

# Transforming the Land Administration Domain Model into an ISO standard (LADM as ISO 19152)

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## Content

- Introduction
- ISO standard
- LADM changes
- Relationship UN-HABITAT and INSPIRE
- Instance level diagrams
- Conclusion

## Introduction

- there are supposed to be huge differences between cadastral and land registry systems (around the world)
- look to the common area's:
  - standardised Model (adaptable, extensible)
  - avoid re-inventing the wheel
  - enable involved parties to communicate
- proposal (FIG Washington, 2002): develop standard  
→ Core Cadastral Domain Model
- February 2008: FIG submits New Work Item Proposal to ISO  
→ accepted as **Land Administration Domain Model**: ISO 19152



## ISO 19152 Scope

- reference model (abstract, conceptual schema)
- basic land/water, below/above surface, information-related Land Administration components
- basic classes: (1) parties, (2) spatial units, (3) rights, responsibilities, and restrictions, (4) spatial sources, and (5) spatial representations
- terminology enabling communication
- shared description of formal or informal practices
- basis for national, and regional profiles
  
- blueprint stereotype for classes in external databases:  
person, address, data, data, and taxation data
- **no** interference with (national) land administration laws

## ISO 19152 Project Team (PT)

- 28 PT Members from: Australia, Canada, Denmark, Finland, Germany, Hungary, Japan, Malaysia, Netherlands, UK, US, South Africa, Thailand, Saudi Arabia, Spain, Sweden
- FIG/UN Habitat, EU Joint Research Centre (JRC), INSPIRE; via FIG also input from Turkey and Portugal
- participation from Korea and China
- PT Meetings on Working Draft (WD):
  - Copenhagen, Denmark, May 2008
  - Delft, The Netherlands, September 2008
  - Tsukuba, Japan, December 2008
- **Committee Draft (CD)**, Molde, Norway, May 2009 meeting

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## Background ISO TC211 geographic information



ISO/TC 211  
Geographic information/Geomatics

- over 60 member countries (participating + observing)
- liaisons with other organizations; e.g. OGC and FIG
- over 40 standards
- main phases in standards development process:
  1. Proposal of new work item (NWIP), determination of scope
  2. Develop specifications in Working Drafts (WD) and Committee Draft (CD) in consensus-building processes
  3. Formal approval International Standard (IS), via Draft IS (DIS) and Final Draft IS (FDIS)

## ISO TC211 and CEN TC287



- close cooperation arranged via resolutions
- based on overall Vienna agreement between ISO and CEN
- goal: equal standards
  - existing ISO standards: unique acceptance procedure (UAP), fast
  - new/ongoing: parallel voting
- 26 February 2009: CEN TC287 accepted LADM  
→ parallel voting in ISO TC211 and CEN TC287 on LADM

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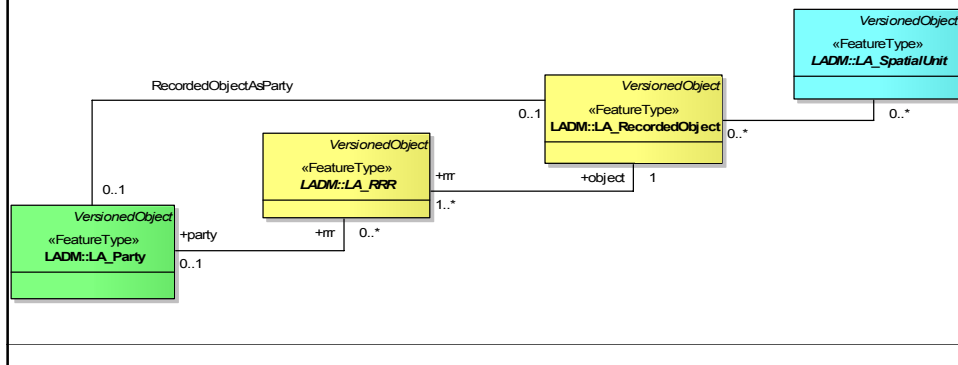
# LADM changes

