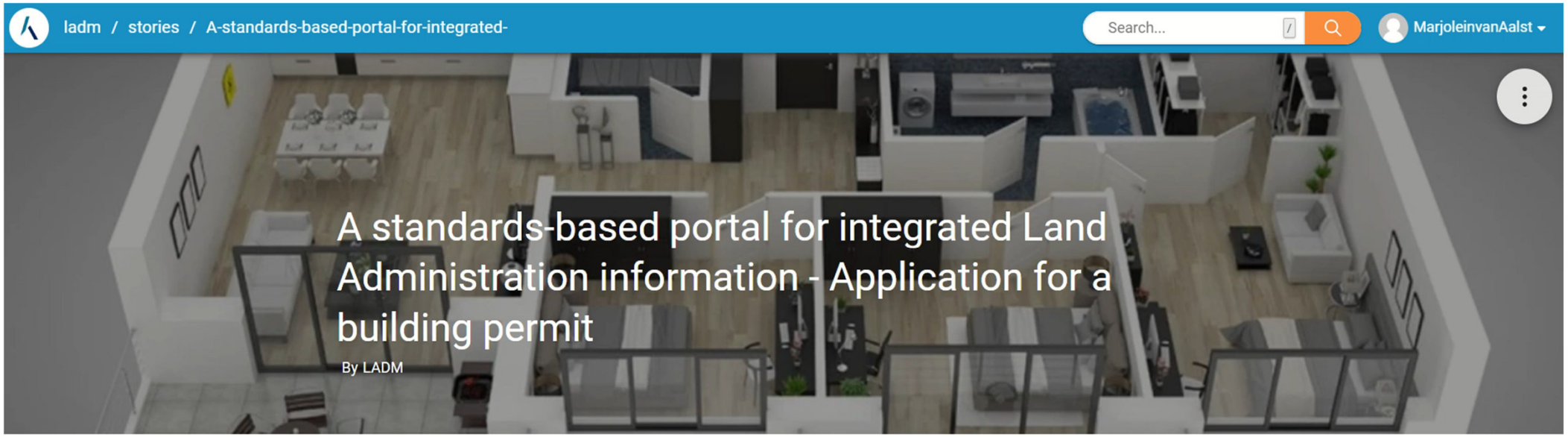
postalcode *
3891AP

Reset RUN QUERY



Data story - Demo

- Spatial plans attached to a specific address and its spatial area
- Personal information



With this data story we would like to demonstrate the retrieval of data sourced from multiple registers through integration, based on the implementation of LADM. This demonstration is based on a use case.

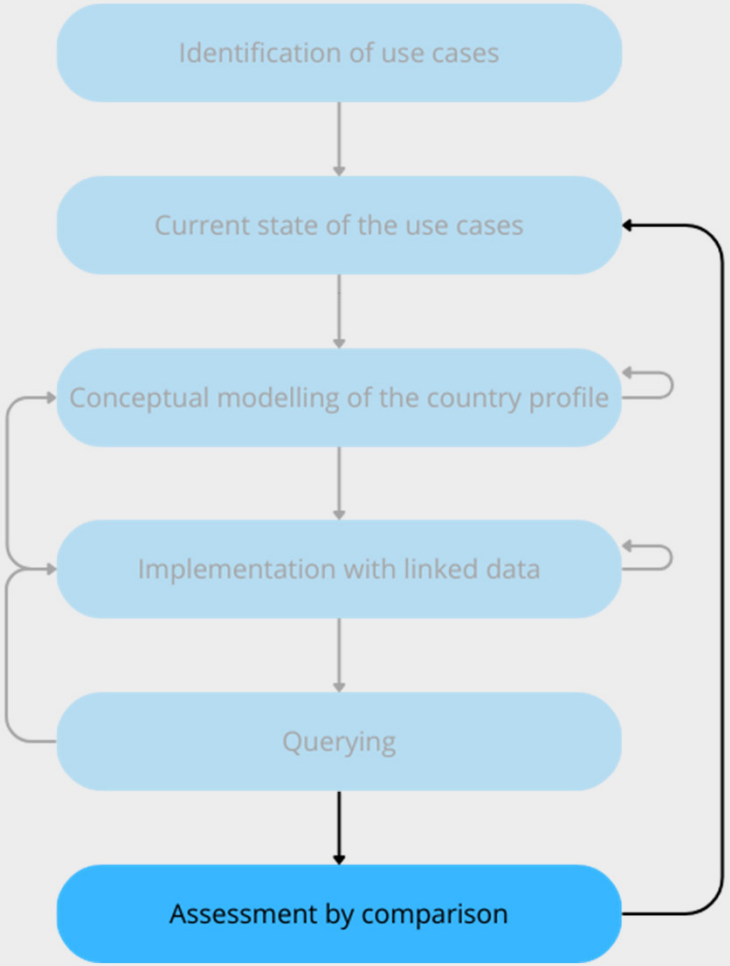
Preliminary phase

Spatial plan information

The following query returns address information and spatial plan information. The input parameter allows the user to query address

Assessment and evaluation

To assess the linked data portal prototype in the form of a data story



Usability test - purpose

To evaluate the usability of the prototype

Goals:

- The prototype should guide the user in retrieving information efficiently
- The prototype should provide information that is clear to the user
- The prototype should be easy to use and/or there should be a learning curve
- The prototype must give the user certainty about the information retrieved
- The prototype should not create limitations and/or frustration for the user

Usability test – prepare for building permit

With identity of citizen:

- Task 1: Find whether there is a spatial plan tied to the address
- Task 2: Find the spatial area of the spatial plan bound to the address

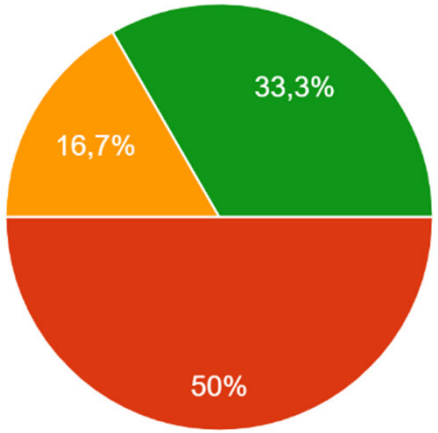
With identity of Municipality permit officer:

- Task 3: Confirm the personal information of the applicant
- Task 4: Find out if the applicant owns buildings, apartments or parcels
- Task 5: Find the surface area of the building and the surface area of the parcel
- Task 6: Find whether there is a spatial plan bound to the address
- Task 7: Find the spatial area of the spatial plan bound to the address
- Task 8: Find whether there is a public law restriction bound to the address

Usability test - results

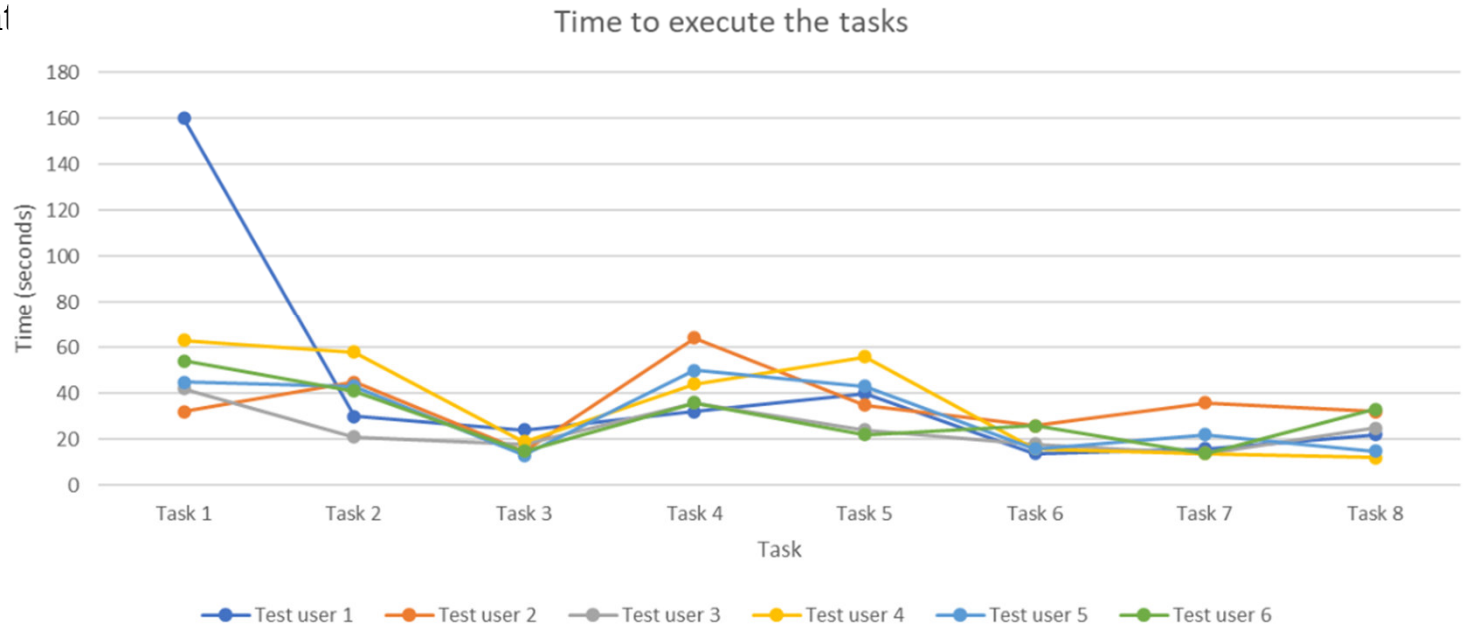
The usability test has shown that:

- Users can query the information for the use cases.
- Users appreciate all information in one web environment.
- Information retrieval is dependent on clear headings.
- Standard language is better understood.
- Users become more proficient in using the prototype.



Users (n=6):

- Red= non-geo student
- Green= non-professional
- Orange= Kadaster professional



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5

Conclusion

Conclusion

What are the benefits and drawbacks of a linked data portal based on the Land Administration Domain Model (LADM) Edition II concepts?

Benefits	*Drawbacks*
• Time efficiency • Resource efficiency • Usability • Enables Kadaster to develop, implement and maintain land administration systems more efficiently • Enables users to access information in a way that is clear and understandable to locals, foreigners and machines	• Validation of the country profile • Creation of datasets conform the ontology • Verification of the attribute lists • Data must be in linked data format • Only data that is accessible and publicly available can be included • Writing of SPARQL queries for querying of the data

The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

2nd relevant SDG

3rd relevant SDG

SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

3D Land Administration

13th International FIG Workshop on LADM & 3D LA
3-5 November 2025, Florianópolis, Santa Catarina, Brazil

Português | Español | English | Workshop Programme

Formalizing land indicators for SDGs: Implementation and evaluation using international standards

Mengying Chen

Co-authors: Eftychia Kalogianni
Peter van Oosterom

FIG Working Week, Brisbane
9 April 2025

TU Delft

Understanding the SDGs in the Context of Land Administration

- **The United Nations' Sustainable Development Goals (SDGs)**
- **a set of 17 global objectives**
- **aimed at promoting social, economic, and environmental well-being by 2030**

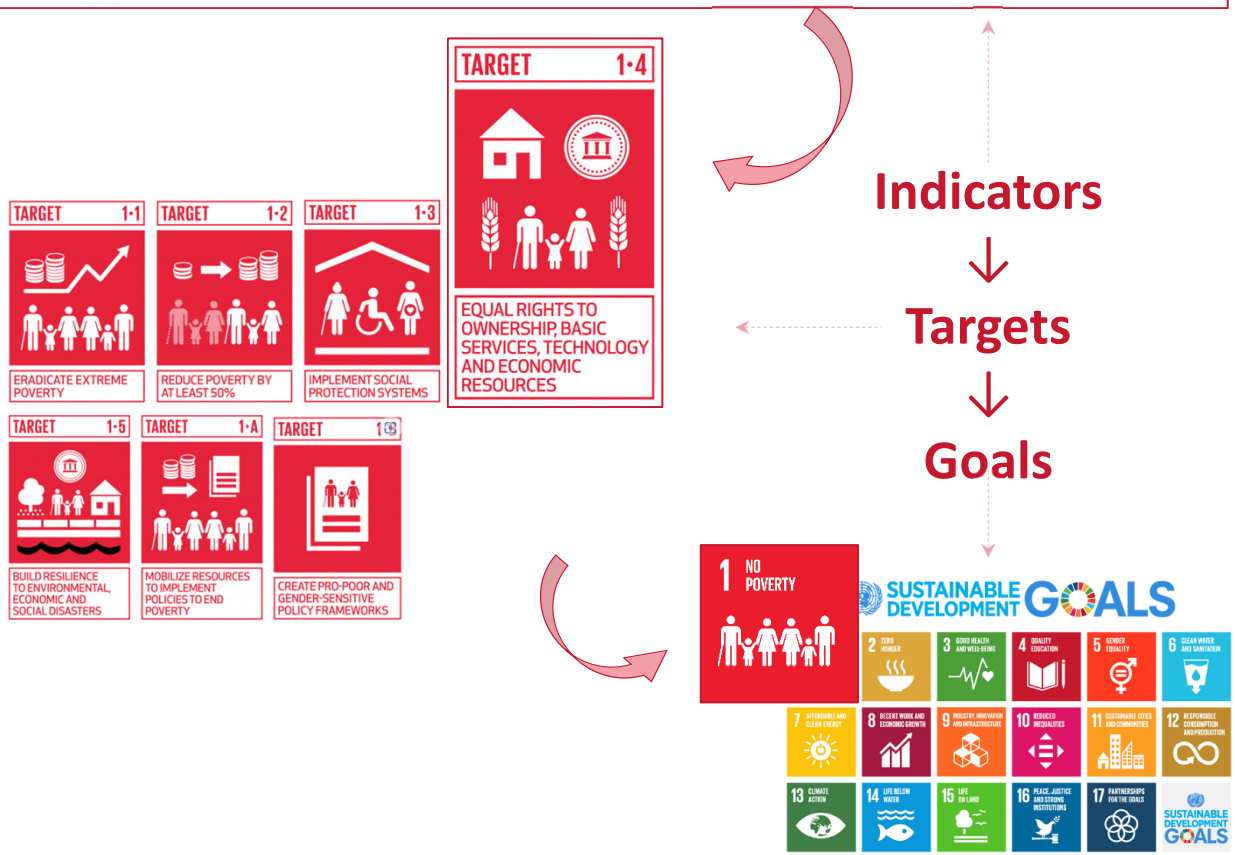
Why Land Administration Matters for Achieving SDGs

- **Enhances Socio-Economic Growth**
- **Supports Sustainable Land Use**
- **Promotes Social Stability**

Key Challenges in Monitoring SDGs

Target 1.4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance

- **Indicator 1.4.1:** Proportion of population living in households with access to basic services
  See metadata :
- **Indicator 1.4.2:** Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure
  See metadata :

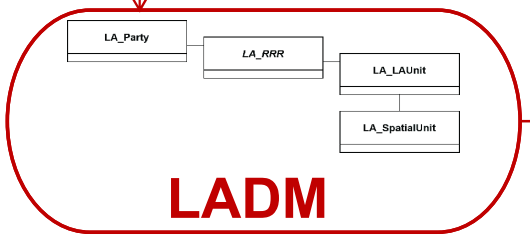


- **Lack of Data and Inconsistency**
- **Disparity Between Global and Local Indicators**
- **Text-based Metadata document**
- **Lack of harmonized monitoring tools**

Importance of Land Administration for SDGs

Land administration for **sustainable development**

Specific implementation pathways



LADM

- Standardization
- Efficiency
- Accuracy
- Scalability
- Interoperability

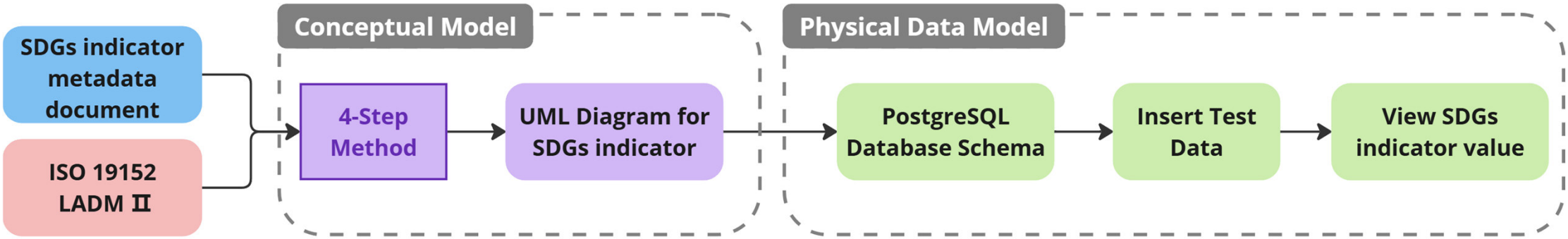
Formalizing SDG land-related indicators by using LADM

SDG

SDGs Indicator

- Lack of Data and Inconsistency
- Lack of harmonized monitoring tools
- Text-based Metadata document
- Disparity Between Global and Local Indicators

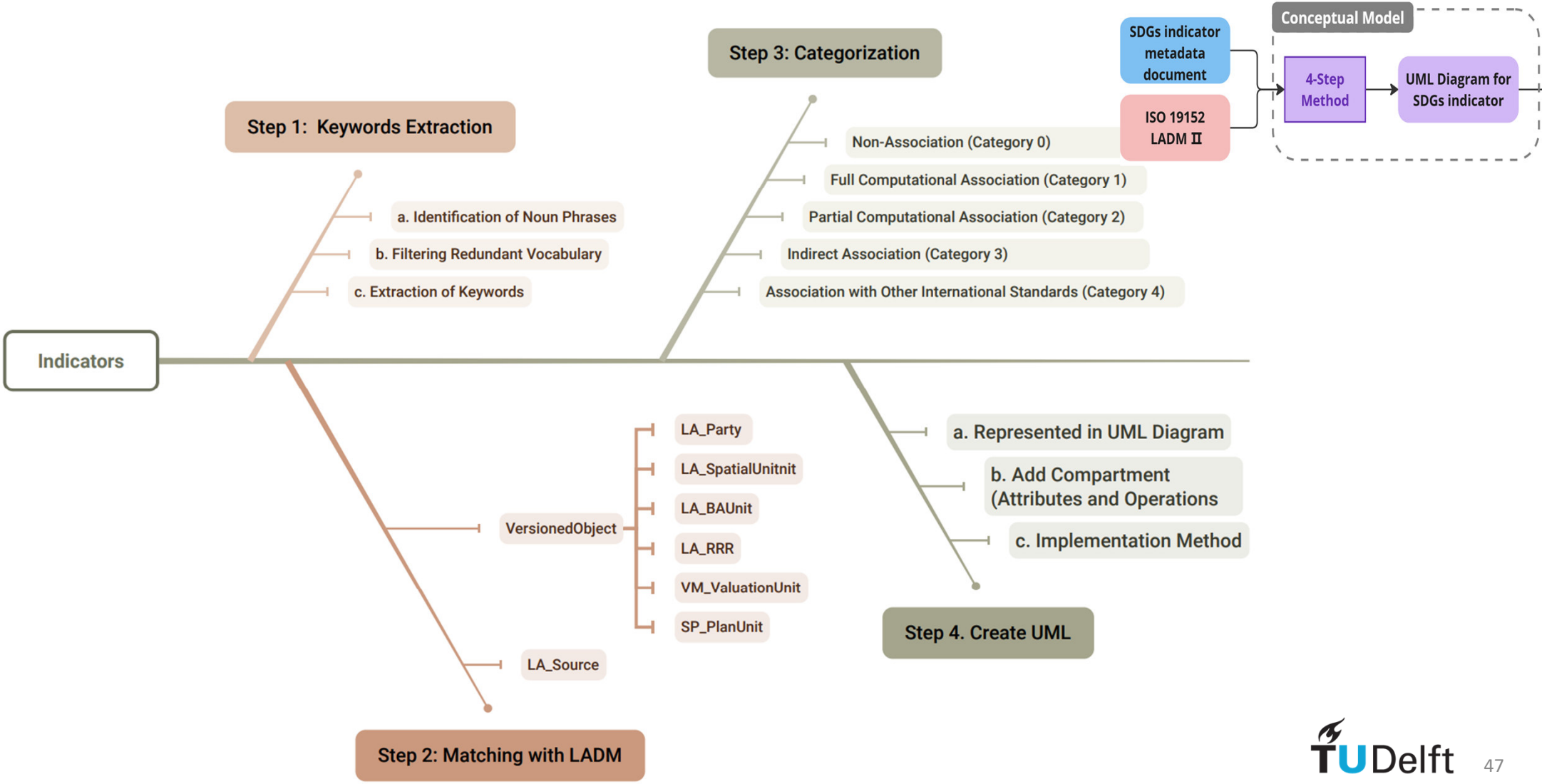
How to formalize? ——Approach Overview



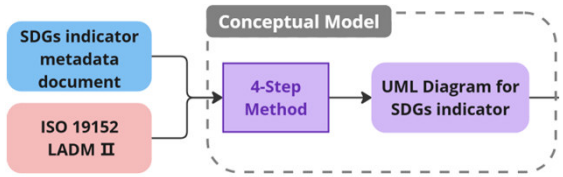
1. *Linking LADM and SDGs Using the Four-Step Method*

