Challenge to Implement International Cadastral Models – Case Finland
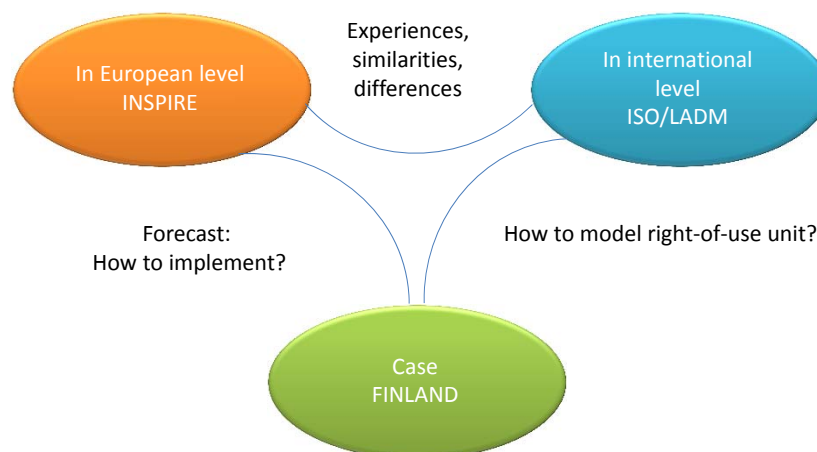
Tarja Myllymäki and Tarja Pykälä

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The topics are …

In European level
INSPIRE

Experiences, similarities, differences

In international level
ISO/LADM

Forecast:
How to implement?

How to model right-of-use unit?

Case
FINLAND

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INSPIRE shortly

- ❑ Directive of European Union, 2007 (Infrastructure for Spatial Information in the European Community)
- ❑ INSPIRE theme Cadastral Parcels has introduced a model for cadastral spatial data
- ❑ Purpose is to use it as reference data
- ❑ Ownership and rights related to parcels are outside the scope of INSPIRE

ISO/LADM shortly

- ❑ ISO work (19152) where the objective is to provide an international standard for the information used in the land administration domain
- ❑ Tries to provide a terminology for land administration, to provide a basis for the development of systems and to enable communication by using a jointly shared vocabulary
- ❑ Conceptual schema which consists of object which model parties, basic administrative units and spatial units and rights, responsibilities and restrictions
- ❑ Party data, address data, valuation data, land use data, archive data and taxation data are outside the scope
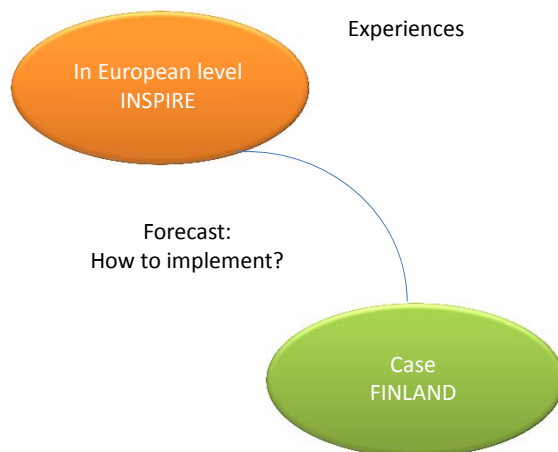
Backgrounds of Finnish cadastre shortly

❑ In Finland all cadastral information - both map and attribute data - are registered in one integral object-oriented database (started 1998, renewed 2005) managed by the National Land Survey

❑ The main objects in the cadastre include basic property units and right-of-use units with the geometry related to them. Basic property unit is the basic unit of registration and it can consist of none, one or many parcels

❑ Since the beginning of 2010 the National Land Survey has been responsible for registering titles and mortgages

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The first topic

Experiences

In European level
INSPIRE

Forecast:
How to implement?