- due to consensus-process: comments and resolutions
- ISO versions WD1, WD2, WD3, CD
- most important changes:
  - simplification of model (classes removed)
  - changed names; e.g. person → party
  - classes got ISO-style prefix LA\_
  - recorded object introduced (real estate, grouping spatial units)
  - recorded object as party; e.g. one parcel owns another parcel
  - new layer concept
  - seamless integration of 2D and 3D

## LADM core: LA\_RecordedObject added

- explicit modeling 'real estates'; e.g. **LA\_Party** Peter has **LA\_RRR** ownership on **LA\_RecordedObject** Peter's estate consisting of 2 **LA\_SpatialUnit** parcels
- LA\_RecordedObject as LA\_Party; e.g. parcel is 'owned' by another parcel (and not a 'normal' person: natural or organization)

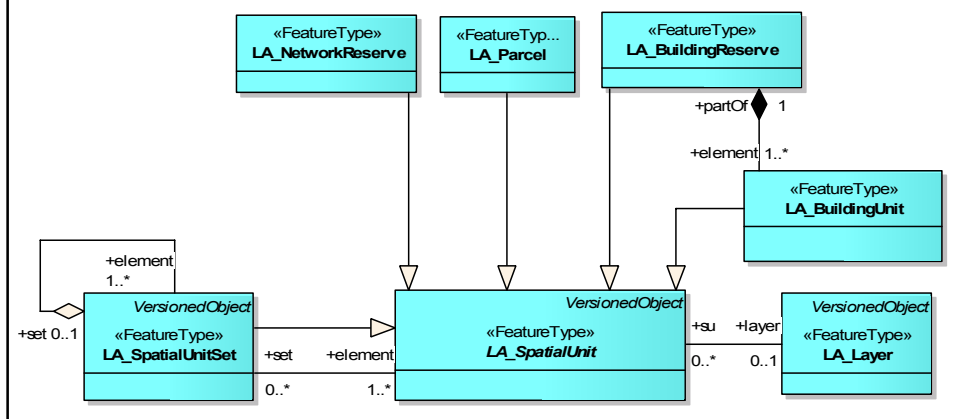
class ladm figure 1a



## LA\_SpatialUnit refined

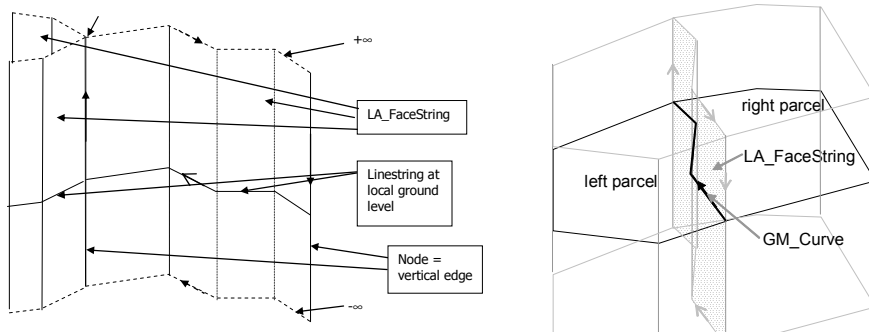
- LA\_SpatialUnit specializations: parcel, network, building(unit)
- organized in LA\_Layer based on structure or content
- 5 types: **point**, **text (unstructured)** **line**, **polygon**, and **topology**
- 2D and 3D integrated without complicating 2D

class ladm figure 3b



## 2D and 3D integration

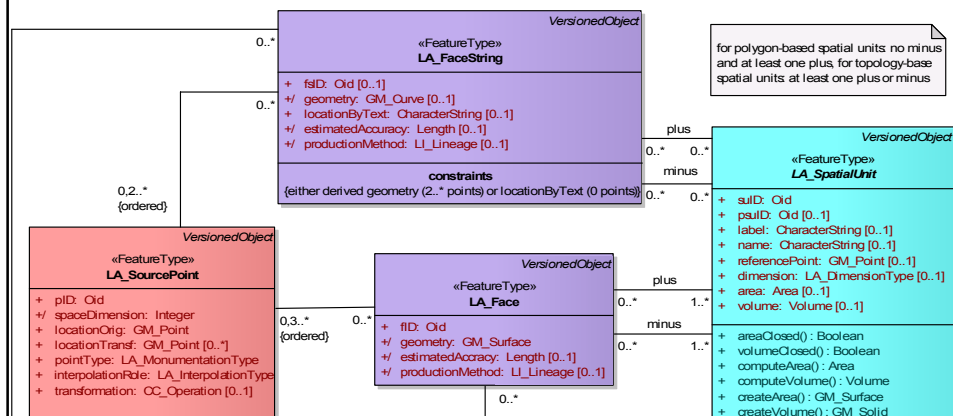
- observation: 2D description implies 3D prismatic volume
- 2D polyline (GM\_curve) implies string of vertical faces