2. *Transition from Conceptual to Physical Model*

Linking LADM and SDGs Using the Four-Step Method



Conceptual Model for SDG Indicator 1.4.2



CASE

the SDG Indicator 1.4.2 *"Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure"*

from a cadaster system compliant with LADM

$$\text{Part (A):} \frac{People\ (adult)\ with\ legally\ recognized\ documentation\ over\ land}{Total\ adult\ population} \times 100$$

from censuses or inter-censual projections

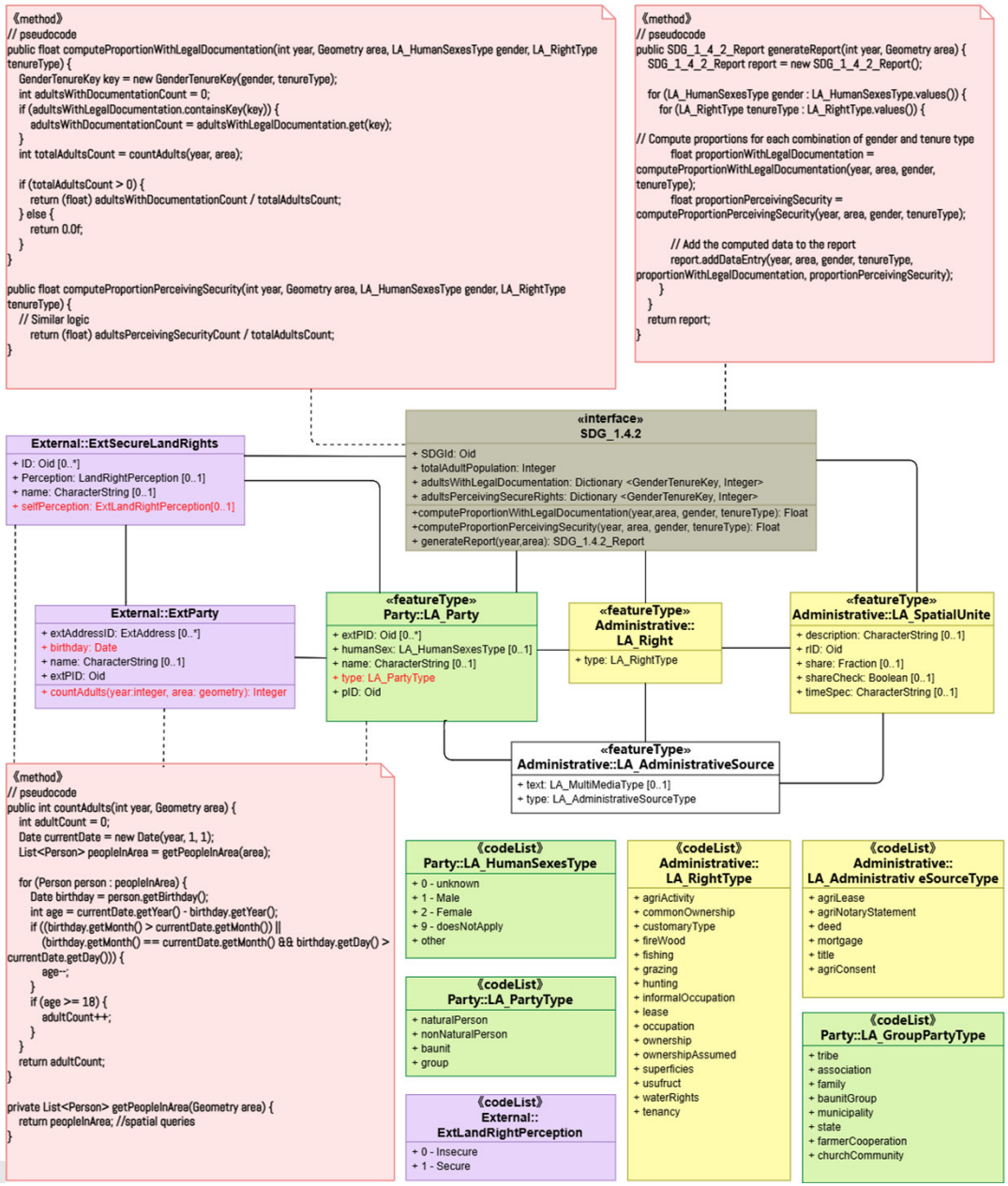
$$\text{Part (B):} \frac{People\ (adult)\ who\ perceive\ their\ rights\ as\ secure}{Total\ adult\ population} \times 100$$

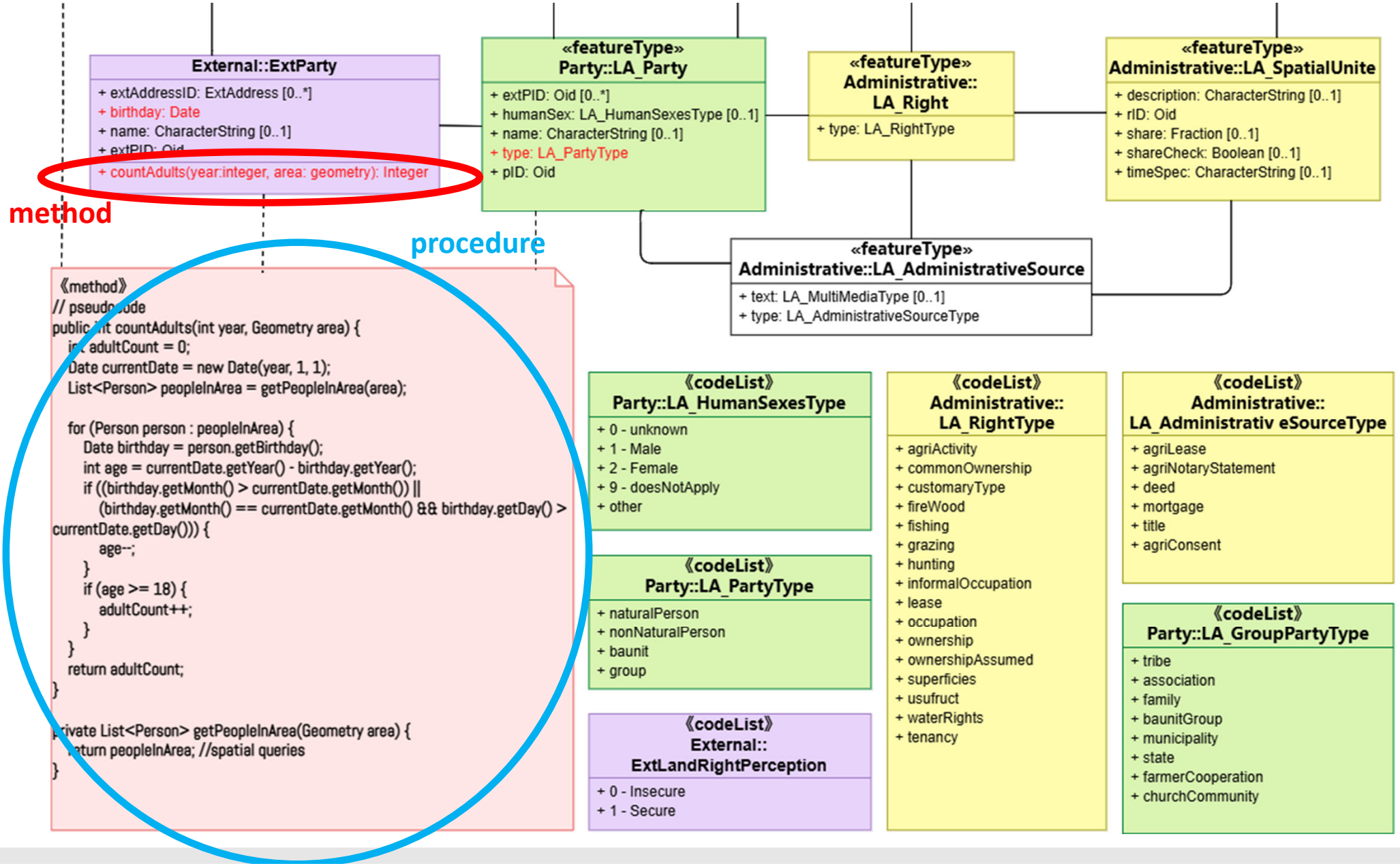
household survey

Conceptual Model for SDG Indicator 1.4.2

Create UML

Existing LADM Class	Attributes Used in the Case	Notes
LA_Party	+gender:LA_HumanSexesType[0..1]	Highlighted to facilitate gender-based classification and calculation.
LA_Right	LA_RightType	Delineating various land tenure types, echoing the "type of tenure" parameter in the indicator. The specific right types are detailed in the "Code List."
LA_AdministrativeSource	+type:LA_AdministrativeSourceType	Signifying "Legally recognized documentation." Its code list meticulously enumerates the possible values, such as agriLease, deed, and title.
LA_BAUnit		While not the focal point, it is outlined to underscore the indicator's emphasis on rights over land.



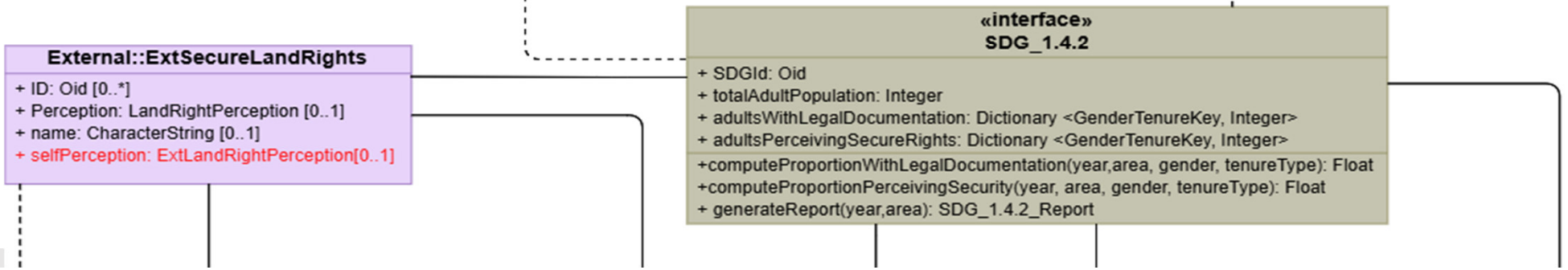

External::ExtParty
+ extAddressID: ExtAddress [0..*]
+ birthday: Date
+ name: CharacterString [0..1]
+ extPID: Oid
+ countAdults(year:integer, area: geometry): Integer
method
«featureType»
Party::LA_Party
+ extPID: Oid [0..*]
+ humanSex: LA_HumanSexesType [0..1]
+ name: CharacterString [0..1]
+ type: LA_PartyType
+ pID: Oid
«featureType»
Administrative::
LA_Right
+ type: LA_RightType
«featureType»
Administrative::LA_SpatialUnite
+ description: CharacterString [0..1]
+ rID: Oid
+ share: Fraction [0..1]
+ shareCheck: Boolean [0..1]
+ timeSpec: CharacterString [0..1]
«featureType»
Administrative::LA_AdministrativeSource
+ text: LA_MultiMediaType [0..1]
+ type: LA_AdministrativeSourceType
procedure
《method》
// pseudocode
public int countAdults(int year, Geometry area) {
int adultCount = 0;
Date currentDate = new Date(year, 1, 1);
List<Person> peopleInArea = getPeopleInArea(area);
for (Person person : peopleInArea) {
Date birthday = person.getBirthday();
int age = currentDate.getYear() - birthday.getYear();
if ((birthday.getMonth() > currentDate.getMonth()) ||
(birthday.getMonth() == currentDate.getMonth() && birthday.getDay() >
currentDate.getDay())) {
age--;
}
if (age >= 18) {
adultCount++;
}
}
return adultCount;
}
private List<Person> getPeopleInArea(Geometry area) {
return peopleInArea; //spatial queries
}
《codeList》
Party::LA_HumanSexesType
+ 0 - unknown
+ 1 - Male
+ 2 - Female
+ 9 - doesNotApply
+ other
《codeList》
Party::LA_PartyType
+ naturalPerson
+ nonNaturalPerson
+ baunit
+ group
《codeList》
External::
ExtLandRightPerception
+ 0 - Insecure
+ 1 - Secure
《codeList》
Administrative::
LA_RightType
+ agriActivity
+ commonOwnership
+ customaryType
+ fireWood
+ fishing
+ grazing
+ hunting
+ informalOccupation
+ lease
+ occupation
+ ownership
+ ownershipAssumed
+ superficies
+ usufruct
+ waterRights
+ tenancy
《codeList》
Administrative::
LA_Administrativ eSourceType
+ agriLease
+ agriNotaryStatement
+ deed
+ mortgage
+ title
+ agriConsent
《codeList》
Party::LA_GroupPartyType
+ tribe
+ association
+ family
+ baunitGroup
+ municipality
+ state
+ farmerCooperation
+ churchCommunity

Conceptual Model for SDG Indicator 1.4.2

UML with methods and procedures

```
《method》
// pseudocode
public float computeProportionWithLegalDocumentation(int year, Geometry area, LA_HumanSexesType gender, LA_RightType
tenureType) {
   GenderTenureKey key = new GenderTenureKey(gender, tenureType);
   int adultsWithDocumentationCount = 0;
   if (adultsWithLegalDocumentation.containsKey(key)) {
      adultsWithDocumentationCount = adultsWithLegalDocumentation.get(key);
   }
   int totalAdultsCount = countAdults(year, area);

   if (totalAdultsCount > 0) {
      return (float) adultsWithDocumentationCount / totalAdultsCount;
   } else {
      return 0.0f;
   }
}

public float computeProportionPerceivingSecurity(int year, Geometry area, LA_HumanSexesType gender, LA_RightType
tenureType) {
   // Similar logic
      return (float) adultsPerceivingSecurityCount / totalAdultsCount;
}
```

```
《method》
// pseudocode
public SDG_1_4_2_Report generateReport(int year, Geometry area) {
   SDG_1_4_2_Report report = new SDG_1_4_2_Report();

   for (LA_HumanSexesType gender : LA_HumanSexesType.values()) {
      for (LA_RightType tenureType : LA_RightType.values()) {

// Compute proportions for each combination of gender and tenure type
         float proportionWithLegalDocumentation =
computeProportionWithLegalDocumentation(year, area, gender,
tenureType);
         float proportionPerceivingSecurity =
computeProportionPerceivingSecurity(year, area, gender, tenureType);

         // Add the computed data to the report
         report.addDataEntry(year, area, gender, tenureType,
proportionWithLegalDocumentation, proportionPerceivingSecurity);
      }
   }
   return report;
}
```



Tools Used

PostgreSQL PostGIS

QGIS

Enterprise Architect

PostgreSQL
open-source relational database used to store and manage spatial and non-spatial data

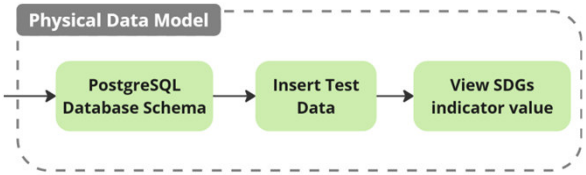
PostGIS
a spatial database extender for PostgreSQL, enabling advanced geographic queries and spatial data processing

QGIS

- Open-source Geographic Information System used for spatial data visualization, analysis, and mapping
- Can link to PostgreSQL/PostGIS

Transition from Conceptual to Physical Model

Model Transformation Strategy



- **Class-to-Table Mapping:**
  Translates LADM classes (e.g., LA Party, LA SpatialUnit) into database tables.Maintains integrity of relationships using foreign key constraints

- **Attribute-to-Column Mapping:**
  Maps attributes to database fields with standard data types; custom data types for specialized needs

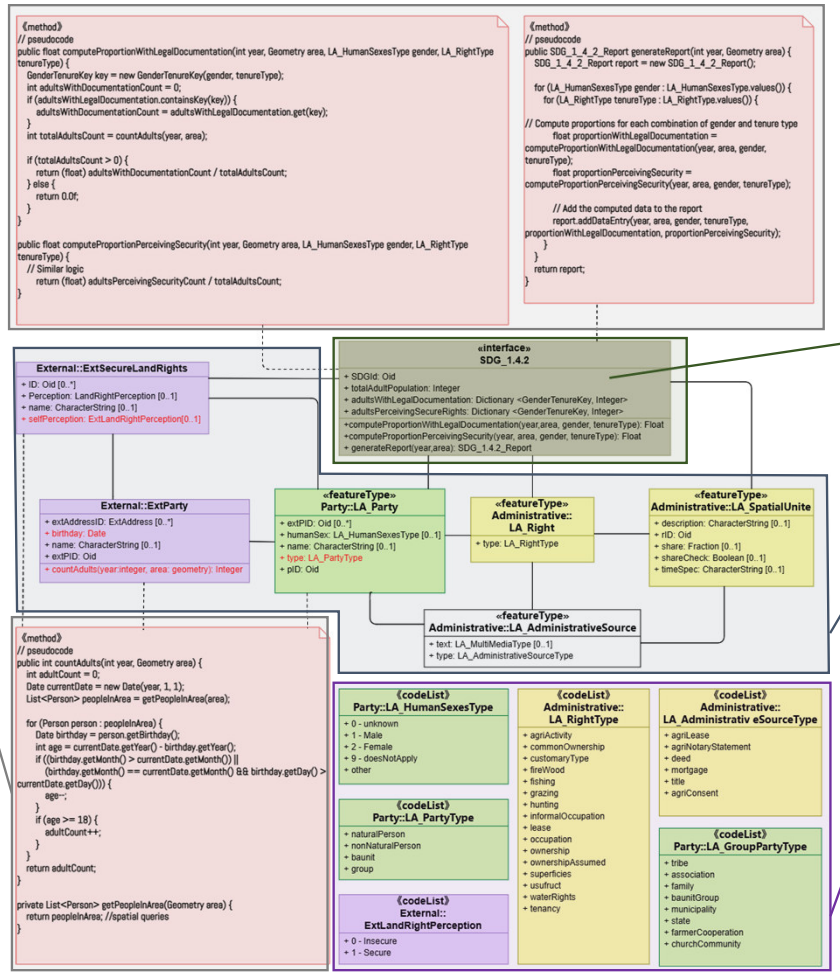
- **Normalization:**
  Reduces redundancy and ensures data integrity through database normalization

- **Hierarchical Mapping:**
  Implements class hierarchies (e.g., versioned objects) using hierarchical table structures

UML structure

SDG Indicator 1.4.2 *"Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure"*

Method to Function

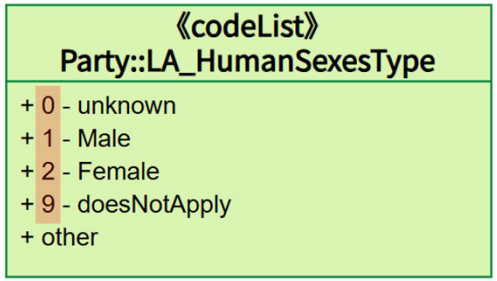


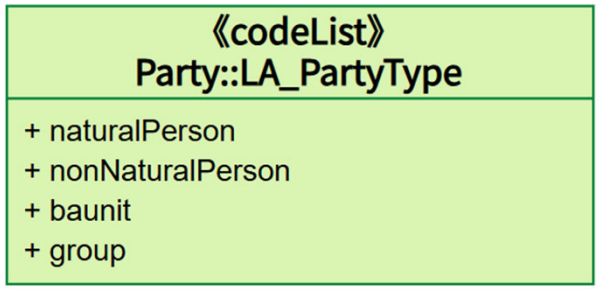
Interface to View

Class to Table

Codelist to Table

Codelist to Table

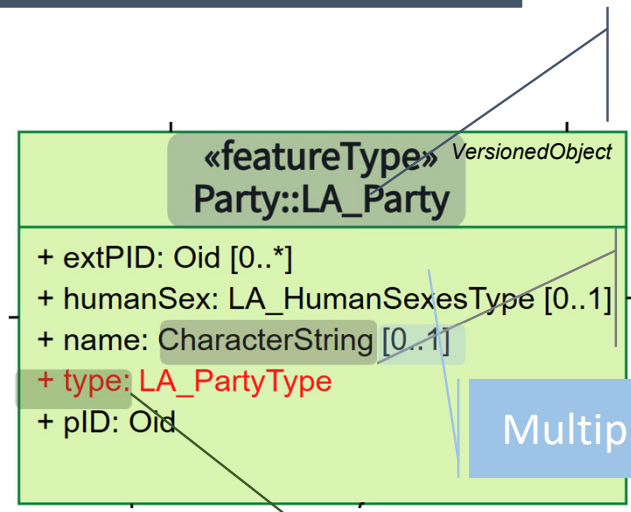





```
CREATE TABLE LA_HumanSexesType (
    hst_id INTEGER UNIQUE NOT NULL,
    hst_description TEXT NOT NULL UNIQUE
);
INSERT INTO LA_HumanSexesType (hst_id, hst_description ) VALUES
(0, 'unknown'),
(1, 'Male'),
(2, 'Female'),
(9, 'doesNotApply'),
(99, 'other');
```

```
CREATE TABLE LA_PartyType (
    pt_id SERIAL PRIMARY KEY,
    pt_description TEXT NOT NULL UNIQUE
);
INSERT INTO LA_PartyType (pt_description ) VALUES
('naturalPerson'),
('nonNaturalPerson'),
('baunit'),
('group');
```

