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

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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
  \( \rightarrow \) Core Cadastral Domain Model
- February 2008: FIG submits New Work Item Proposal to ISO
  \( \rightarrow \) 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

- 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
  \(\Rightarrow\) 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)

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
2D and 3D integration

- observation: 2D description implies 3D prismatic volume
- 2D polyline (GM_curve) implies string of vertical faces: LA_FaceString
- true 3D described with arbitrary oriented faces: LA_Face
2D and 3D integration

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

### 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
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

object AnnexC Case01

```plaintext
- «FeatureType» Joe_LA_Party
type = naturalPerson

- «FeatureType» Fruit Co._LA_Party
type = nonNaturalPerson

- «FeatureType» LongLease.LA_Right
type = lease
  share = 1/1
  timeSpec = 25 years

- «FeatureType» Ownership.LA_Right
type = ownership
  share = 1/1
  timeSpec = <Null>

- «FeatureType» Record_Joe_LA_RecordedObject
  roID = 100
  name = Joe's Farm

- «FeatureType» Parcel_Joe.LA_SpatialUnit
  suID = 100
  Area = 1234
  type = 2D

- «FeatureType» timeSpec is from the date of registry

- «FeatureType» timeSpec should be interpreted as a permanent right
```
Example 2: parcel complex with one owner

object AnnexC Case25

A number of non-adjacently Parcels under the same ownership, which are on the same administrative unit, can relate to just one LA_RecordedObject in some jurisdictions.

Example 3: serving parcel

object AnnexC Case04

A serving parcel (instance of LA_RecordedObject) has no direct natural or non-natural owner but instead ownership is defined via associations (in the served parcels 1 to 4 in the diagram) through the common Real Property right.
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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
- 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

LA_RRR: Rights, Restrictions, Responsibilities