## 2D and 3D integration

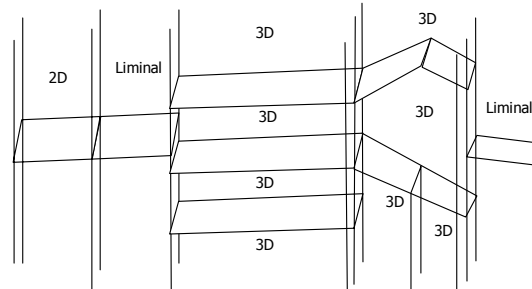
- 2D polyline (GM\_curve) implies string of vertical faces: **LA\_FaceString**
- true 3D described with arbitrary oriented faces: **LA\_Face**

adm figure 2f



## 2D and 3D integration

- between 2D and 3D spatial unit transition via **liminal** spatial units



Simple 2D spatial unit	Liminal 2D spatial unit	3D spatial units	3D spatial units	Liminal 2D spatial unit
			Liminal 2D spatial unit A	

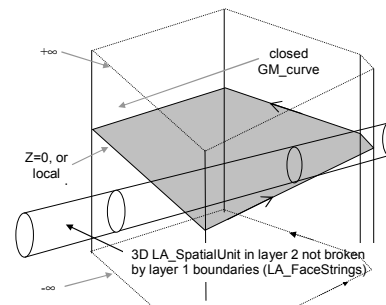
## Introduction of LA\_Layer

- organization based on content or structure:
  - example 1, content-based: one layer with 'primary' (strongest) rights, another layer with rights that can be added/subtracted (e.g. restrictions)
  - example 2, structure-based: one layer with topologically structured parcels (one part of the country), another layer with (unstructured) line based parcels (other part of country)

- can also be used in 3D context: one layer 'normal' parcels, another layer with subtracted 3D parcels

- based on independence principle

- each country design own layers





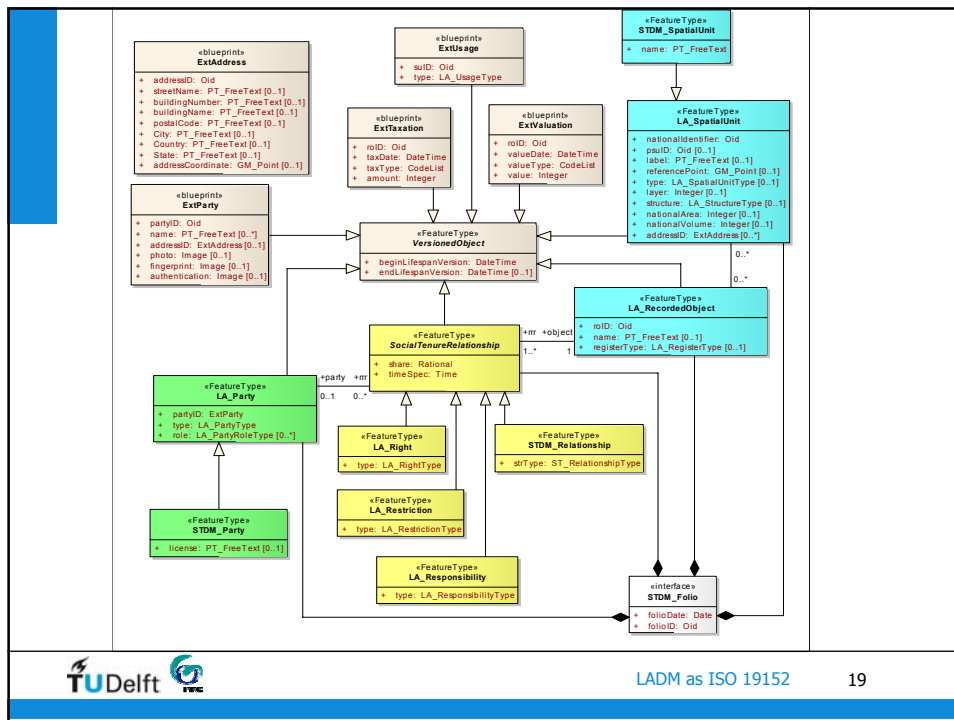
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# UN-HABITAT and the STDM Social Tenure Domain Model