Class to Table



Class Name

Table Name

Attribute Type

Data Type

Multiplicity

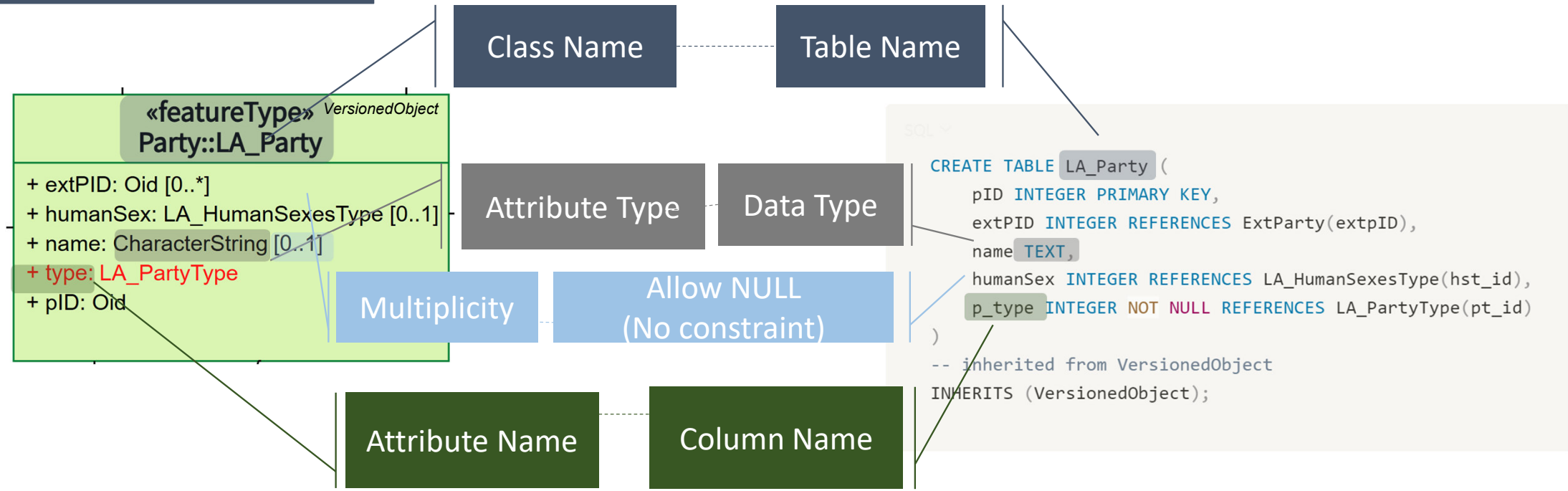
Allow NULL
(No constraint)

Attribute Name

Column Name

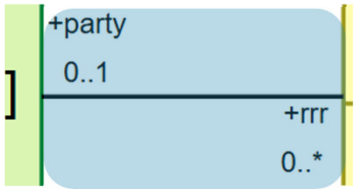
```sql
CREATE TABLE LA_Party (
    pID INTEGER PRIMARY KEY,
    extPID INTEGER REFERENCES ExtParty(extpID),
    name TEXT,
    humanSex INTEGER REFERENCES LA_HumanSexesType(hst_id),
    p_type INTEGER NOT NULL REFERENCES LA_PartyType(pt_id)
)
-- inherited from VersionedObject
INHERITS (VersionedObject);
```

Class to Table



UML Component	SQL Representation	Example
Class Name	Table Name	UML Class: LA_Party → SQL Table: LA_Party
Attribute Name	Column Name	UML Attribute: name → SQL Column: name
Attribute Type	Data Type	UML Type: CharacterString → SQL Type: TEXT
Multiplicity: 1	NOT NULL Constraint	UML Multiplicity: 1 → SQL Constraint: name TEXT NOT NULL
Multiplicity: 0..1	Allow NULL (No constraint)	UML Multiplicity: 0..1 → SQL Column: name TEXT
Multiplicity: 0..*	Many-to-Many Relationship, Association Table	UML Multiplicity: 0..* → Requires a join table
unique identifier	PRIMARY KEY Constraint	UML Attribute: pID → SQL: pID INTEGER PRIMARY KEY
Inheritance(usually in italics in the upper right corner)	INHERITS keyword (for PostgreSQL)	UML: LA_Party inherits VersionedObject → SQL: INHERITS (VersionedObject)
Visibility (public/private/protected)	Ignored in SQL, all attributes accessible	N/A
Initial Value	DEFAULT Clause	UML availabilityStatus: LA AvailabilityStatusType = documentAvailable → SQL: availabilityStatus INTEGER DEFAULT 1(the id of documentAvailable)

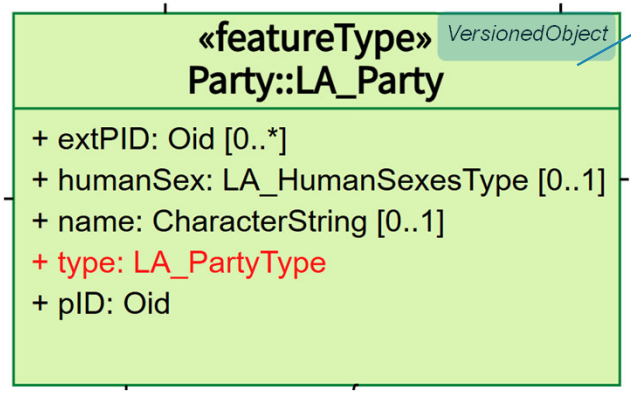
Class to Table: Relationships Between Tables



Association

```
CREATE TABLE LA_Right (
    rID INTEGER PRIMARY KEY,
    r_type INTEGER NOT NULL REFERENCES LA_RightType (rt_id),

    -- inherited from LA_RRR
    suID INTEGER REFERENCES la_spatialunit(suid),
    pID INTEGER REFERENCES la_party(pid),
```

Use foreign keys



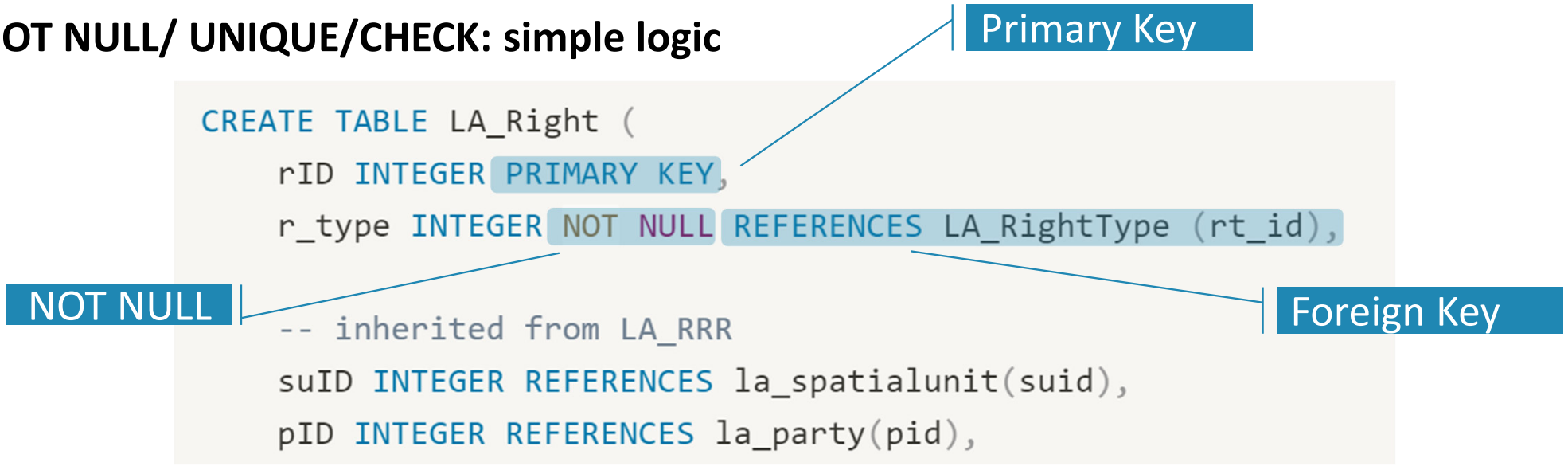
Inheritance

```
CREATE TABLE LA_Party (
    pID INTEGER PRIMARY KEY,
    extPID INTEGER REFERENCES ExtParty(extpID),
    name TEXT,
    humanSex INTEGER REFERENCES LA_HumanSexesType(hst_id),
    p_type INTEGER NOT NULL REFERENCES LA_PartyType(pt_id)
)
-- inherited from VersionedObject
INHERITS (VersionedObject);
```

Use INHERITS keyword

Class to Table: Constraints

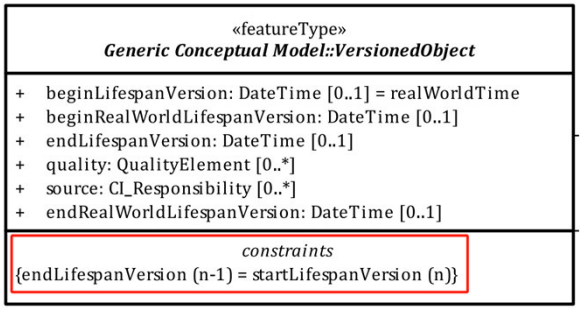
- **Primary Key: id**
- **Foreign Key: relationship between tables(Class to Class/ codelist to Class)**
- **NOT NULL/ UNIQUE/CHECK: simple logic**



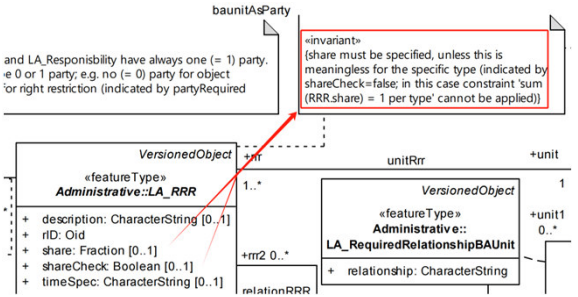
Class to Table: Constraints

Functions and Triggers for Complex Constraints

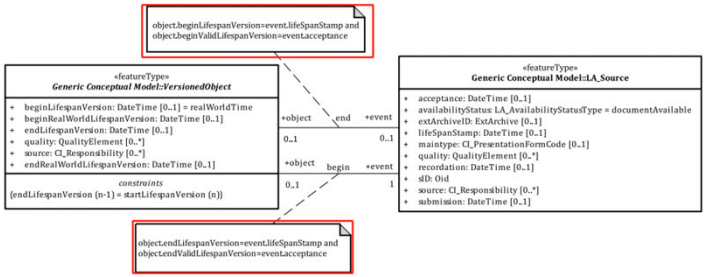
- **check version lifespan**



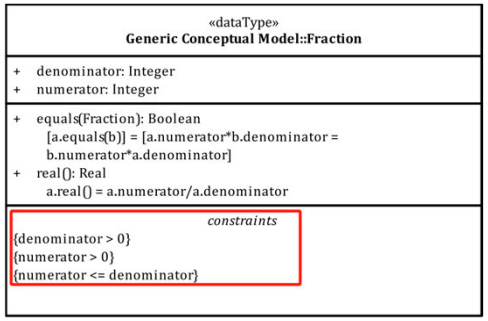
- **check share sum**



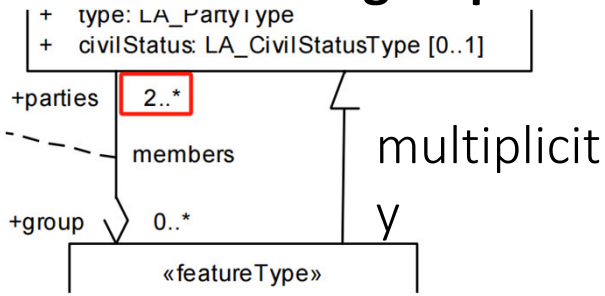
- **check source constraints**



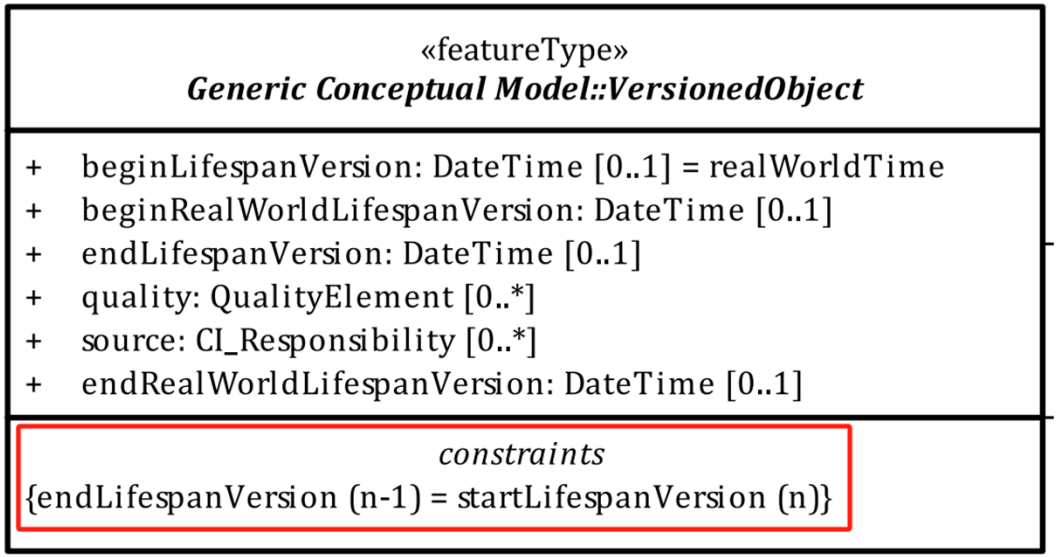
- **check fraction validity**



- **check minimum group members**



Class to Table: Constraints (example lifespan)



- For each version of a record, the end time of the previous version must match the start time of the next
- Prevents gaps in historical data, preserving data integrity and consistency

```
1  select * from la_party
```

Data Output | Messages | Notifications

	beginlifespanversion timestamp with time zone	endlifespanversion timestamp with tim	beginrealworldlifespanversion timestamp with time zone	endrealworldlifespanversion timestamp with time zone	pid [PK] integer	extpid integer	name text
1	2000-01-01 14:37:22+01	[null]	2000-01-01 00:00:00+01	[null]	10001	110001	M1

Class to Table: Constraints (example lifespan)

```
    IF NEW.endLifespanVersion IS NULL THEN
        query := format(
            'SELECT EXISTS (SELECT 1 FROM %I WHERE suid = $1)',
            TG_TABLE_NAME
        );
        EXECUTE query INTO suid_exists USING NEW.suid;
        IF suid_exists = FALSE THEN
            RETURN NEW;
        END IF;
```

If no previous record exists for suid, skips the continuity check since it's the first entry for this suid.

```
        query := format(
            'SELECT endLifespanVersion FROM %I WHERE suid = $1 AND endLifespanVersion IS
NOT NULL ORDER BY endLifespanVersion DESC LIMIT 1',
            TG_TABLE_NAME
        );

        EXECUTE query INTO prev_endLifespanVersion USING NEW.suid;
```

Retrieves the endLifespanVersion of the most recent record for the same suid if it exists

Class to Table: Constraints (example lifespan)

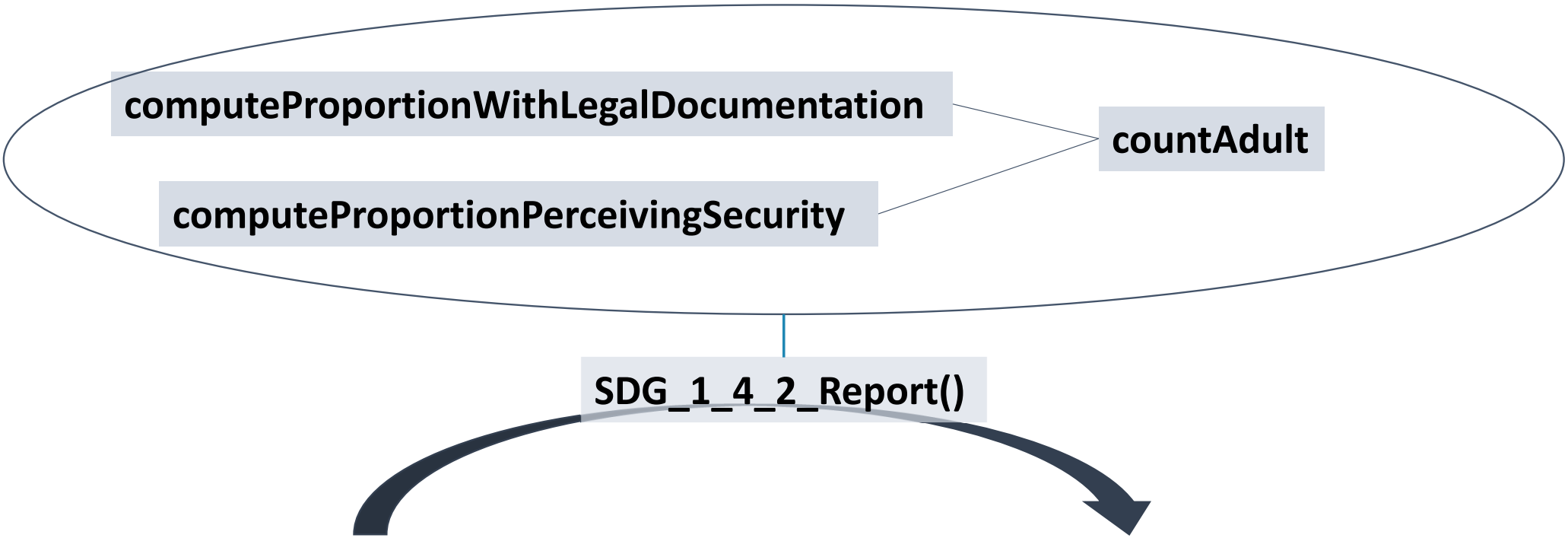
```
    IF NEW.endLifespanVersion IS NULL THEN
        query := format(
            'SELECT EXISTS (SELECT 1 FROM %I WHERE suid = $1)',
            TG_TABLE_NAME
        );
        EXECUTE query INTO suid_exists USING NEW.suid;
        IF suid_exists = FALSE THEN
            RETURN NEW;
        END IF;
```

If no previous record exists for suid, skips the continuity check since it's the first entry for this suid

```
        IF prev_endLifespanVersion IS NOT NULL AND prev_endLifespanVersion <> NEW.beginL
ifespanVersion THEN
            RAISE EXCEPTION 'Lifespan continuity error in table % for suid %: previous e
ndLifespanVersion % does not match new beginLifespanVersion %',
                            TG_TABLE_NAME, NEW.suid, prev_endLifespanVersion, NEW.beginL
ifespanVersion;
        END IF;
```

Raises an exception if they don't match, preventing data inconsistency

Method to Functions



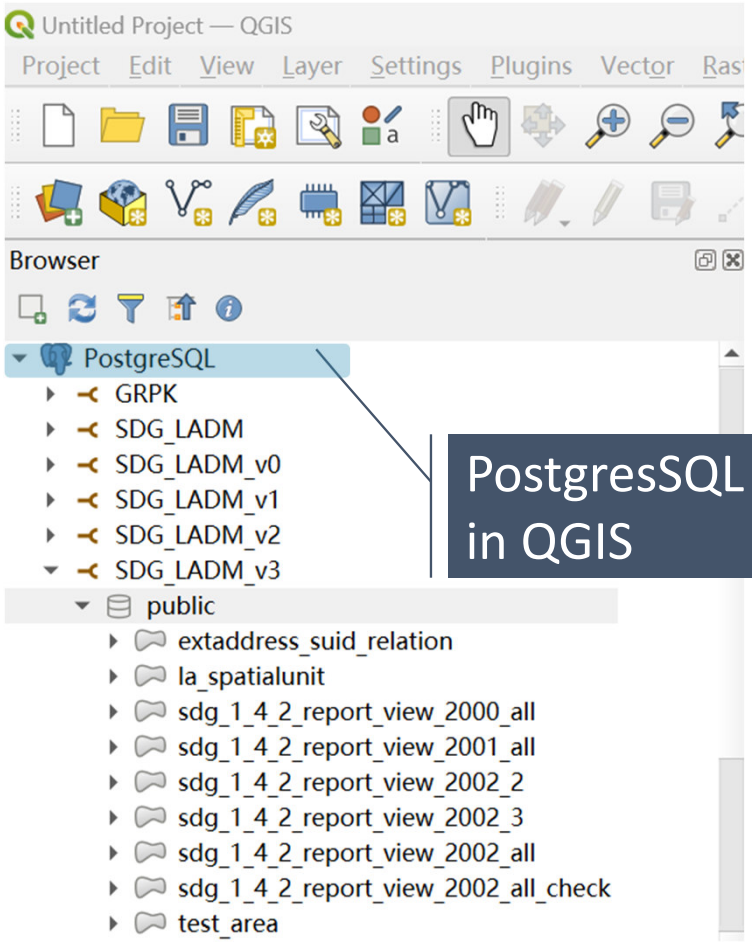

```
SELECT *
FROM SDG_1_4_2_Report(
  '2000-01-01 00:00:00',
  '2001-01-01 00:00:00',
  (SELECT geom FROM test_area WHERE id = 1)
);
```

	report_region geometry	report_category text	report_subcategory text	report_totaladultscount integer	report_proportionperceivingsecurity double precision	report_proportionwithlegaldocumentation double precision
1	01030000204071...	total	[null]	17	0.47058823529411764	0.47058823529411764
2	01030000204071...	gender	9	17	0	0
3	01030000204071...	gender	2	17	0.23529411764705882	0.23529411764705882
4	01030000204071...	gender	1	17	0.23529411764705882	0.23529411764705882
5	01030000204071...	tenure_type	11	17	0.47058823529411764	0.47058823529411764