Case
FINLAND

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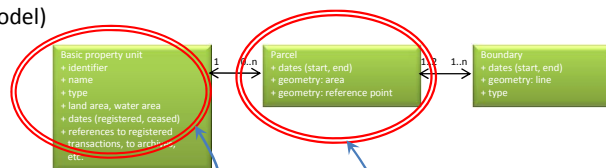# Implementing the INSPIRE Cadastral Parcels model in Finland

❑ Implementation work should start this year
❑ This forecast is based on experiences of work in thematic working group and in commenting work
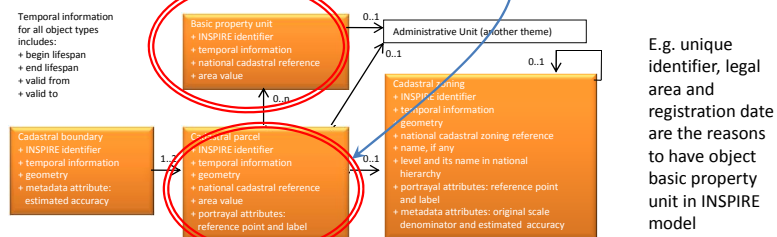
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Viewpoint of data provider shown with models

Concept of basic property unit, parcel and boundary in the Finnish cadastre (information service model)

The INSPIRE Cadastral Parcels model

Temporal information for all object types includes:
+ begin lifespan
+ end lifespan
+ valid from
+ valid to

E.g. unique identifier, legal area and registration date are the reasons to have object basic property unit in INSPIRE model

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...and with words

Cadastral Parcel

- **The core object in INSPIRE Cadastral Parcels model**
- **Mandatory or available attributes in Finland**
  1. INSPIRE identifier
  2. National cadastral reference
  3. Geometry (parcel outlines as polygon)
  4. Label
  5. Reference point
  6. Begin lifespan (insert or change date)
  7. Association to basic property unit

Cadastral Boundary

- **For metadata (e.g. estimated accuracy)**
- **Estimated accuracy is recorded only for cadastral points in Finland**

Basic Property Unit

- **To be used by countries where unique cadastral identifiers are given only for basic property units and not for parcels**
- **Mandatory or available attributes in Finland**
  1. INSPIRE identifier
  2. National cadastral reference
  3. Area value (total area)
  4. Valid from (date of registration)
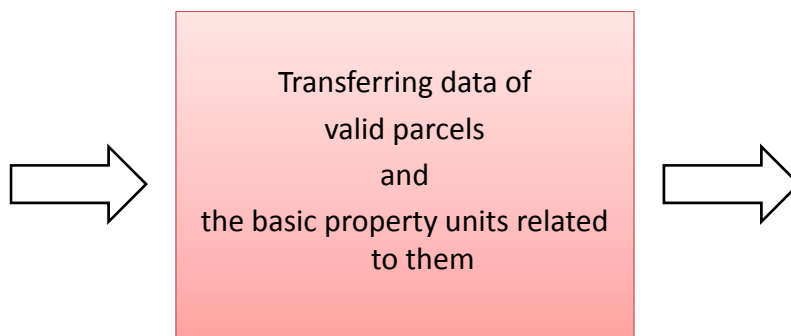 5. Association to administrative unit

Cadastral Zoning

- **For portrayal, for searches, for metadata (e.g. estimated accuracy)**
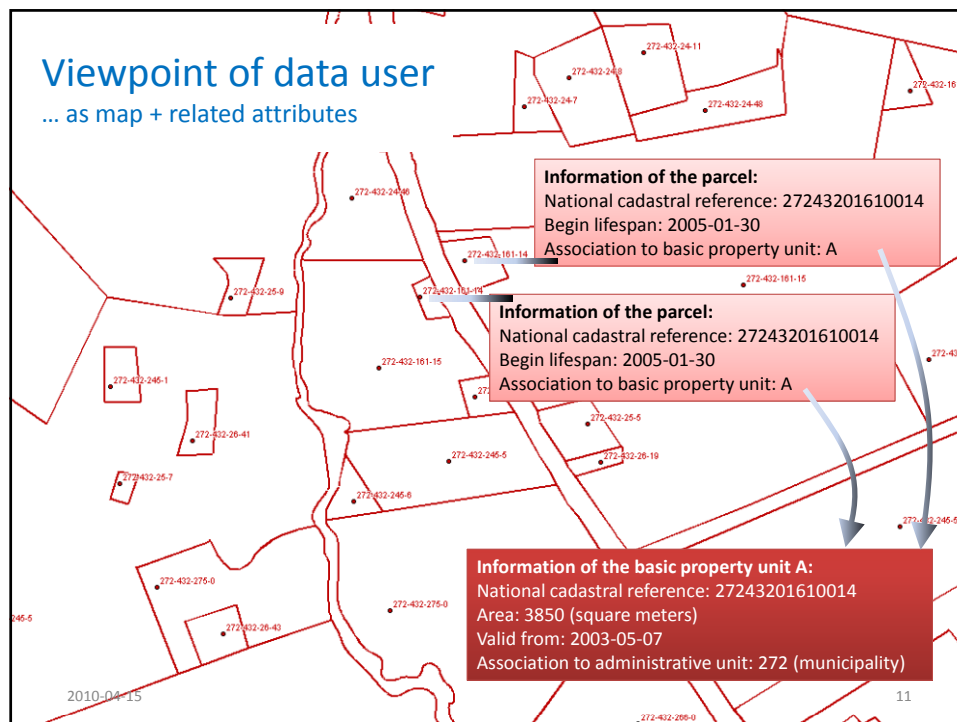- **No zoning within scope of INSPIRE is used in Finland**