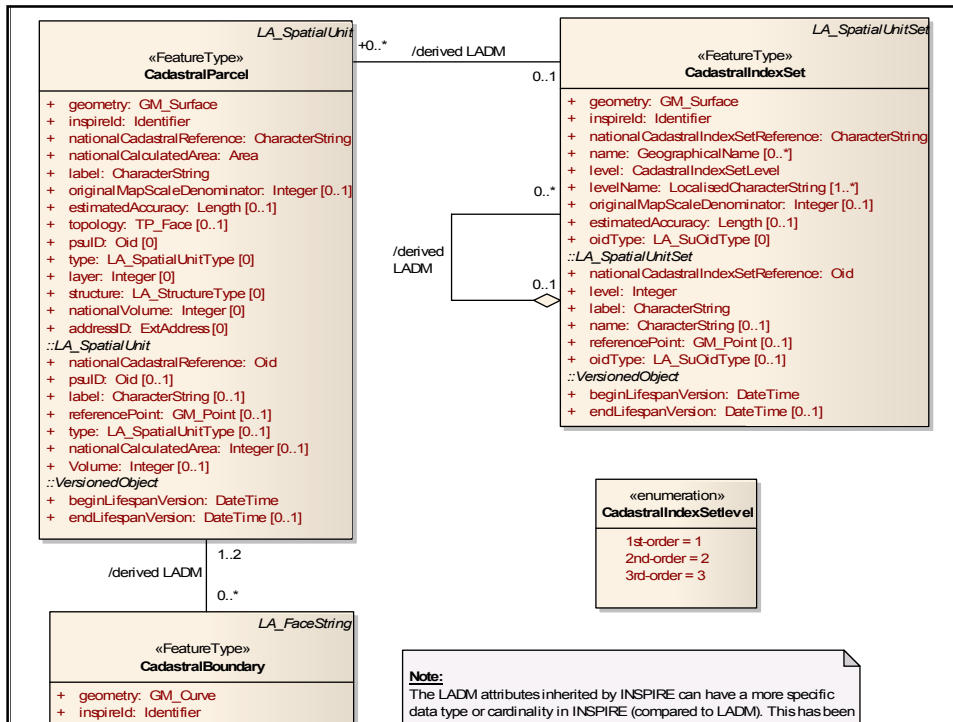
- STDM has to support a range of
  - 'rights': from informal (customary, indigenous) to formal
  - persons (variety of types: groups, organizations, natural persons)
  - spatial units (form text to topology in 2D or 3D)
- STDM is a specialization of LADM and will be included as informative annex B of ISO 19152
- ITC develops STDM based prototype for Ethiopia in close co-operation with FIG and UN-HABITAT



## INSPIRE Cadastral Parcels (CP)



- harmonizing geo-information in Europe → ESDI
- concerns about 34 different types of data sets of which CP is one
- 27 different countries with 22 languages (and more influence; e.g. Iceland, Norway and Switzerland are also involved)
- agreement on content during exchange
- LADM based INSPIRE cadastral parcels: select of relevant classes, use inheritance and add attributes and constraints
- ISO 19152 / LADM and INSPIRE cadastral parcels have different scope, but the overlap does fit