Input: time interval and area

Output: indicator values by category

QGIS visualization



PostgresSQL in QGIS

(a) Multi-Level Map

(b) Female Proportion Perceiving Security in First-level Map

(c) Female Proportion Perceiving Security in second-level Map

(a) Overall Proportion Perceiving Security

(b) Female Proportion Perceiving Security

(c) Ownership Proportion Perceiving Security

(d) Overall Proportion with Legal Documentation

Validation of constraints

Use of invalid data to test whether the system can accurately recognise and report errors

Example: check_version_lifespan_continuity

```
UPDATE LA_Right
SET
    endLifespanVersion = '2001-01-01 08:35:03',
    endRealWorldLifespanVersion = '2001-01-01 00:00:00'
WHERE
    rID = 20004;
```

```
INSERT INTO LA_Right (rID, r_type, suID, pID, share, shareCheck, timeSpec, beginLifespan
Version, endLifespanVersion, beginRealWorldLifespanVersion, endRealWorldLifespanVersion)
VALUES
(20014, 11, 30004, 10013, '(1,1)', TRUE, NULL, '2001-01-02 08:35:03', NULL, '2001-01-01
00:00:00', NULL);
```

Data Output | Messages | Notifications

```
ERROR:  Error occurred in check_version_lifespan_continuity: Lifespan continuity error in table la_right for suid 30004: previous
endLifespanVersion 2001-01-01 08:35:03+01 does not match new beginLifespanVersion 2001-01-02 08:35:03+01
CONTEXT:  在RAISE的第45行的PL/pgSQL函数check_version_lifespan_continuity()
```

Contributions

- **Standardized Solution for SDG Calculation**:
  - Utilizes ISO 19152 LADM for systematic, standardized calculation of SDG indicators in land administration
  - Promotes global standardization and consistency
- **Automated System for Dynamic Data Processing**:
  - Efficiently processes land rights changes, population dynamics, and administrative updates
  - Enhances accuracy and efficiency in monitoring SDG 1.4.2
- **Foundation for Future Research and Applications**:
  - Validates feasibility with simulated data, setting groundwork for real-world applications
  - Provides a reference for expanding to other SDG indicators and for policy development

Future work

- **Application to Other SDG Indicators**

Extend the system to support additional land-related SDGs, such as:

SDG 11: Sustainable Cities and Communities

SDG 15: Life on Land

- **Integration of Real-World Data**

- **Enhancement of User Interface and Reporting**

The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

2nd relevant SDG

3rd relevant SDG

SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

Further reading

- Mengying Chen, Peter Van Oosterom, Eftychia Kalogianni, Paula Dijkstra, Christiaan Lemmen, Bridging Sustainable Development Goals and Land Administration: The Role of the ISO 19152 Land Administration Domain Model in SDG Indicator Formalization, In: Land, MDPI AG, 13(491), pp. 27, 2024. pdf

- Mengying Chen, Formalizing land indicators for SDGs: Implementation and evaluation using international standards, Master's thesis, Geomatics, Delft University of Technology, pp. 133, 2024. pdf

3D Land Administration

FIG

13th International FIG Workshop on LADM & 3D LA
3-5 November 2025, Florianópolis, Santa Catarina, Brazil

Português | Español | English | Workshop Programme

Deadline submission
Extended abstract
(500-1000 words):
15 May 2025

https://www.gdmc.nl/3DCadastres/workshop2025/

some news!

News in 2025

Two New Publications: The Land Administration Domain Model – an overview, and LADM in the Classroom

March 2025

In 2012, the Land Administration Domain Model (LADM) was approved as an official ISO standard. The LADM is a conceptual information model. It describes and structures the core of a land administration: information about people, about land and about people to land relationships.

News in 2025

Two New Publications. The Land Administration Domain Model – and overview, and LADM in the Classroom

New Publication: A CALL TO ACTION: Climate Responsible Land Governance and Disaster Resilience. Safeguarding Land Rights

Global Surveyors Day 2025

FIG General Assembly 2025 – Agenda

FIG CONGRESS 2026, A site visit Cape Town

She's measuring more than land; she's shaping the future

Memorandum of Understanding between FIG Commission 9 and the International Valuation Standards Council (IVSC)

LADM in the Classroom

Extended version

This book introduces the reader to the Land Administration Domain Model (LADM) through examples. It starts by giving the reader an overview of core LADM concepts then proceeds to illustrate how data about different people-to-land relationships can be organized using LADM. Each example represents a scenario that can be encountered in a Land Administration System. The scenarios used in examples are derived from the Land Administration System of the hypothetical town of Watteriver together with its surrounding rural areas. Each case, representing a particular scenario, is presented both conceptually and using a simplified representation of a database in which data are stored concretely. A demonstration dataset, accompanying GIS project, and reusable slides are available online - details in the book.

The Land Administration Domain Model - An Overview

FIG Publication 84 - FIG Guide

This publication gives an overview of LADM. The publication is intended for anyone wishing to learn more about LADM: why is it needed, how is it designed, what is it and what are the benefits. This overview publication has an extended version titled 'LADM in the Classroom' with a focus to training and higher education.

Read more

Read the publication in PDF

https://www.fig.net/news/news_2025/03_pub84_ladm.asp

LADM in the Classroom

Extended version

This book introduces the reader to the Land Administration Domain Model (LADM) through examples. It starts by giving the reader an overview of core LADM concepts then proceeds to illustrate how data about different people-to-land relationships can be organized using LADM. Each example represents a scenario that can be encountered in a Land Administration System. The scenarios used in examples are derived from the Land Administration System of the hypothetical town of Watteriver together with its surrounding rural areas. Each case, representing a particular scenario, is presented both conceptually and using a simplified representation of a database in which data are stored concretely. A demonstration dataset, accompanying GIS project, and reusable slides are available online - details in the book.

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Read more

Read the publication in PDF

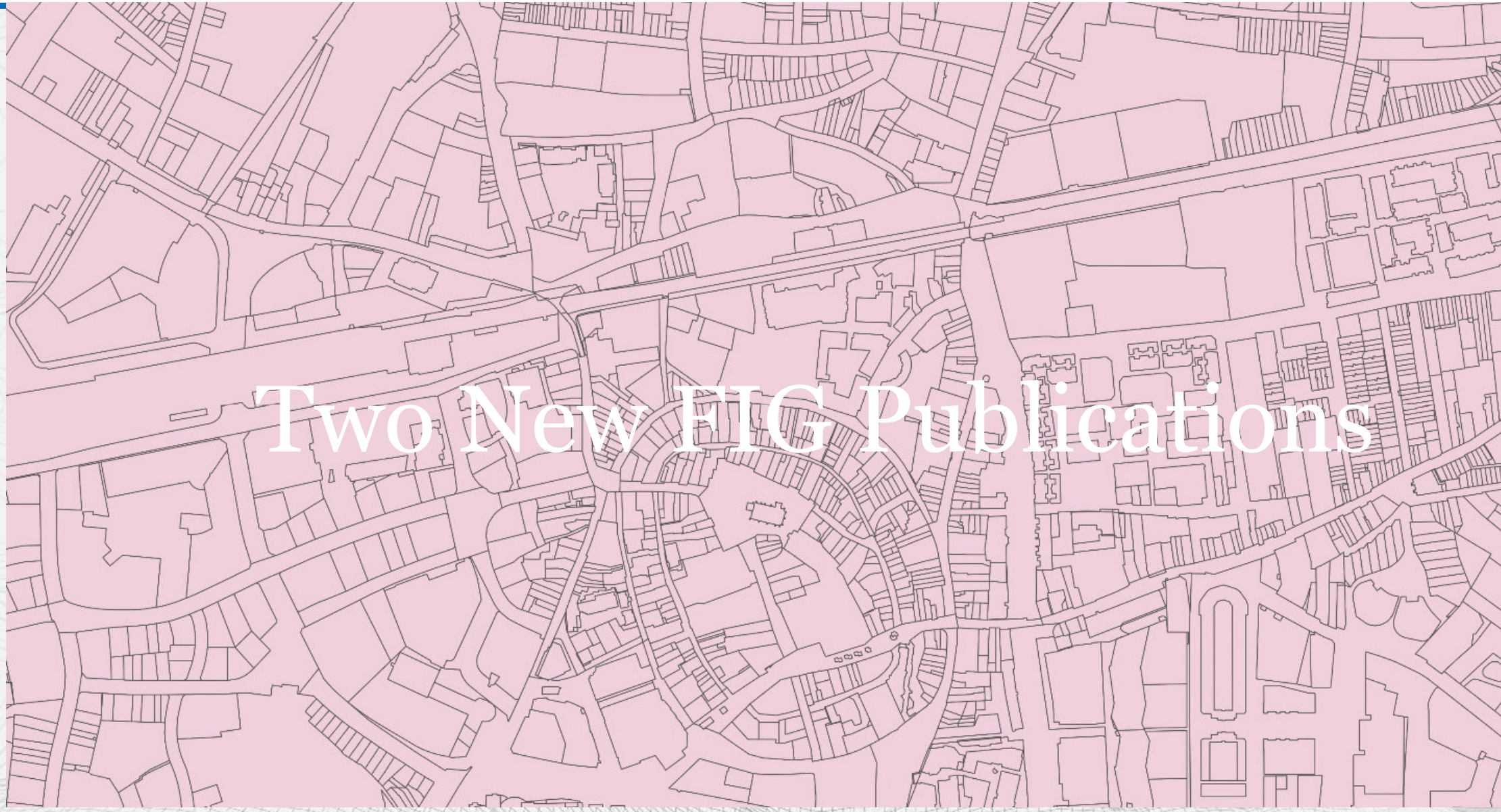
https://www.fig.net/news/news_2025/03_pub84_ladm.asp

New Edition of the Land Administration Domain Model Now Nearly Completed

Peter van Oosterom, Christiaan Lemmen, Abdullah Kara

Wednesday 9 April 2025 (**nearly same** presentation as in FIG Standards network session Monday 7 April 2025)

FIG Working Week 2025, Brisbane, Australia

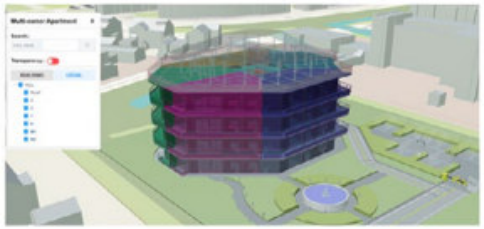


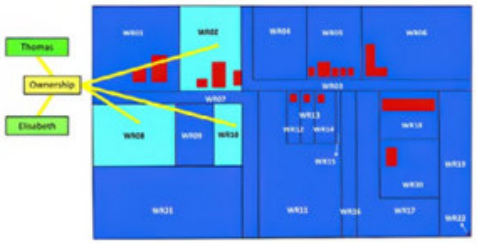
Two New FIG Publications

FIG GUIDE

FIG PUBLICATION
NO 84

The Land Administration Domain Model
An Overview

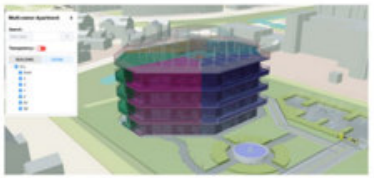


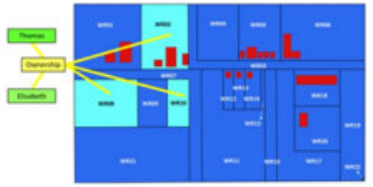
party — right — property — spatial unit

INTERNATIONAL FEDERATION OF SURVEYORS (FIG)

PUBLICATION –
EXTENDED VERSION

LADM in the Classroom

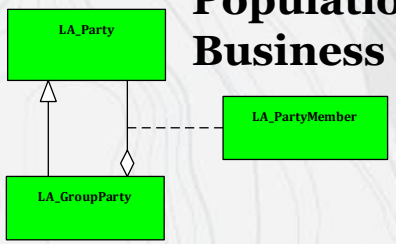





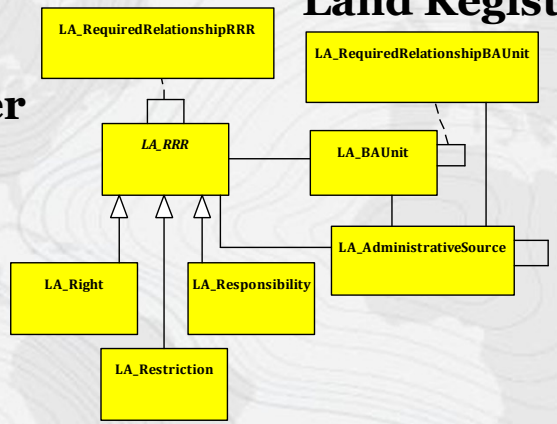
party — right — property — spatial unit

UNIVERSITY OF TWENTE. | ITC | TU Delft | kadaster

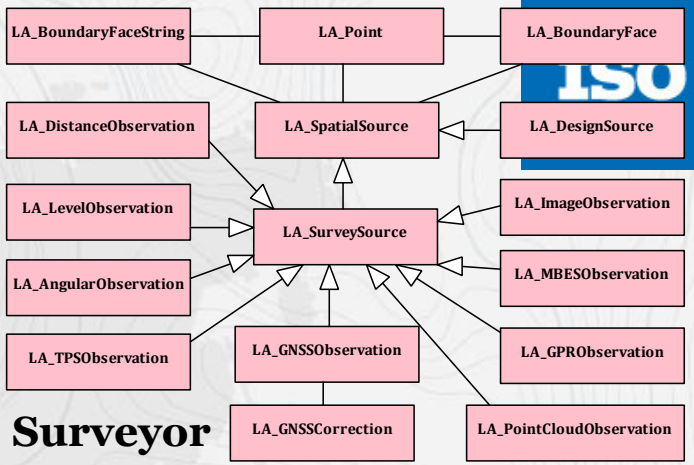
Land Administration in Distributed Environment



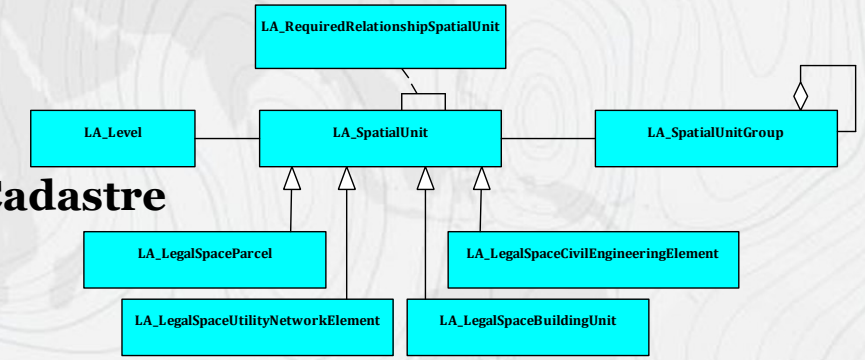
Population + Business Register



Land Registry

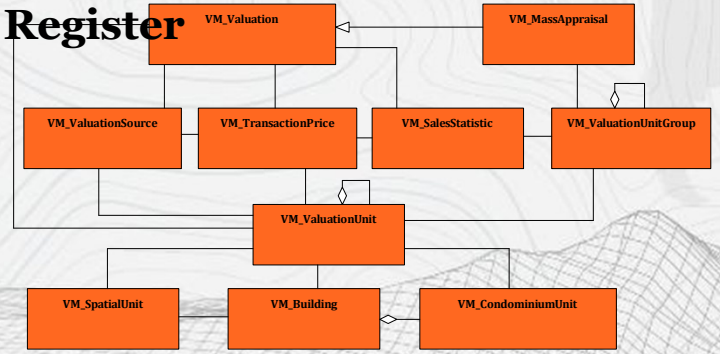


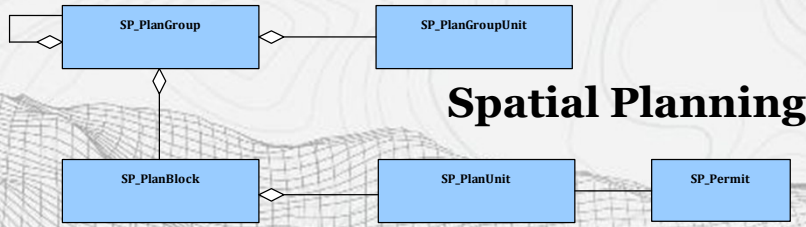
Surveyor



Cadastre

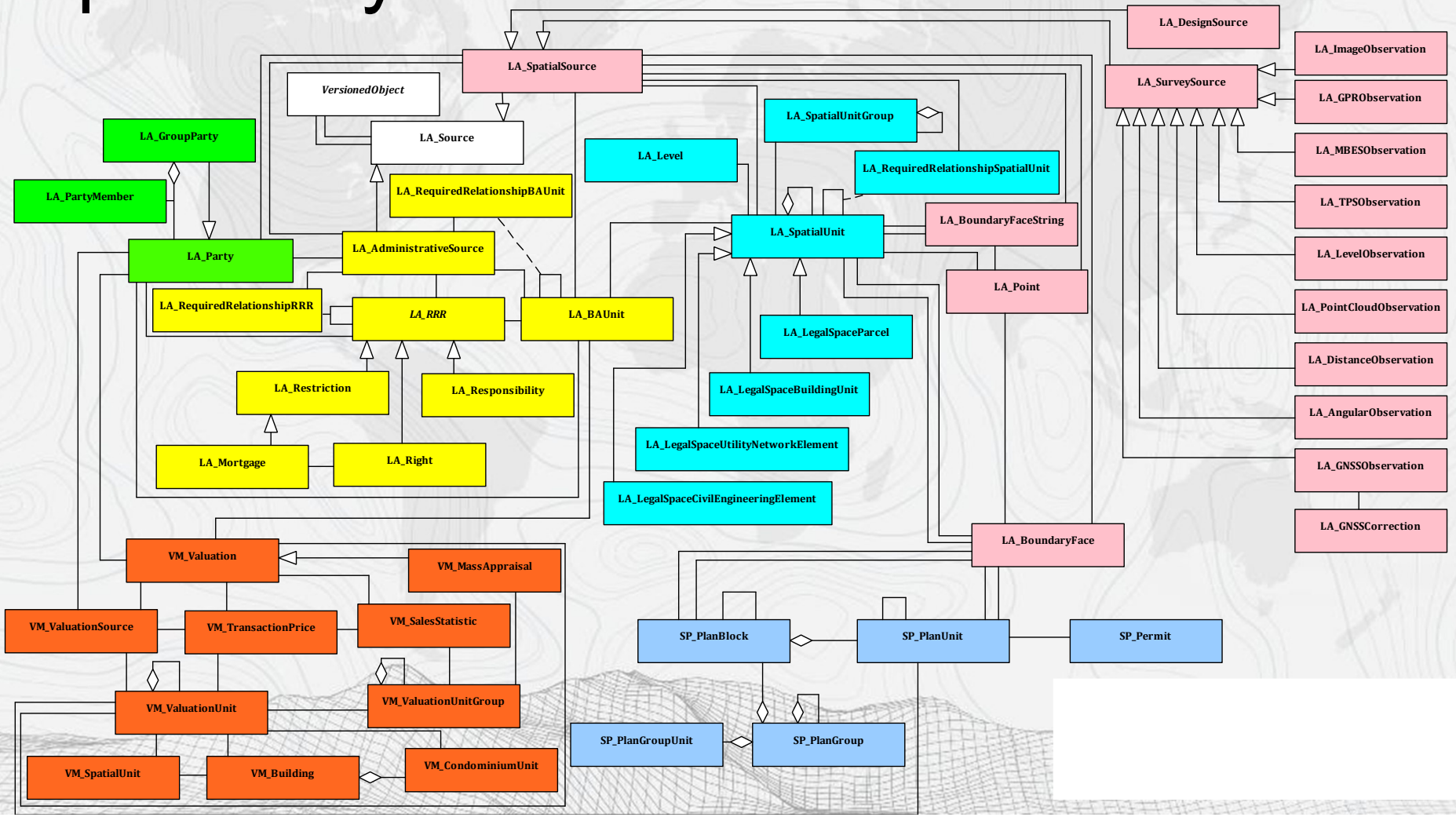
Valuation Register



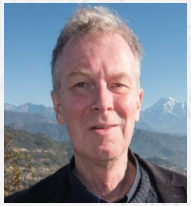


Spatial Planning

LADM is the foundation for Interoperability



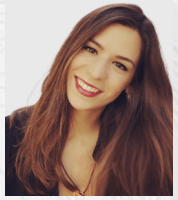
The Land Administration Domain Model
An Overview