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All in one sentence

Transferring data of
valid parcels
and
the basic property units related
to them

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Viewpoint of data user
… as map + related attributes

Information of the parcel:
National cadastral reference: 27243201610014
Begin lifespan: 2005-01-30
Association to basic property unit: A

Information of the parcel:
National cadastral reference: 27243201610014
Begin lifespan: 2005-01-30
Association to basic property unit: A

Information of the basic property unit A:
National cadastral reference: 27243201610014
Area: 3850 (square meters)
Valid from: 2003-05-07
Association to administrative unit: 272 (municipality)

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Experiences - INSPIRE

❑ In reality transfer file format, so called product (with rules how to make information service)

❑ The INSPIRE Cadastral Parcels model itself seems to be quite simple

❑ Transformation rules from national database structure to INSPIRE model structure including all exceptional cases can be complicated

❑ A lot of work was required to compile the terminology. It tries to be suitable for all countries

❑ If INSPIRE product does not fulfil national use cases, it means extra work and could therefore cause more costs than benefits in the short run

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The second topic

Experiences

In international
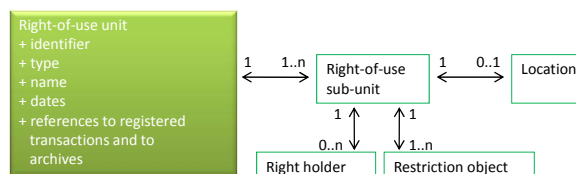level
ISO/LADM
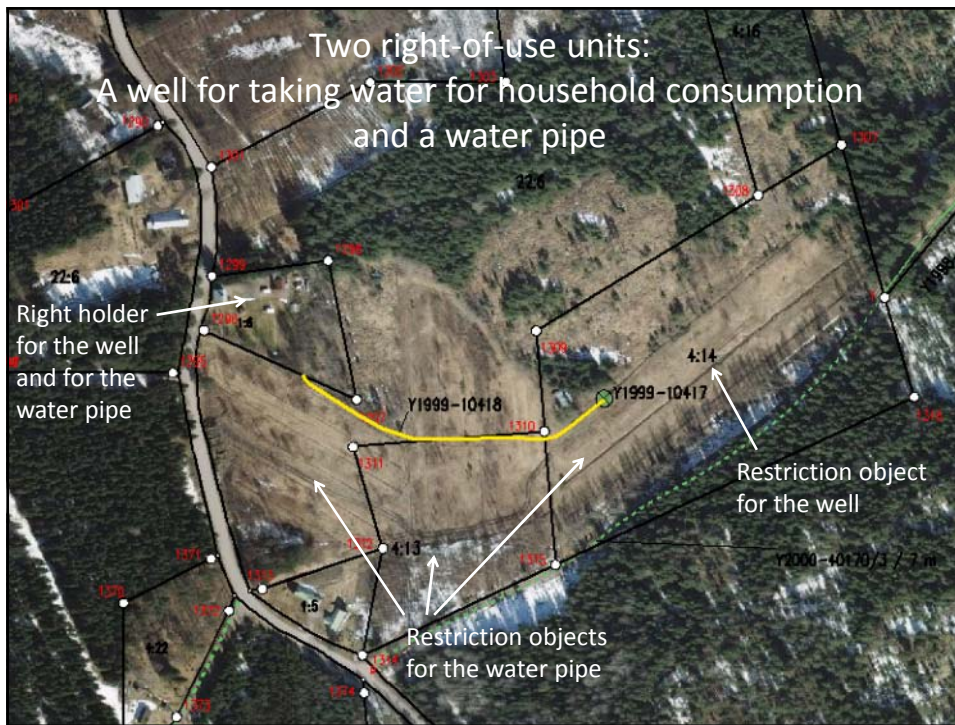
How to model right-of-use unit?