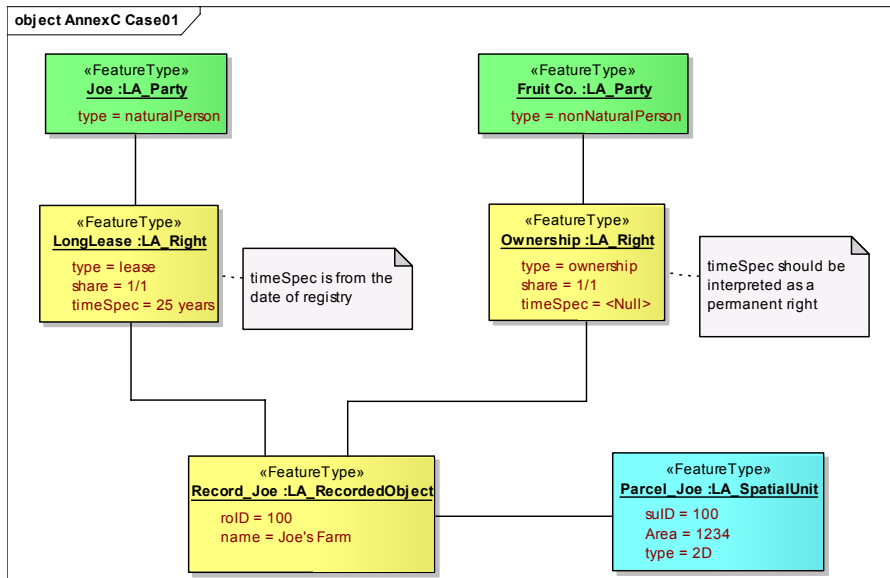
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## Instance level diagrams

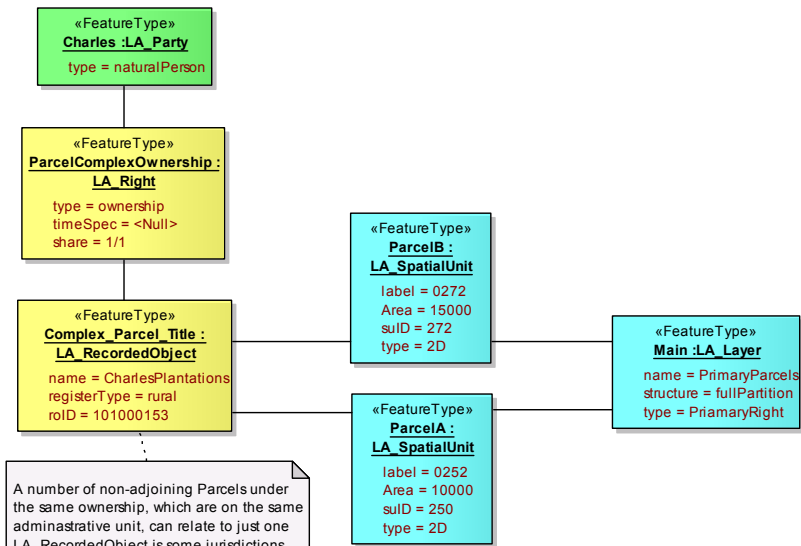
- LADM at high abstraction level
- specific cases illustrate the model
- many different cases identified in Annex C of ISO 19152
- illustrates simplicity of LADM: just show the needed classes (and image is not cluttered with other classes)
  
- selection of 3 example cases is presented:
  - ownership and leasehold
  - parcel complex with one owner
  - serving parcel

## Example 1: one parcel with ownership and leasehold



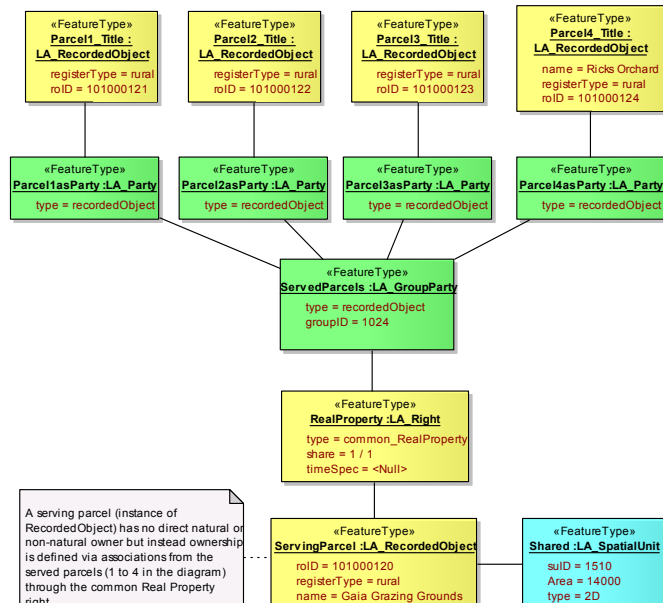
## Example 2: parcel complex with one owner