Christiaan Lemmen

Peter van Oosterom

Abdullah Kara



Eftychia Kalogianni

LADM:

- information model for land administration
- land and sea
- land tenure, land value and planned land use
- language, common vision
- system development – interoperability
- GIS and DBMS providers
- developed by FIG, ISO, IHO and OGC and others

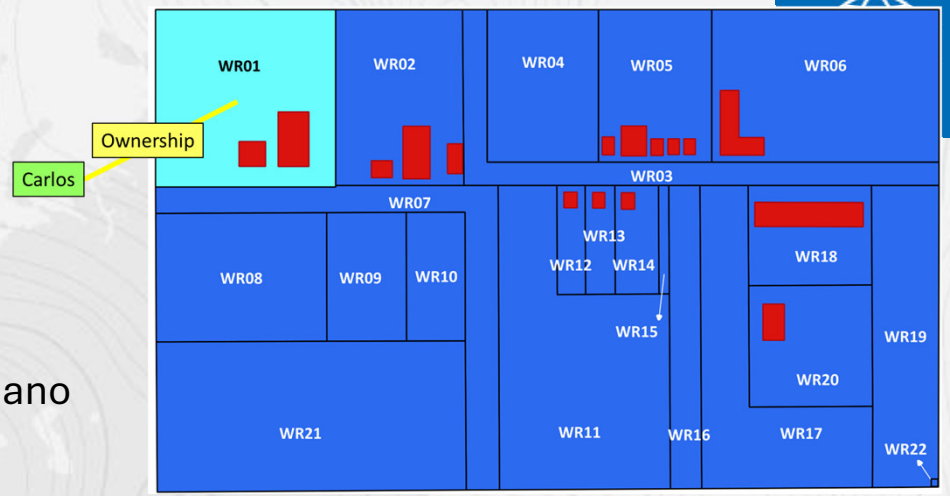
https://www.fig.net/resources/publications/figpub/

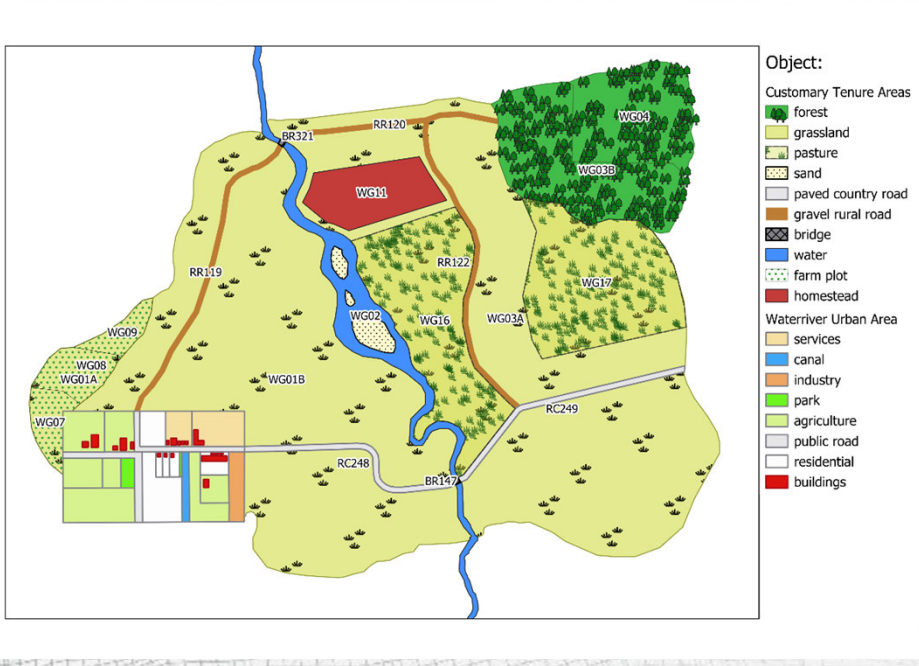
LADM in the Classroom

Christiaan Lemmen

Malumbo Chipofya

Andre da Silva Mano





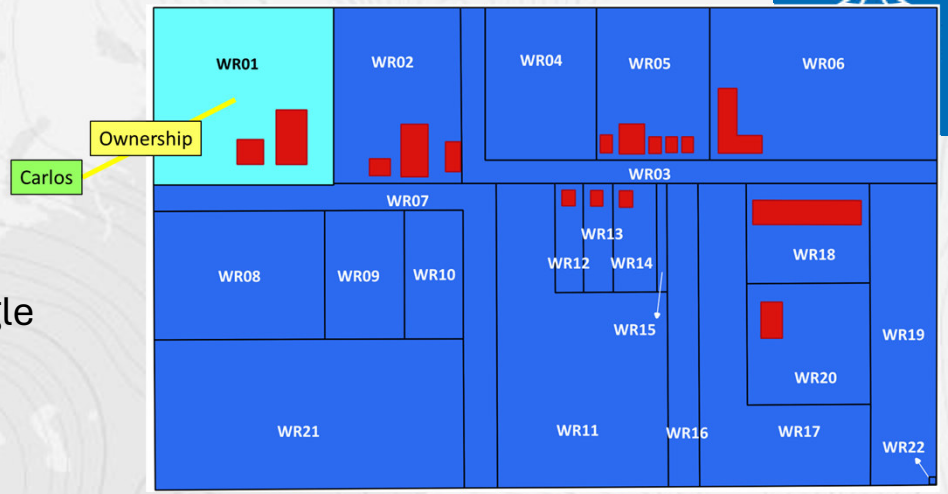
LADM in the Classroom

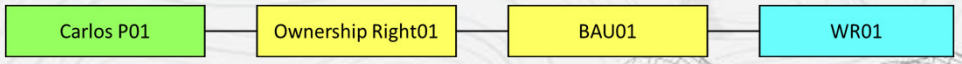
1

Teaching book has four elements plus associated resources downloadable online at https://ladm.itc.utwente.nl/ladm_classroom.

2

All examples illustrated with a single map and dataset.





3

Illustration of how land admin. data can be structured using specific instances.

	p_id	name
1	P01	Carlos

	r_id	type	share
1	Right01	Ownership	

	bau_id
1	BAU01

	su_id	area	geom	...
1	WR01			

4

Illustration of corresponding database structure

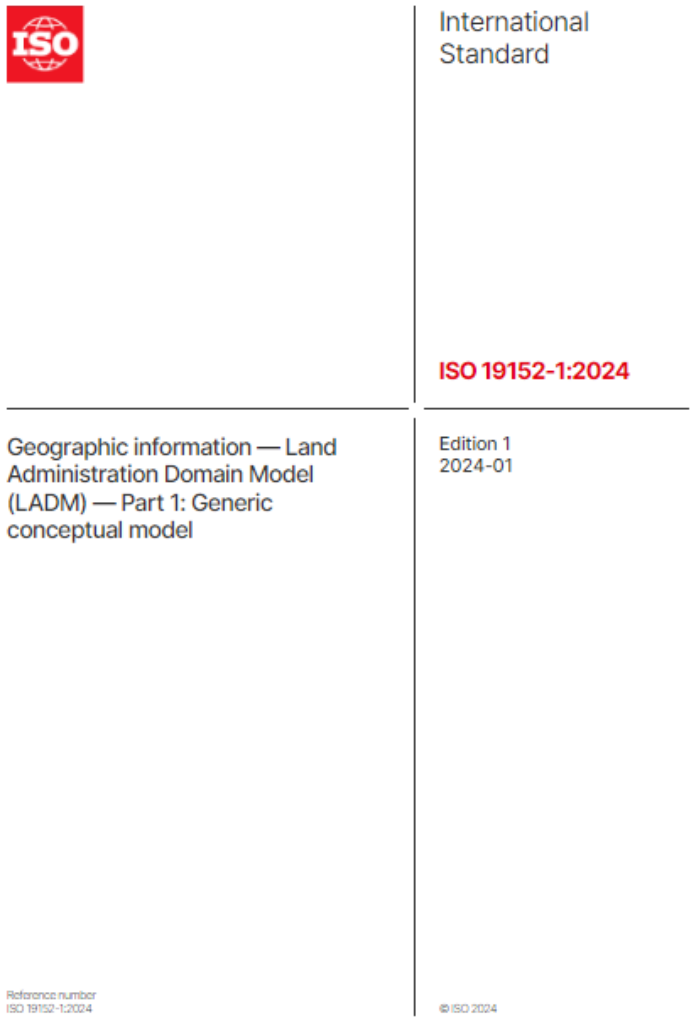
Status of various parts since previous WW

From part 1 to 5
a brief update

Note FIG publications available from:
https://www.fig.net/resources/publications/figpub/

ISO 19152 LADM – Part 1: Generic conceptual model

Published as an International Standard in January 2024



Results of voting on DIS of LADM Part 2

The results of voting on Draft International Standard (DIS) for LADM Part 2 Land registration:

- **Yes**: **24** [Australia (SA), Austria (ASI), China (SAC), Czech Republic (UNMZ), Finland (SFS), France (AFNOR), Indonesia (BSN), Jamaica (BSJ), Japan (JISC), Korea (KATS), Lithuania (LST), Malaysia (DSM), New Zealand (NZSO), Romania (ASRO), Russian Federation (GOST R), Saudi Arabia (SASO), Serbia (ISS), Slovakia (UNMS SR), Slovenia (SIST), South Africa (SABS), Spain (UNE), Sweden (SIS), United Kingdom (BSI), United States (ANSI)]
- **No**: **1** [Canada (SCC)]
- **Abstain**: **16** [Belgium (NBN), Chile (INN), Denmark (DS), Germany (DIN), Greece (NQIS ELOT), Hungary (MSZT), India (BIS), Iran (INSO), Italy (UNI), Netherlands (NEN), Norway (SN), Panama (DGNTI), Poland (PKN), Switzerland (SNV), Thailand (TISI), Turkey (TSE)]

What has been done from June 2024 to April 2025 – **ISO 19152-2 Land Registration**

- A total of **269 comments were received** on the **Draft International Standard (DIS) ballot**. Of these, 204 are editorial comments, 28 are technical comments and 37 are general comments.
- **Three online project team meetings** were organized on **7 October 2024, 8 October 2024 and 10 October 2024** to discuss the with the project team (**ISO/TC 211 experts of participating countries**).
- The **agreed resolutions were processed** in ISO 19152-2 Land Registration. These accepted comments include **redrawing all figures of LADM Part 2** (around 100 figures) in order to provide an editable figure to ISO/TC 211 and defining more than 200 code list value.

What has been done from June 2024 to April 2025 – **ISO 19152-2 Land Registration**

- On the changes in the document, the UML model of LADM Part 2 is updated. **The updated UML model is submitted to the Harmonised Model Maintenance Group (HMMG) of ISO/TC 211** and the new model is approved.
- Following HMMG approval, **ISO 19152-2 has been submitted to ISO/TC 211** for the **FDIS stage on 17 October 2024**. **On 18 November 2024**, it is registered as **ISO/FDIS 19152-2 to ISO**
- **Final Draft International Standard (FDIS) ballot for LADM Part 2 has been initiated on 10 February 2025.**

What is expected?

- The result of the FDIS vote was received yesterday **7 April 2025**. Now the vote is positive, the final stage, the International Standard, will be initiated by ISO. It is expected that LADM Part 2 will be published as an ISO International Standard in 2025.

Results of voting **FDIS** of LADM Part 2

The **yesterday** results of voting on Final Draft International Standard (FDIS) for LADM Part 2 Land registration:

- **Yes**: **28** [Australia (SA), Austria (ASI), China (SAC), Finland (SFS), France (AFNOR), Germany (DIN), India (BIS), Indonesia (BSN), Iran (INSO), Jamaica (BSJ), Japan (JISC), Korea (KATS), Lithuania (LST), Malaysia (DSM), New Zealand (NZSO), Nigeria (SON), Norway (SN), Russian Federation (GOST R), Saudi Arabia (SASO), Serbia (ISS), Slovakia (UNMS SR), Slovenia (SIST), South Africa (SABS), Spain (UNE), Sweden (SIS), Thailand (TISI), United Kingdom (BSI), United States (ANSI)]
- **No**: **1** [Canada (SCC)]
- **Abstain**: **13** [Belgium (NBN), Chile (INN), Check Republic (UNMZ), Denmark (DS), Greece (NQIS ELOT), Hungary (MSZT), Italy (UNI), Netherlands (NEN), Poland (PKN), Portugal (IPQ), Romania (ASRO), Switzerland (SNV), Turkey (TSE)]

- **Note:** parallel voting in CEN (European countries), no negative vote

ISO 19152 LADM – Part 2: Land registration

Registered to ISO as a **Final Draft International Standard (FDIS)** in **November 2024**

ISO/FDIS 19152-2

Geographic information — Land Administration Domain Model (LADM)

Part 2: Land registration

Under development

This draft is in the approval phase.

← Will replace ISO 19152:2012

ISO 19152 LADM – Part 3: Marine georegulation

Published as an International Standard in July 2024

Results of voting on DIS of Part 4

The results of voting on Draft International Standard (DIS) for LADM Part 4 Valuation information:

- **Yes**: **19** [Australia (SA), Austria (ASI), China (SAC), France (AFNOR), Germany (DIN), India (BIS), Indonesia (BSN), Jamaica (BSJ), Korea (KATS), New Zealand (NZSO), Poland (PKN), Russian Federation (GOST R), Saudi Arabia (SASO), Slovakia (UNMS SR), Slovenia (SIST), Spain (UNE), Sweden (SIS), Turkey (TSE), United States (ANSI)]
- **No**: **1** [Canada (SCC)]
- **Abstain**: **18** [Belgium (NBN), Chile (INN), Czech Republic (UNMZ), Finland (SFS), Denmark (DS), Greece (NQIS ELOT), Hungary (MSZT), Iran (INSO), Italy (UNI), Japan (JISC), Malaysia (DSM), Netherlands (NEN), Norway (SN), Panama (DGNTI), Romania (ASRO), Portugal (IPQ), Serbia (ISS), South Africa (SABS), Switzerland (SNV), Thailand (TISI), United Kingdom (BSI)]

What has been done from June 2024 to April 2025 – **ISO 19152-4 Valuation information**

- A total of **116 comments were received** on the **Draft International Standard (DIS) ballot**. Of these, 97 are editorial comments, 3 are technical comments and 16 are general comments.
- **One online project team meetings** were organized on **18 November 2024,** to discuss the with the project team (**ISO/TC 211 experts of participating countries**).
- The **agreed resolutions were processed** in ISO 19152-4 Valuation information. These accepted editorial comments include **redrawing all figures of LADM Part 4** (around 30 figures) in order to provide an editable figure to ISO/TC 211 and defining more than 100 code list value.

What has been done from June 2024 to April 2025 – **ISO 19152-4 Valuation information**

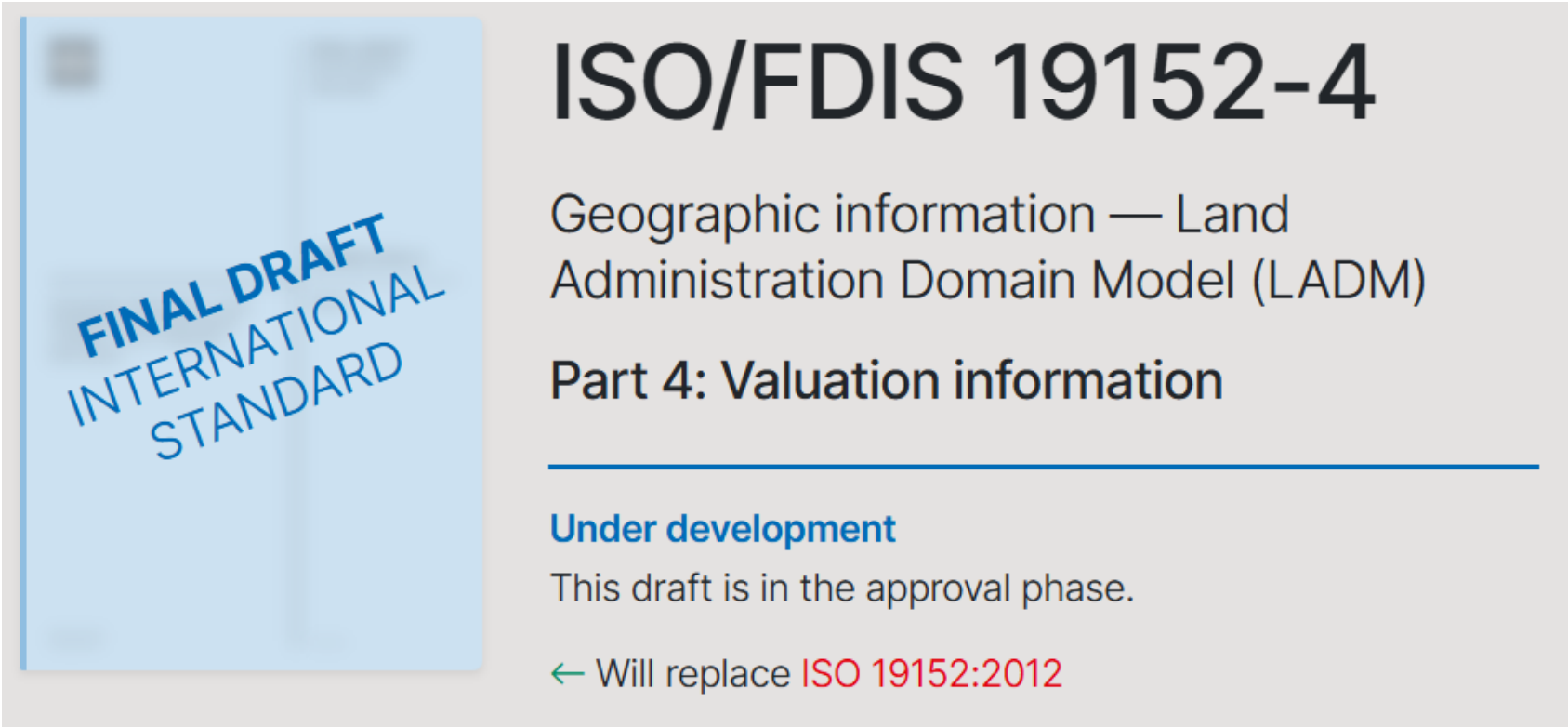
- Taking into account the changes in the document, the UML model of LADM Part 4 is updated. **The updated UML model is submitted to the Harmonised Model Maintenance Group (HMMG) of ISO/TC 211** and the new model is approved.
- Following HMMG approval, **ISO 19152-4 has been submitted to ISO/TC 211** for the **FDIS stage on 23 December 2024**. On **17 January 2025**, it is registered as **ISO/FDIS 19152-4 to ISO.**
- **Final Draft International Standard (FDIS) ballot for LADM Part 4 has been initiated in March 2025.**

What is expected?

- The result of the FDIS vote is expected in **June 2025**. If the vote is positive, the final stage, the International Standard, will be initiated by ISO. It is expected that LADM Part 4 will be published as an ISO International Standard in 2025.

ISO 19152 LADM – Part 4: Valuation information

Registered to ISO as a **Final Draft International Standard (FDIS)** in **January 2025**



Results of voting on DIS of Part 5

The results of voting on Draft International Standard (DIS) for LADM Part 5 Spatial plan information:

- **Yes: 28** [Australia (SA), Austria (ASI), China (SAC), Croatia (HZN), Czech Republic (UNMZ), Ethiopia (IES), Finland (SFS), France (AFNOR), Germany (DIN), Hungary (MSZT), India (BIS), Indonesia (BSN), Jamaica (BSJ), Korea (KATS), New Zealand (NZSO), Panama (DGNTI), Poland (PKN), Romania (ASRO), Russian Federation (GOST R), Saudi Arabia (SASO), Slovakia (UNMS SR), Slovenia (SIST), South Africa (SABS), Spain (UNE), Sweden (SIS), Thailand (TISI), United Kingdom (BSI), United States (ANSI)]
- **No: 1** [Canada (SCC)]
- **Abstain: 13** [Belgium (NBN), Chile (INN), Denmark (DS), Greece (NQIS ELOT), Iran (INSO), Italy (UNI), Japan (JISC), Malaysia (DSM), Netherlands (NEN), Norway (SN), Serbia (ISS), Switzerland (SNV), Turkey (TSE)]

What has been done from June 2024 to April 2025 – **ISO 19152-5 Spatial plan information**

- A total of **124 comments were received** on the **Draft International Standard (DIS) ballot**. Of these, 124 are editorial comments, 16 are technical comments and 24 are general comments.
- **Two online project team meetings** were organized on **19 -20 November 2024,** to discuss the with the project team (**ISO/TC 211 experts of participating countries**).
- The **agreed resolutions were processed** in ISO 19152-5 Spatial plan information. These accepted editorial comments include **redrawing all figures of LADM Part 5** (around 30 figures) in order to provide an editable figure to ISO/TC 211 and defining more than 100 code list value.