Case
FINLAND

Concept of right-of-use unit in Finland

❑ Obligatory way to register rights and restrictions
  ▪ Object which is mentioned in cadastral acts
  ▪ Experiences since 1998, both users and developers have considered this concept very successful
❑ Units with unique identifiers in the whole country
❑ Different types are defined in acts. Types are as code lists, homogenous types in the whole country
  ▪ Private roads, wells, landing places for boats, building easements, fishing restrictions, protected areas, mining rights etc.
❑ Own lifecycle and own attributes
  ▪ Associations to geometry and to right holders and restriction objects are done via sub-units

Right-of-use unit
+ identifier
+ type
+ name
+ dates
+ references to registered
  transactions and to
  archives

| 1 | 1..n | Right-of-use sub-unit | 1 | 0..1 | Location |

1 ↑   ↑ 1
0..n ↓   ↓ 1..n

| Right holder | Restriction object |

Two right-of-use units:
A well for taking water for household consumption and a water pipe

Right holder for the well and for the water pipe

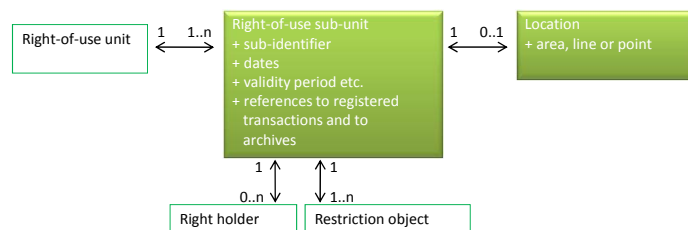Restriction object for the well
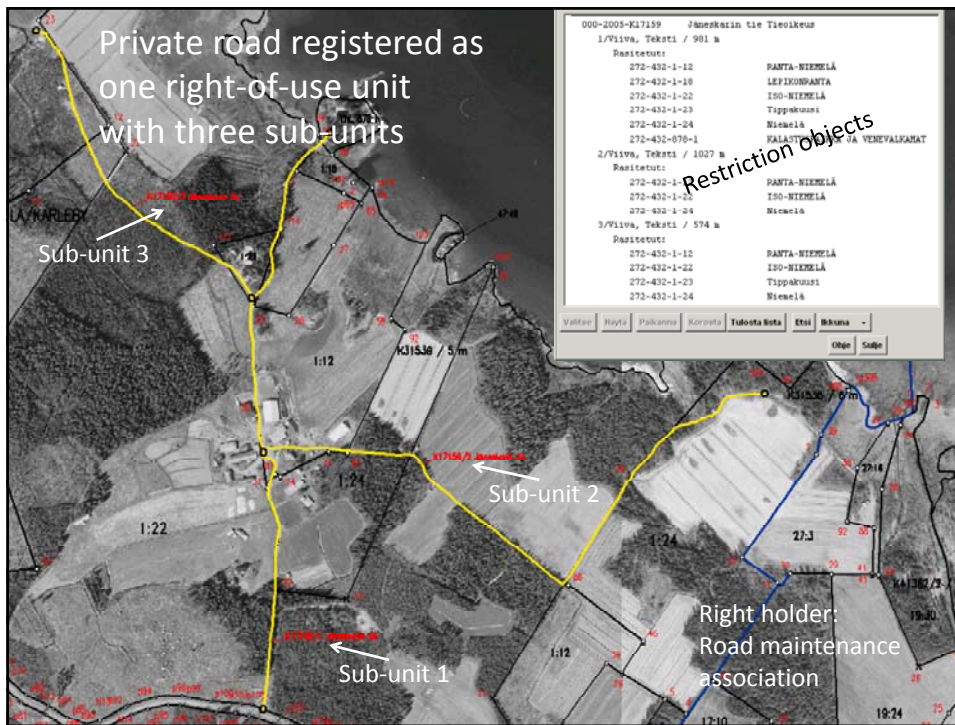
Restriction objects for the water pipe