object AnnexC Case25



## Example 3: serving parcel

object AnnexC Case04



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## Development (schedule) of LADM

- New Working Item Proposal (NWIP): was in February 2008
- Working Draft (WD): discussions were in Copenhagen, Delft and Tsukuba
- Committee Draft (CD): expected in June 2009
- Draft International Standard (DIS): December 2009
- Final Draft International Standard (FDIS): December 2010
- International Standard (IS): June 2011

## Conclusion

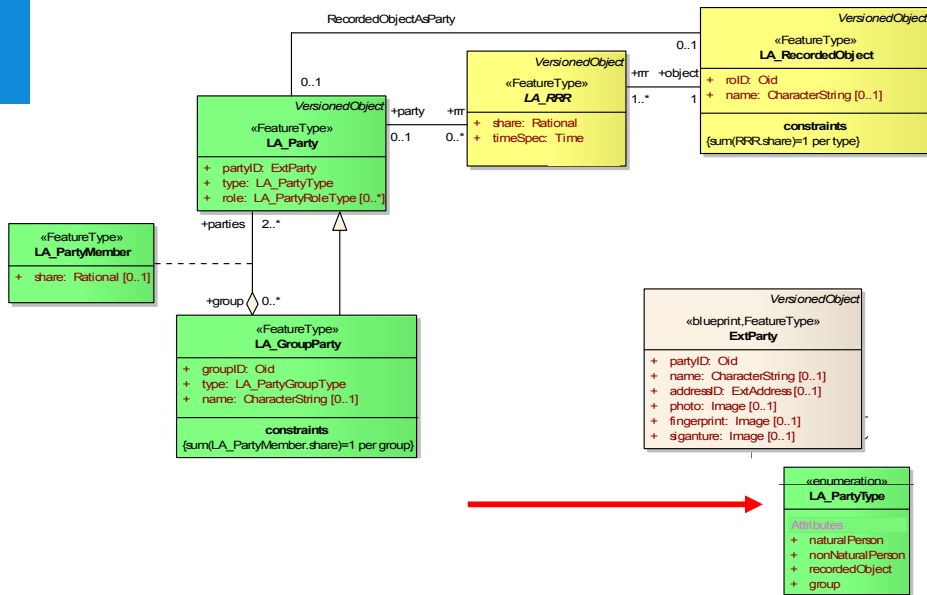
- after WD's, LADM should now be relatively stable: CD
- LADM work item has been accepted by CEN TC287
- several country profiles (being) developed: Portugal, Australia, The Netherlands, Japan, and Hungary
- important related developments: UN-HABITAT, INSPIRE, and LPIS (not mentioned in presentation: EU agricultural parcels)
- consensus process → acceptance by wide community
- Land Administration cornerstone of the Spatial Information Infrastructure (SII)

## ISO 19152 Annexes

- A. Abstract Test Suite
- B. Social Tenure Domain Model
- C. Object Diagrams (Instance Level Cases)
- D. Country Examples
- E. Spatial Profiles (2D, 3D, Topology)
- F. LADM and LPIS (Agricultural Parcels)
- G. LADM and INSPIRE

# LA\_Party

class ladm figure 2b



# LA\_RRR: Rights, Restrictions, Responsibilities

class ladm figure 2c

«Invariant»  
 (In case of Right and Responsibility there is always 1 Party and in case of Restriction there can be 0 (object restriction) or 1 Party (right restriction))

«Invariant»  
 (Party can only have 0 RRR in case the Party has specific role)

ISO 4217 is used for list of currencies in the ISO 19103 measure