What has been done from June 2024 to April 2025 – **ISO 19152-5 Spatial plan information**

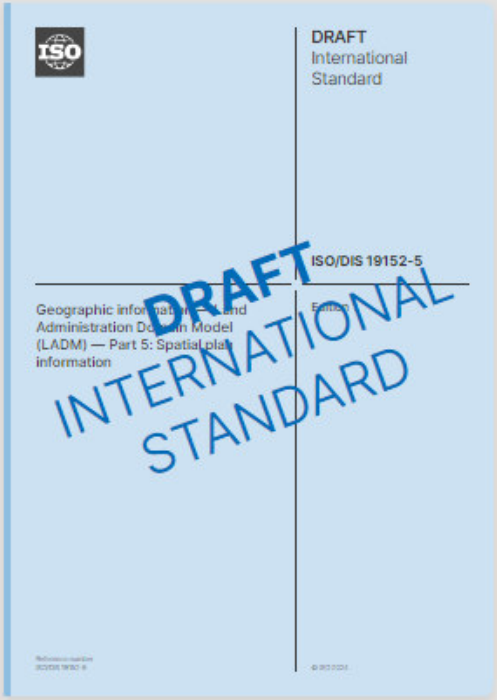
- Taking into account the changes in the document, the UML model of LADM Part 5 is updated by Abdullah Kara. **The updated UML model is submitted to the Harmonised Model Maintenance Group (HMMG) of ISO/TC 211** and the new model is approved.
- Following HMMG approval, **ISO 19152-5 has been submitted to ISO/TC 211** for the **FDIS stage on 23 December 2024**. On **21 February 2025**, it is registered as **ISO/FDIS 19152-5 to ISO.**
- **Final Draft International Standard (FDIS) ballot for LADM Part 5 will be initiated in April 2025.**

What is expected?

- The result of the FDIS vote is expected in **July 2025**. If the vote is positive, the final stage, the International Standard, will be initiated by ISO. It is expected that LADM Part 5 will be published as an ISO International Standard in 2025.

ISO 19152 LADM – Part 5: Spatial plan information

Registered to ISO as a **Final Draft International Standard (FDIS)** in **February 2025**



Read sample

← TC ← ISO/TC 211

ISO/DIS 19152-5

Geographic information — Land Administration Domain Model (LADM)

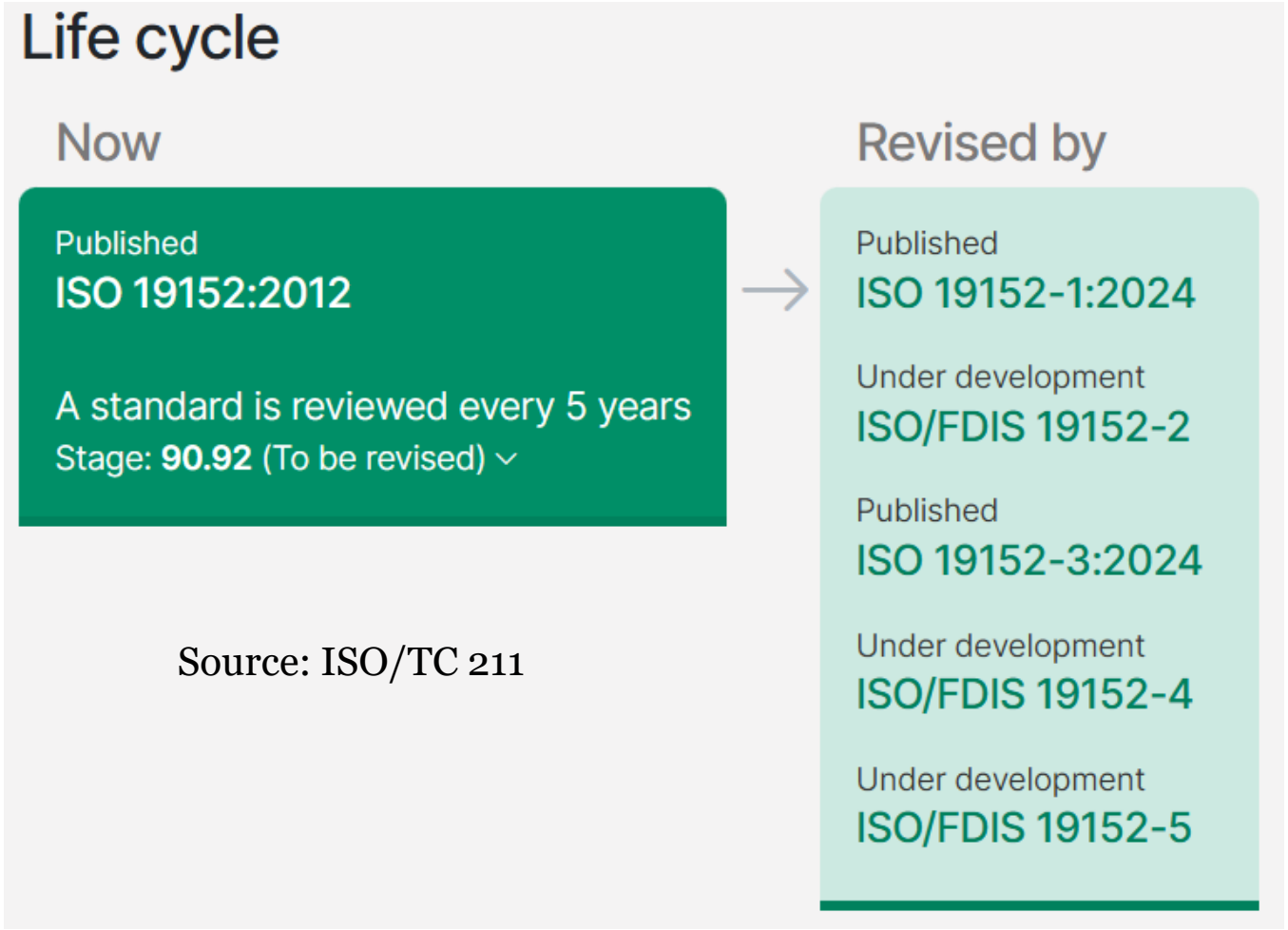
Part 5: Spatial plan information

Under development

This Draft International Standard is in the enquiry phase with ISO members.

← Will replace ISO 19152:2012

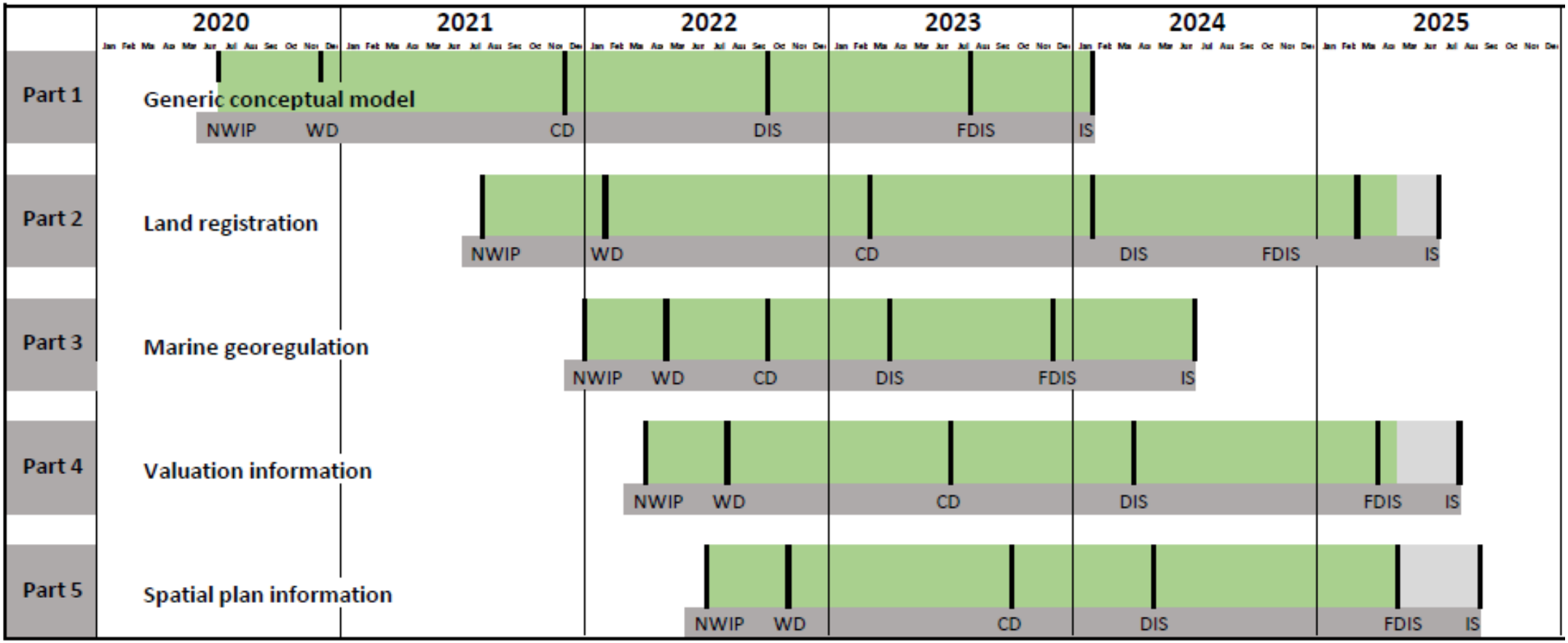
Status of LADM



Source: ISO/TC 211

LADM Edition II – Current Status of All Parts of LADM

(as of April 2025)



Next to the ISO LADM project meetings

- **ISO/TC 211 58th Hybrid Plenary meeting** (Chiswick, London June 24th - 28th) and **ISO/TC 211 59th Hybrid Plenary meeting** (Sydney, Australia, November 11th -15th) n.
- The **FIG 12th International FIG Workshop on the Land Administration Domain Model** & 3D Land Administration.

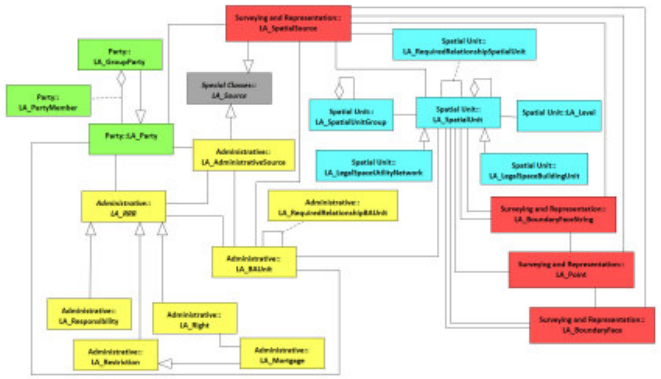
3D Land Administration

12th International FIG Workshop on LADM & 3D LA
24-26 September 2024, Kuching, Malaysia

Workshop Home | Workshop Programme

What has been done besides ISO?

- FIG publication no.84 – Land Administration Domain Model An overview
- FIG publication (extended version) – LADM in the classroom



What is planned?

- Join online to **ISO/TC 211 60th Hybrid Plenary meeting** and presents the recent development of LADM series (Wuhan, China, 19-23 May 2025)
- Evaluate and process the received comments for **ISO/FDIS 19152-2 Land registration**
- Evaluate and process the received comments for **ISO/FDIS 19152-4 Valuation information**
- Evaluate and process the received comments for **ISO/FDIS 19152-5 Spatial plan information**

3D Land Administration

13th International FIG Workshop on LADM & 3D LA
3-5 November 2025, Florianópolis, Santa Catarina, Brazil

Português | Español | English | Workshop Programme

Deadline submission Extended abstract (500-1000 words):
15 May 2025

https://www.gdmc.nl/3DCadastres/workshop2025

Thank you!

LADM supporting Land and Sea Information Integration

Peter van Oosterom, TU Delft, The Netherlands
Chrit Lemmen, Twente University, The Netherlands
Chris Body, OGC Australia/New Zealand

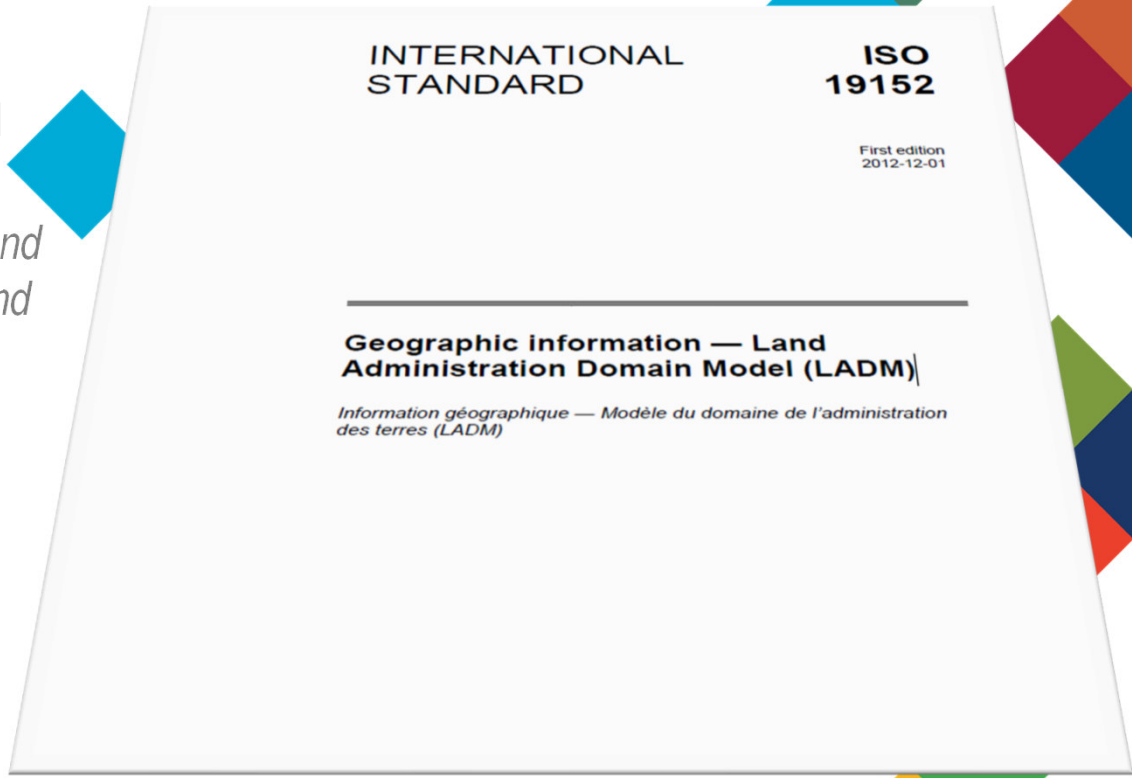
Wednesday 9 April 2025, FIG Working Week 2025, Brisbane, Australia

Contents

Background

- Scope of ISO 19152:2012 Geographic information — Land Administration Domain Model (LADM):
  - *'.. covering basic information-related components of land administration (including those over water and land, and elements above and below the surface of the earth);'*
- Noticed by experts from IHO

IHO International Hydrographic Organization


INTERNATIONAL STANDARD

ISO 19152

First edition
2012-12-01

Geographic information — Land Administration Domain Model (LADM)

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

IHO – The S-121 Maritime Limits and Boundaries Standard Project Team

Mandate

Support the management and exchange of a State's Maritime Sovereignty, Sovereign rights extents and associated juridical zones as described under the United Nations Convention on the Law of the Sea (UNCLOS).

REQUIRED

Noticed and used by IHO S-121

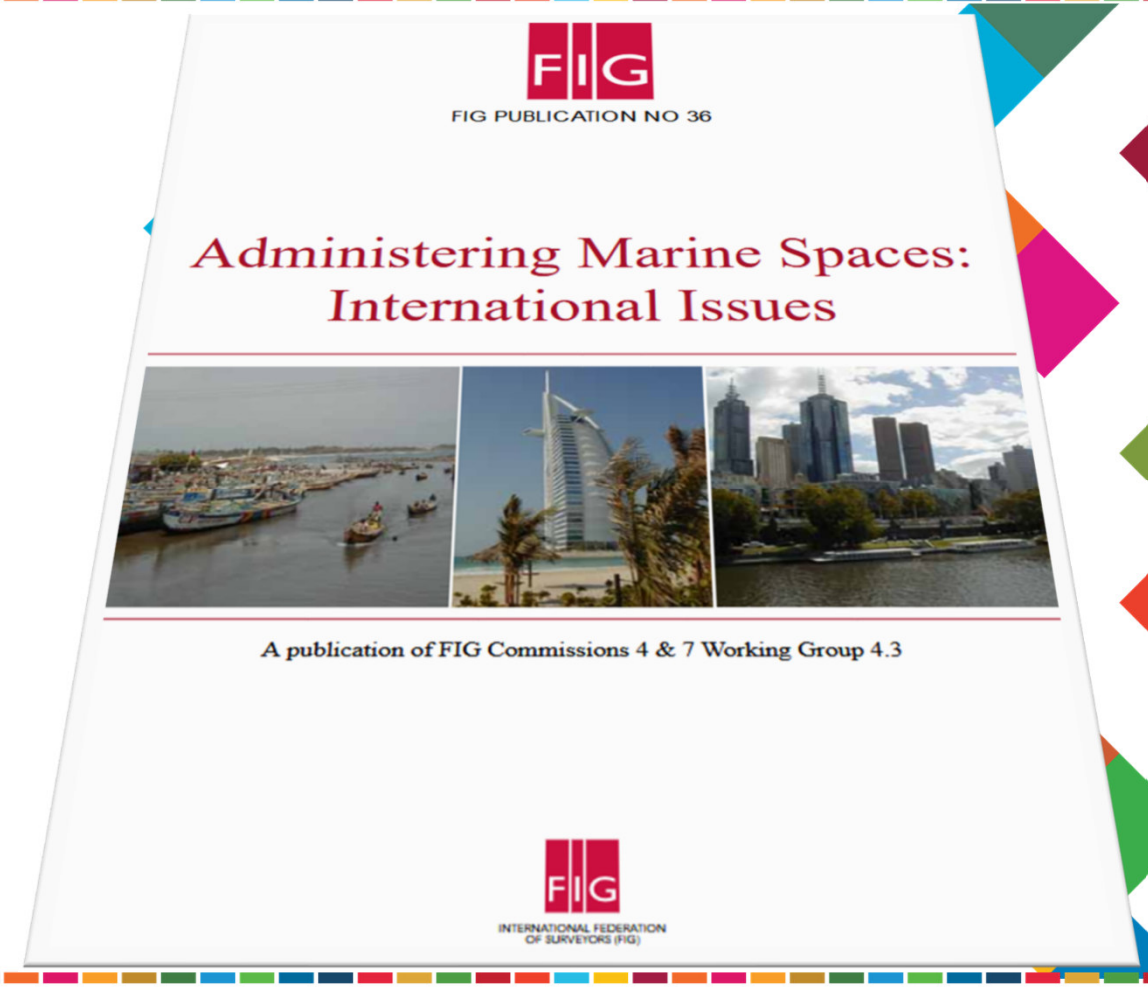
- Maritime Limits and Boundaries
- Edition 1 published October 2019

- Download from: https://registry.iho.int/productspec/view.do?idx=177&product_ID=S-121&statusS=5&domainS=ALL&category=product_ID&searchValue=#

Earlier work within FIG

- Publication no 36 from 2006
- Commission 4 (Hydrography) and Commission 7 (Cadastre and Land Management)
- Focus on International Issues

- FIG should have role in the new Land-Sea information integration debate!



Contents

Recent Initiatives (1/2)

- Presentation at FIG commission 5 and 7 AM 2024:
  'A Preliminary UN-GGIM (United Nations Committee of Experts on Global Geospatial Information Management) Work to Integrate Land and Sea'
- Revised LADM not mentioned
- Indirect link with UN-IGIF and FELA

A Preliminary UN-GGIM Work to Integrate Land and Sea

Kean Huat SOON and Victor KHOO, Singapore

Key words: Integration, Integrated Geospatial Information Framework, UN-GGIM

SUMMARY

The challenges of integrating various domains such as terrestrial and maritime are not new to many geospatial professionals. Recently under the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), the UN Expert Group on Land Administration and Management (EG-LAM) together with other functional groups such as UN Working Group on Marine Geospatial Information, has carried out the work to develop a guidance paper on integration of terrestrial, maritime, built, and cadastral domains. The guidance paper aims to provide a reference for developing, unifying, strengthening the integration of the four domains in geospatial information management.

Terrestrial and maritime domains are generally referred to topography and baltimetry surfaces, while built and cadastral domains are respectively referred to built environment and ownership space. Understand the huge amount of work to cover the four domains, the paper will be developed in phases with initial focus on land and sea integration (i.e. terrestrial and maritime domains) followed by built and cadastral domains. In the presentation, we will describe the background and motivation of the on-going work, its approach, current progress, etc. The presentation aims to share, discuss, and solicit feedback and potential solutions from geospatial professionals.