Right-of-use sub-unit

❑ Sub-units have associations to geometry and to right holders and restriction objects
- Right-of-use unit has at least one sub-unit with or without geometry
- Sub-units enable flexible structure
  - Land surveyor decides in the legal survey how many sub-units are needed
  - For every geometry type
  - One geometry can be divided into several geometries to associate certain bunch of right holders
  - Different attributes (validity period, width of road etc.)
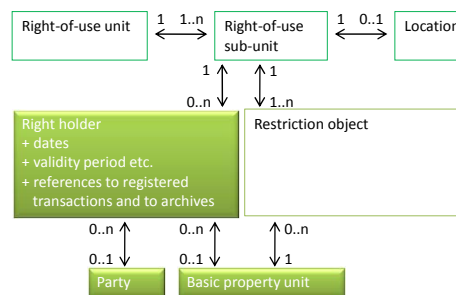
❑ Own lifecycle and own attributes

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Private road registered as one right-of-use unit with three sub-units

Sub-unit 3

Sub-unit 2

Sub-unit 1

Restriction objects

Right holder:
Road maintenance association

Right holder

❑ Legal dependency to right holder is done by an association
- Usually cadastral units
- Sometimes juridical persons (e.g. municipality or energy company)

❑ Own lifecycle and own attributes
- Possible to maintain the information for each right holder without any changes to the sub-unit and possible to keep history of changes
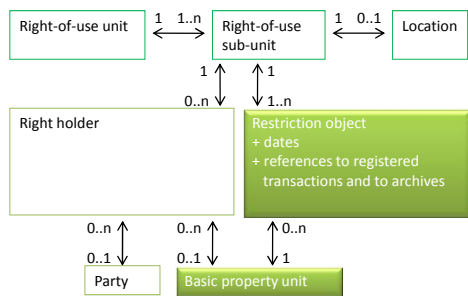

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Restriction object

❑ Legal dependency to restriction object is done by an association
  ▪ Restricted object is always cadastral unit
❑ Own lifecycle and own attributes
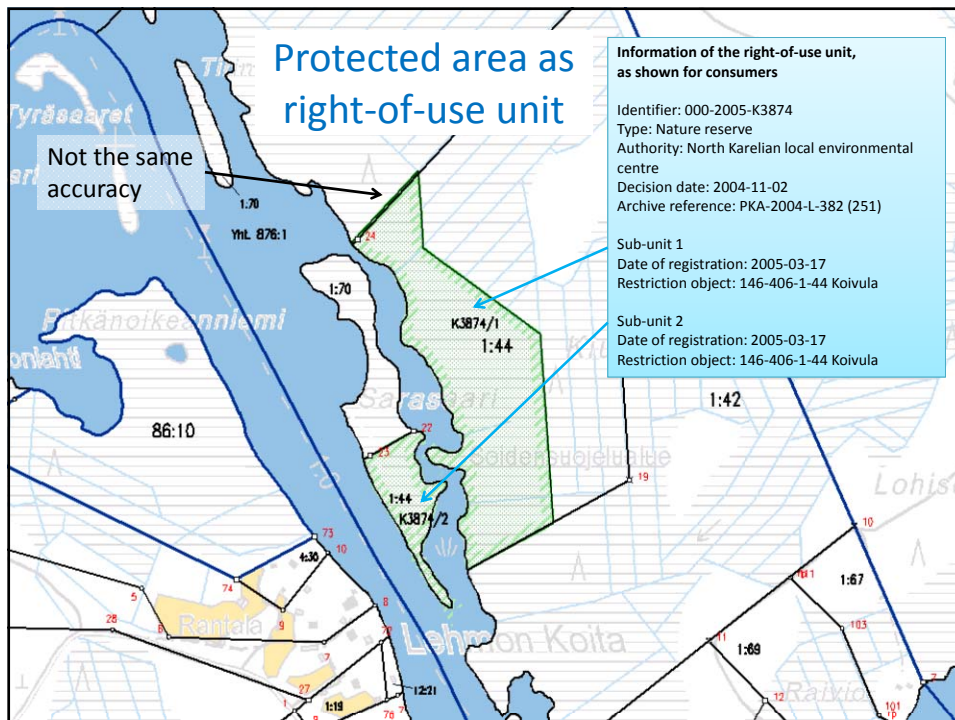 ▪ Possible to maintain the information for each association without any changes to the sub-unit