The issues of integration are not merely technical, they are also political, social, and economic. To deal with the issues we take the approach by anchoring the nine strategic pathways from the United Nations Integrated Geospatial Information Framework (UN-IGIF). We conduct focus group discussions, workshops, technical discussions with professionals from government agencies, academia, and the private sector to understand their problems and possible solutions. We not only document success stories but also are interested in lessons learnt or unsuccessful stories. When the feedback is gathered, we analyse them based on the nine strategic pathways and recommend solutions as deem necessary.

The objective of the guidance paper is two-fold. Firstly, it is to identify innovative and insightful ways to deploy the UN-IGIF on addressing the issues of integration. Secondly, it aims to encourage collaboration across domains and working groups in the UNGGIM, and the international communities to address global challenges, through the co-development of the paper.

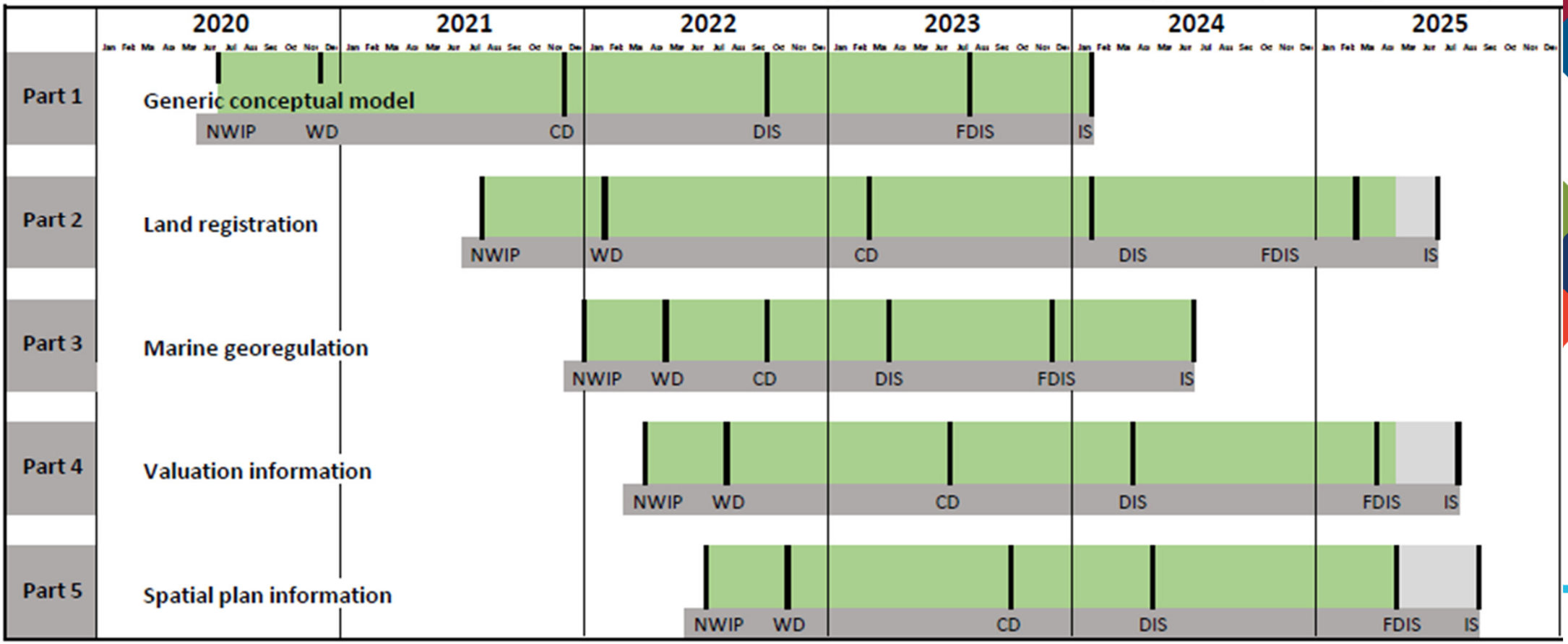
Recent Initiatives (2/2)

- UN-GGCE (**United Nations Global Geodetic Centre of Excellence**) organized the International Workshop on the Integration of Terrestrial, Maritime, Built and Cadastral Domains, **"Joining Land and Sea"**, 2 – 5 December 2024, Bogor, Indonesia
- Chris Body presented '**The OGC Community Connecting Land and Sea Federated MSDI Pilots and ISO 19152 LADM**'
- Antonius Bambang Wijanarto (President, UN-GGIM AP) proposed geodesy additions to FELA and IGIF-Hydro

United Nations
United Nations Global Geodetic Centre of Excellence

Contents

LADM revision: multi-part standard

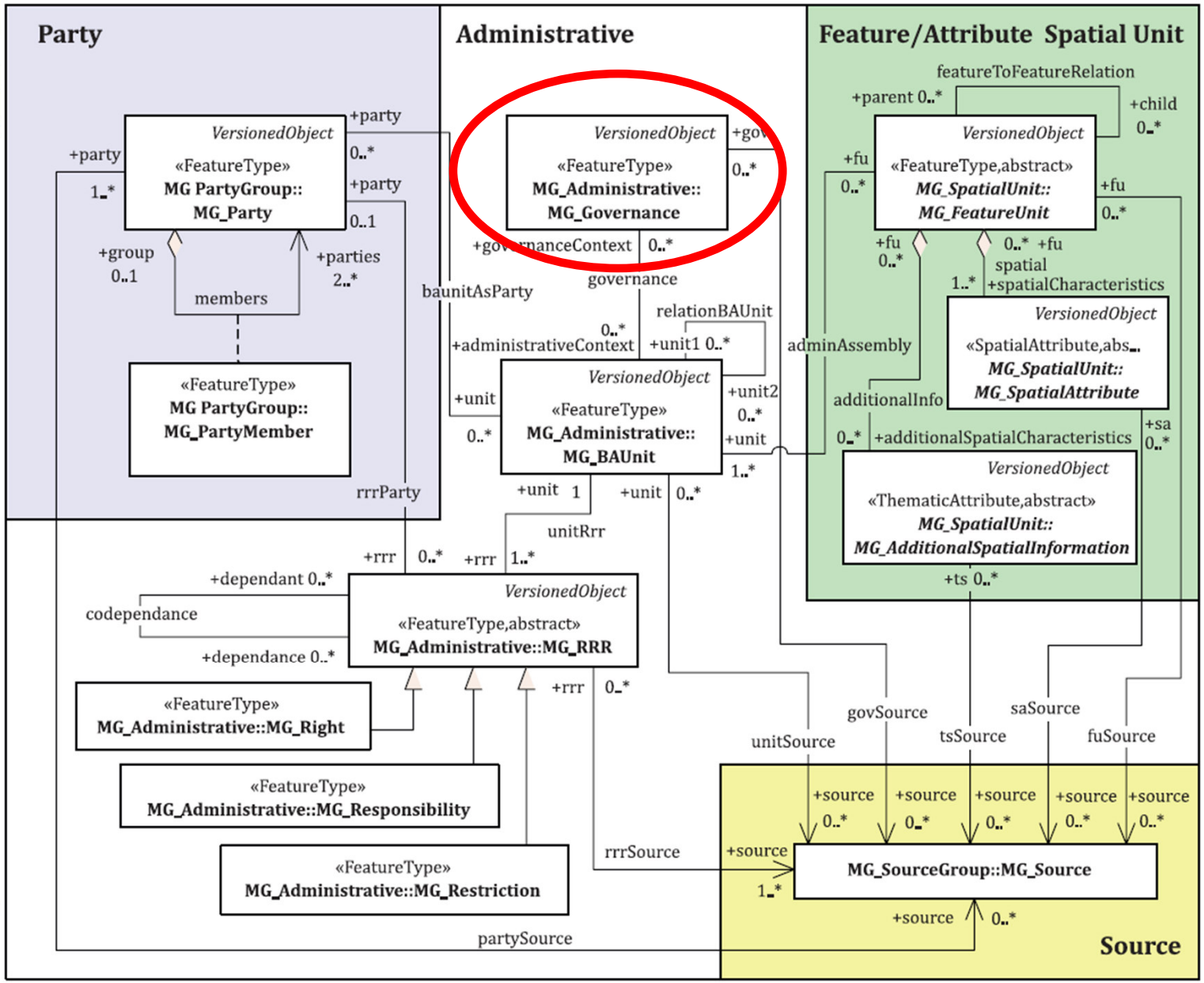


ISO 19152 LADM – Part 3: Marine georegulation

Published as an International Standard in July 2024

LADM part 3

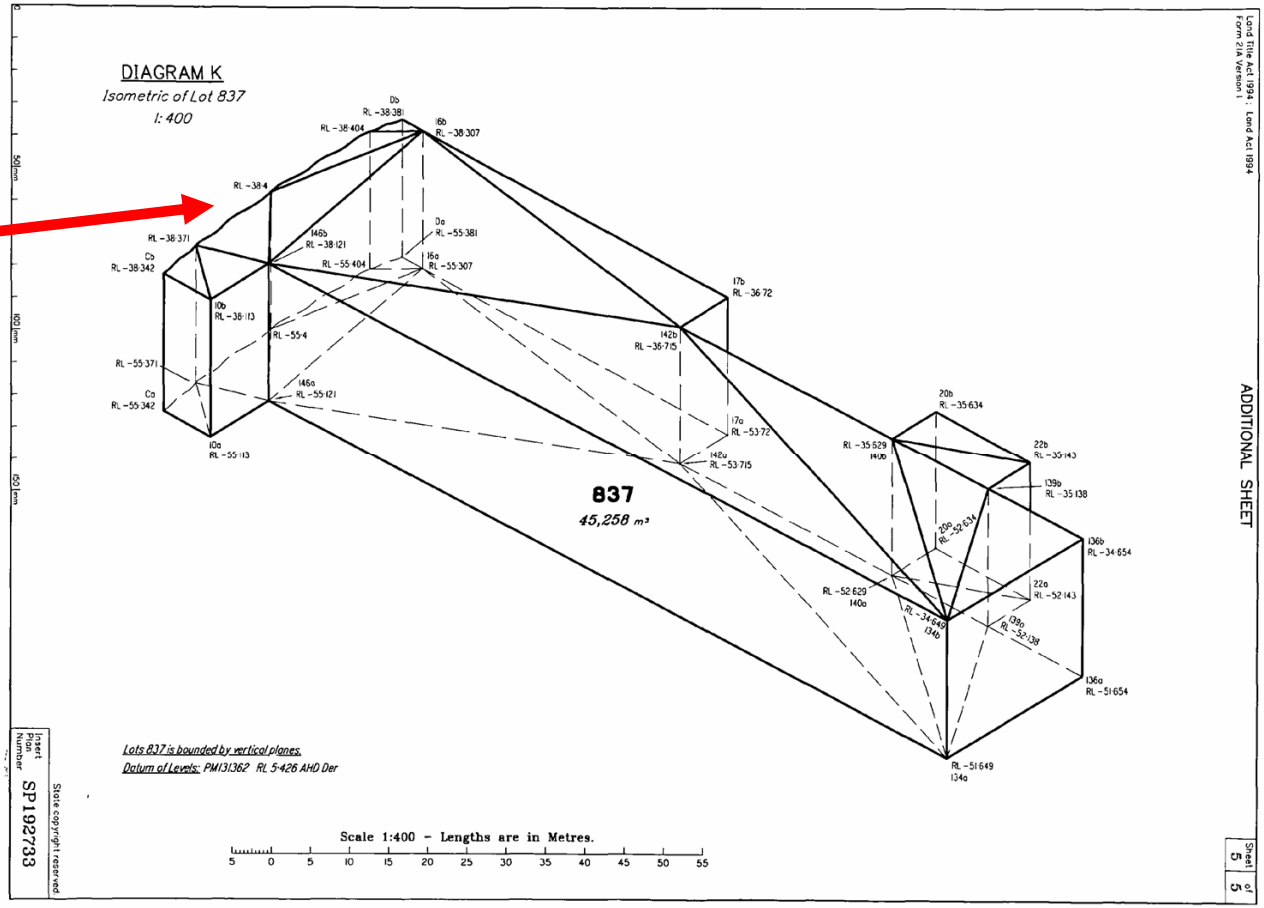
- Main structure similar to LADM Generic Conceptual Model
- New class MG_Governance: **'..description of the context information from a proclamation, law or treaty document'**



LADM does support dynamic boundaries

Example from Brisbane 3D+time Tunnel registration: Note Lot 837

Volumentric Lot has moving boundary

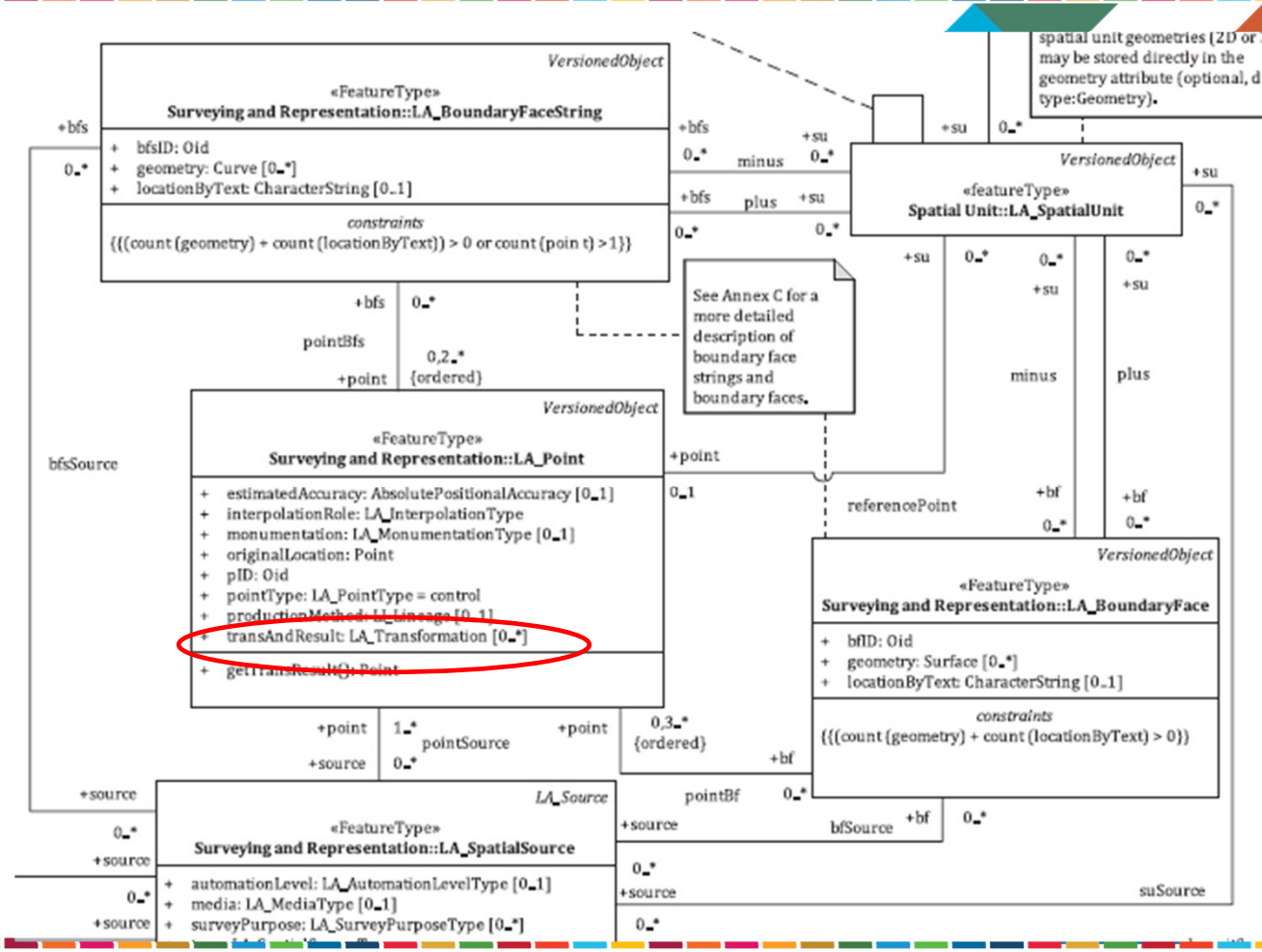


LADM support for CRS & transformations

- LA_Point attribute: transAndResult: LA _Transformation [0..*]

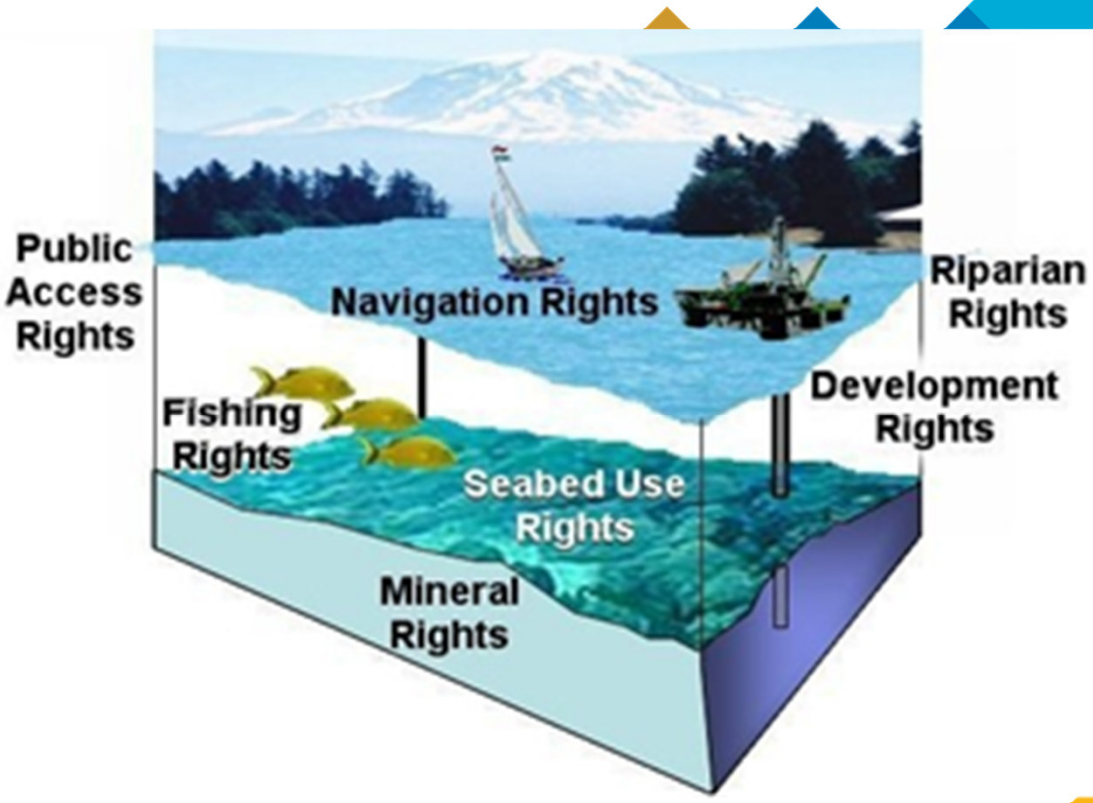
- The data type LA _Transformation has 2 attributes:
  - transformation OperationMethod (from ISO 19111)
  - transformedLocation Point

- for coordinate transformation, but also least squares adjustments, map fitting,…

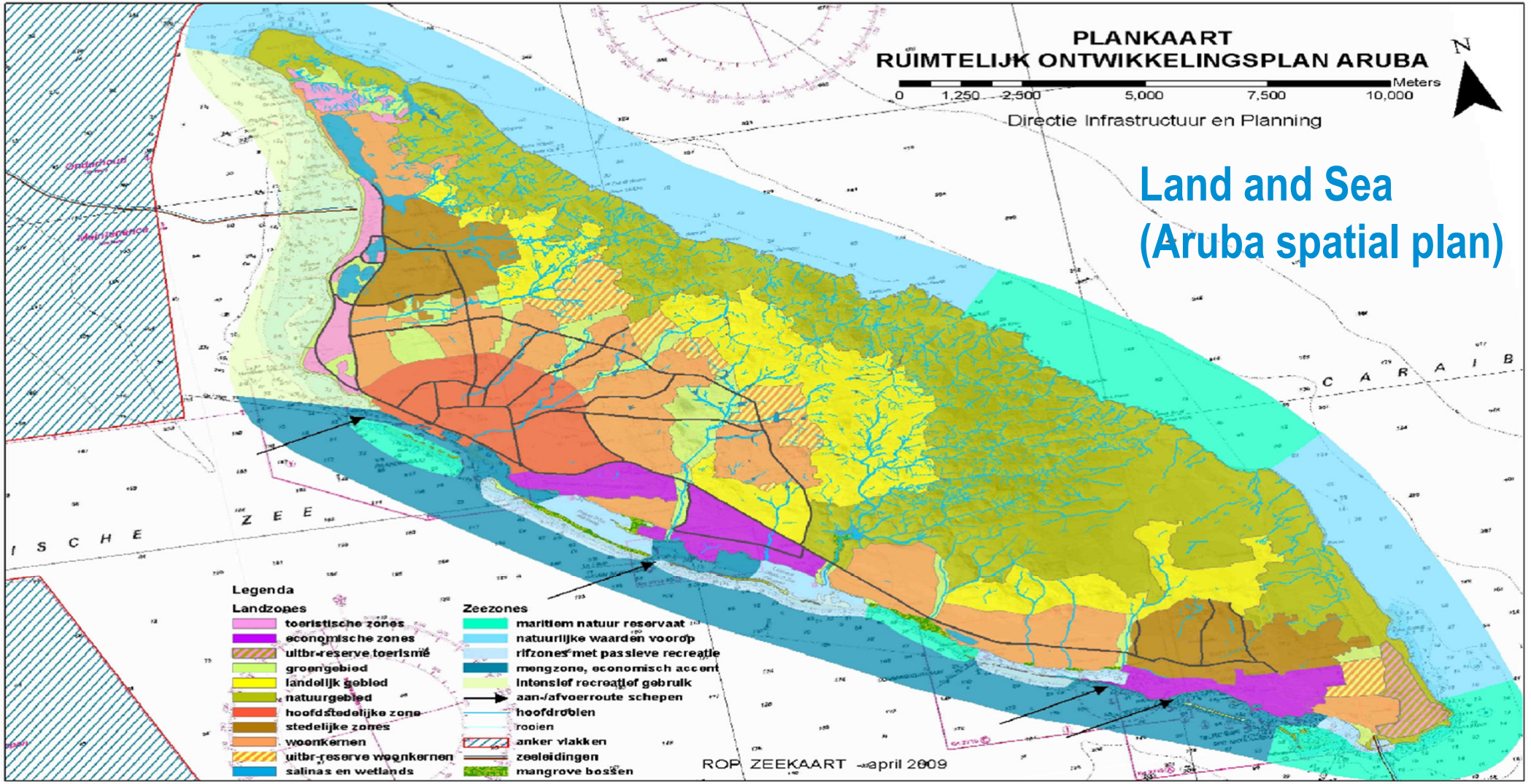


Contents

Note the 3D nature of the various rights in the marine environment

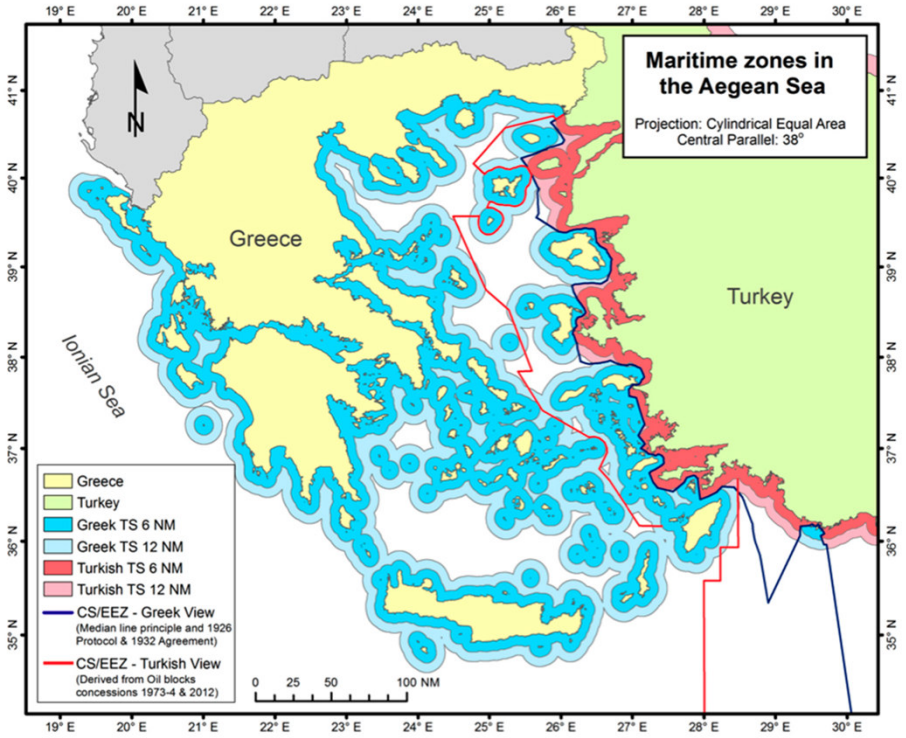


Source: PhD thesis Michael Sutherland 2005

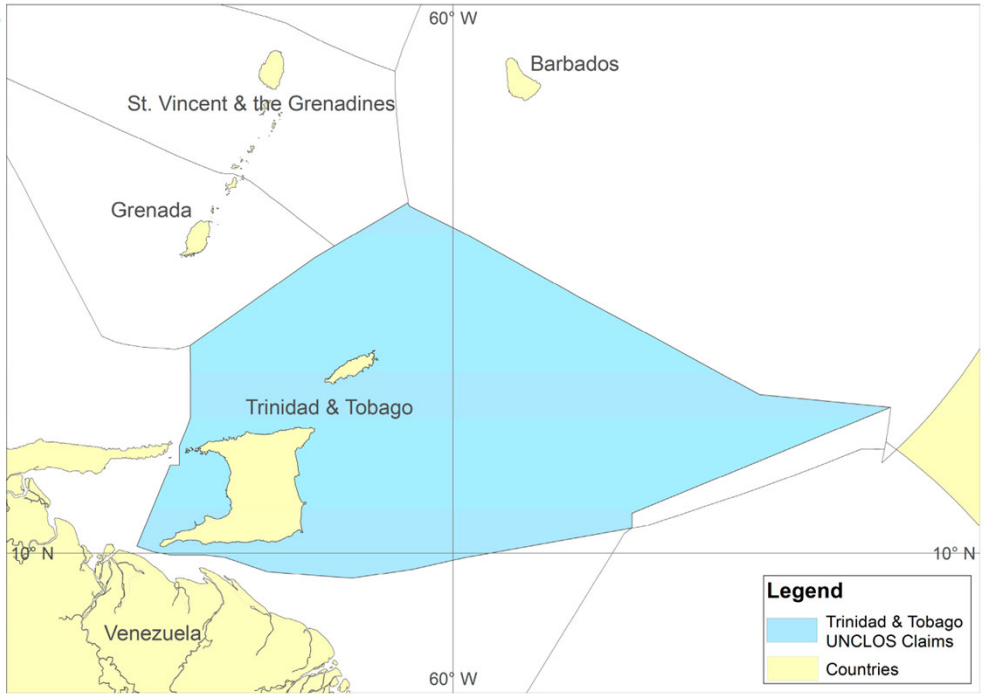

PLANKAART
RUIMTELIJK ONTWIKKELINGSPLAN ARUBA
0 1,250 2,500 5,000 7,500 10,000 Meters
Directie Infrastructuur en Planning
N
Land and Sea
(Aruba spatial plan)
Legenda
Landzones
toeristische zones
economische zones
uitbr-reserve toerisme
groengebied
landelijk gebied
natuurgebied
hoofdstedelijke zone
stedelijke zones
woonkernen
uitbr-reserve woonkernen
salinas en wetlands
Zeezones
maritiem natuur reservaat
natuurlijke waarden voorop
rifzones met passieve recreatie
mengzone, economisch accent
intensief recreatief gebruik
aan-/afvoerroute schepen
hoofdgeulen
reddingen
anker vlakken
zeeleidingen
mangrove bossen
ROP ZEEKAART april 2009

Marine Limits and boundaries

Greece Exclusive Economic Zone (EEZ)

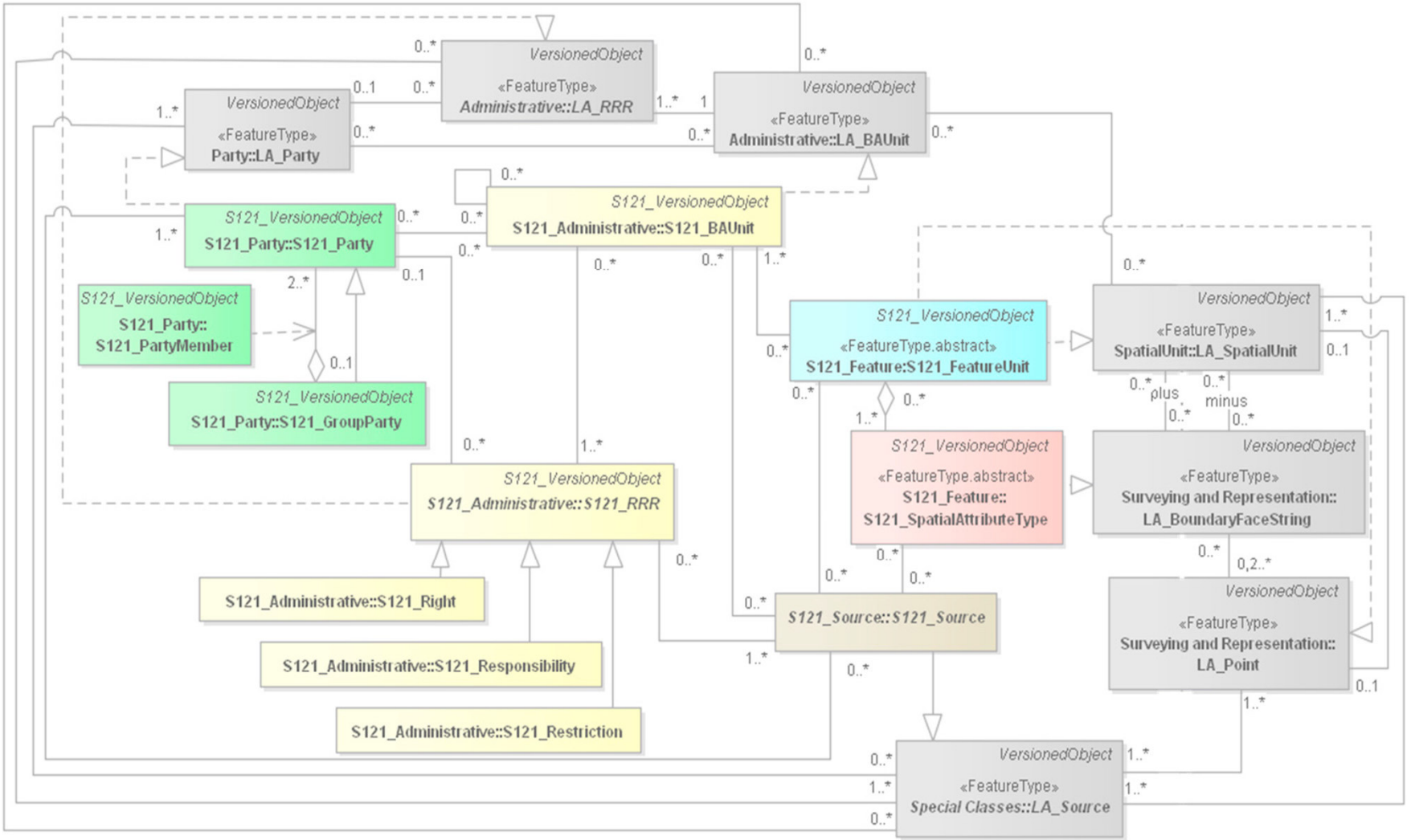


Trinidad & Tobego UNCLOS Claim



LADM/S-121

Rights
Restrictions
Responsibilities



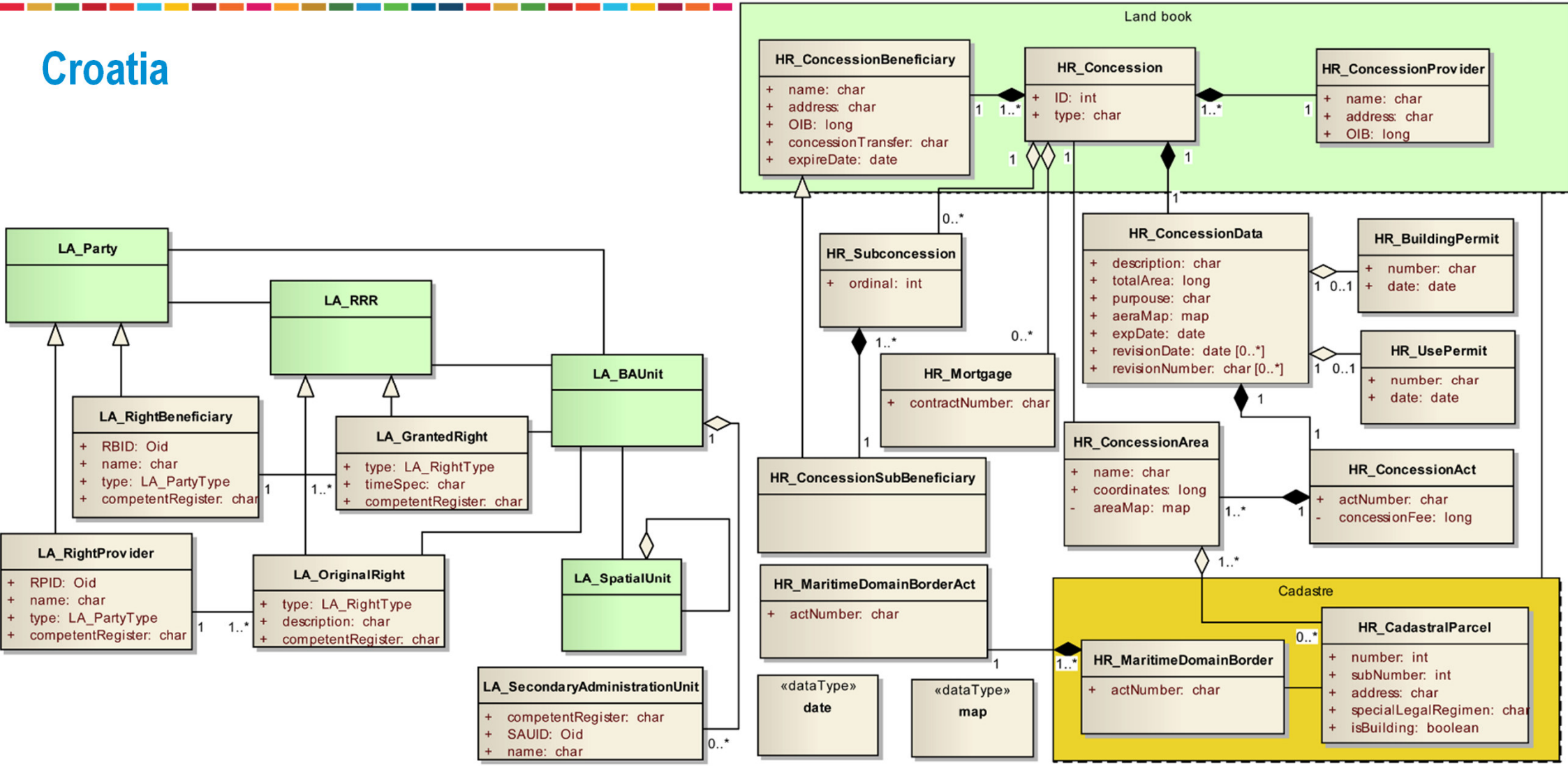
Source:
Athanasiou et al, 2017

Croatia

Note the land-sea boundary

Source: Veljko et al., 2021

Croatia


Land book
HR_ConcessionBeneficiary
+ name: char
+ address: char
+ OIB: long
+ concessionTransfer: char
+ expireDate: date
HR_Concession
+ ID: int
+ type: char
HR_ConcessionProvider
+ name: char
+ address: char
+ OIB: long
HR_Subconcession
+ ordinal: int
HR_ConcessionData
+ description: char
+ totalArea: long
+ purpouse: char
+ aeraMap: map
+ expDate: date
+ revisionDate: date [0..*]
+ revisionNumber: char [0..*]
HR_BuildingPermit
+ number: char
+ date: date
HR_UsePermit
+ number: char
+ date: date
HR_Mortgage
+ contractNumber: char
HR_ConcessionSubBeneficiary
HR_ConcessionArea
+ name: char
+ coordinates: long
- areaMap: map
HR_ConcessionAct
+ actNumber: char
- concessionFee: long
HR_MaritimeDomainBorderAct
+ actNumber: char
«dataType» date
«dataType» map
Cadastre
HR_MaritimeDomainBorder
+ actNumber: char
HR_CadastralParcel
+ number: int
+ subNumber: int
+ address: char
+ specialLegalRegimen: char
+ isBuilding: boolean
LA_Party
LA_RRR
LA_BAUnit
LA_RightBeneficiary
+ RBID: Oid
+ name: char
+ type: LA_PartyType
+ competentRegister: char
LA_GrantedRight
+ type: LA_RightType
+ timeSpec: char
+ competentRegister: char
LA_RightProvider
+ RPID: Oid
+ name: char
+ type: LA_PartyType
+ competentRegister: char
LA_OriginalRight
+ type: LA_RightType
+ description: char
+ competentRegister: char
LA_SpatialUnit
LA_SecondaryAdministrationUnit
+ competentRegister: char
+ SAUID: Oid
+ name: char

Contents

The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

2nd relevant SDG

3rd relevant SDG

SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals

Conclusions

- Land/sea integration requirements covered by LADM
- Horizontal and vertical reference systems and conversions
- Representation for dynamic coastline definition
- Model the agreed and non agreed international boundaries
- Represent marine spatial plans
- Valuation of all properties on land and on sea
- Support for climate change mitigation and adoption

Selected references

- Veljko Flego, Miodrag Roić, Irena Benasić, **LADM extensions to maritime domain in multi-register environment - Case study Croatia**, In: Land Use Policy, Volume 102, March 2021, 105247
- Ainn Zamzuri, Imzan Hassan and Alias Abdul Rahman, **Development of 3D Marine Cadastre Data Model Based on Land Administration Domain Model**, ISPRS Archives, 46(4/W3-2021), pp. 337-345
- Charisse Griffith-Charles, Michael Sutherland, and Sunil Lalloo, **Extensions to the LADM Trinidad and Tobago toward a Juridical, Fiscal, and Marine Cadastre**, In: Proceedings 7th LADM Workshop, Zagreb, Croatia, 11-13 April 2018, pages 319-330
- Katerina Athanasiou, Michael Sutherland, Christos Kastrisios, Lysandros Tsoulos, Charisse Griffith-Charles, Dexter Davis and Efi Dimopoulou, **Toward The Development Of A Marine Administration System Based On International Standards**, ISPRS Int. J. Geo-Inf. 2017, 6, 194
- Michael Sutherland. **Marine Boundaries and the Governance of Marine Spaces**. Ph.D. Dissertation (University of New Brunswick) and University of New Brunswick, technical paper, 2005

WORKING WEEK 2025 AND

3D Land Administration

13th International FIG Workshop on LADM & 3D LA
3-5 November 2025, Florianópolis, Santa Catarina, Brazil

Português | Español | English | Workshop Programme

Deadline submission Extended abstract (500-1000 words):
15 May 2025

https://www.gdmc.nl/3DCadastres/workshop2025/

WORKING WEEK 2025

some news!

FIG

International Federation of Surveyors
Fédération Internationale des Géomètres
Internationale Vereinigung der Vermessungsingenieure

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News in 2025

Two New Publications: The Land Administration Domain Model – an overview, and LADM in the Classroom

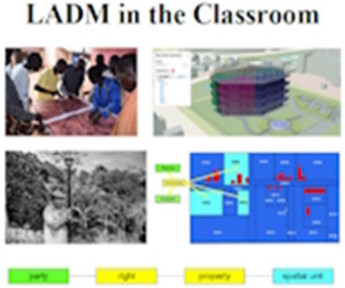
March 2025

In 2012, the Land Administration Domain Model (LADM) was approved as an official ISO standard. The LADM is a conceptual information model. It describes and structures the core of a land administration: information about people, about land and about people to land relationships.

News in 2025

ORGANISED BY FIG Geospatial Council of Australia

WORKING WEEK 2025 AND Loca
THE NATIONAL GEO



UNIVERSITY OF TWENTE. TUDelft

LADM in the Classroom

Extended version

This book introduces the reader to the Land Administration Domain Model (LADM) through examples. It starts by giving the reader an overview of core LADM concepts then proceeds to illustrate how data about different people-to-land relationships can be organized using LADM. Each example represents a scenario that can be encountered in a Land Administration System. The scenarios used in examples are derived from the Land Administration System of the hypothetical town of Watteriver together with its surrounding rural areas. Each case, representing a particular scenario, is presented both conceptually and using a simplified representation of a database in which data are stored concretely. A demonstration dataset, accompanying GIS project, and reusable slides are available online - details in the book.

Missing: chapter on LADM part 3 Marine Georegulation (any volunteers?)

The Land Administration Domain Model - An Overview

FIG Publication 84 - FIG Guide

This publication gives an overview of LADM. The publication is intended for anyone wishing to learn more about LADM: why is it needed, how is it designed, what is it and what are the benefits. This overview publication has an extended version titled 'LADM in the Classroom' with a focus to training and higher education.

Read more

Read the publication in PDF

https://www.fig.net/news/news_2025/03_pub84_ladm.asp