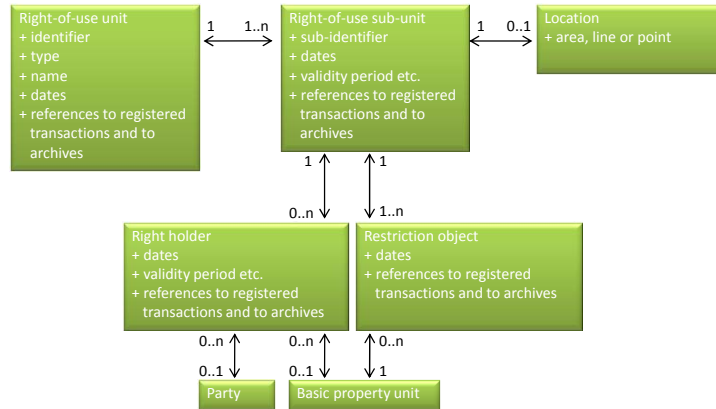❑ Geometry overlay is used during the registration to help recognizing the restriction objects
  ▪ On-the-fly geometry overlay can't be used
    o Does not always provide legally correct information , e.g. locations are not always registered with the same accuracy
    o Provides only temporary information, not lifecycle of the relationship
    o Not for legal rights with liability of damages by incorrect information

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Protected area as right-of-use unit

Not the same accuracy

Information of the right-of-use unit, as shown for consumers

Identifier: 000-2005-K3874
Type: Nature reserve
Authority: North Karelian local environmental centre
Decision date: 2004-11-02
Archive reference: PKA-2004-L-382 (251)

Sub-unit 1
Date of registration: 2005-03-17
Restriction object: 146-406-1-44 Koivula

Sub-unit 2
Date of registration: 2005-03-17
Restriction object: 146-406-1-44 Koivula

Slide 21

Model of right-of-use unit + LADM = Pre-analysis

Right-of-use unit
+ identifier
+ type
+ name
+ dates
+ references to registered
  transactions and to
  archives

1   1..n

Right-of-use sub-unit
+ sub-identifier
+ dates
+ validity period etc.
+ references to registered
  transactions and to
  archives

1   0..1

Location
+ area, line or point

1   1

0..n   1..n

Right holder
+ dates
+ validity period etc.
+ references to registered
  transactions and to archives

Restriction object
+ dates
+ references to registered
  transactions and to archives

0..n   0..n   0..n
0..1   0..1   1

Party   Basic property unit

Slide 22
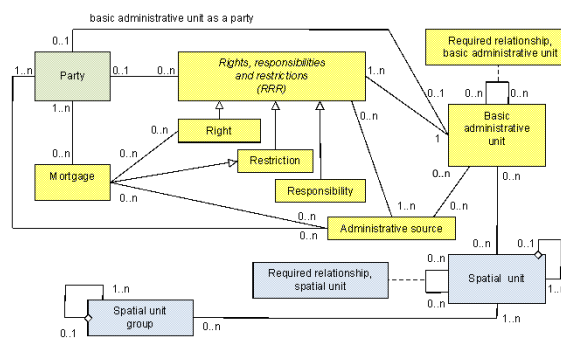
Model of right-of-use unit + LADM = Pre-analysis

LADM model, version 2009-12-07, the basis for the pre-analysis of the right-of-use unit

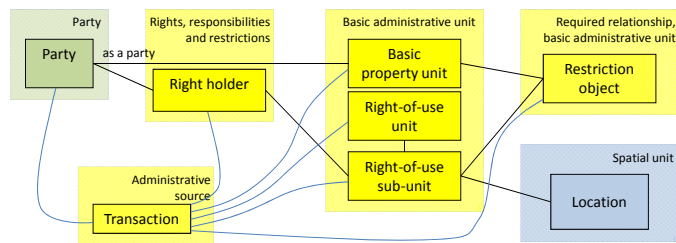basic administrative unit as a party

Party

Rights, responsibilities and restrictions (RRR)

Required relationship, basic administrative unit

Right

Restriction

Responsibility

Mortgage

Basic administrative unit

Administrative source

Required relationship, spatial unit

Spatial unit

Spatial unit group

Model of right-of-use unit + LADM = Pre-analysis

Result looked like this, the classes for right-of-use unit have been classified under LADM classes in this picture.

But as one class (Required relationship, basic administrative unit) is now missing from the newest LADM model, this pre-analysis is not relevant anymore.

To summarize: LADM supports the idea of administrative units with unique identifiers. It does not directly support legally registered relationships between different type of administrative units but favours geometry overlay.

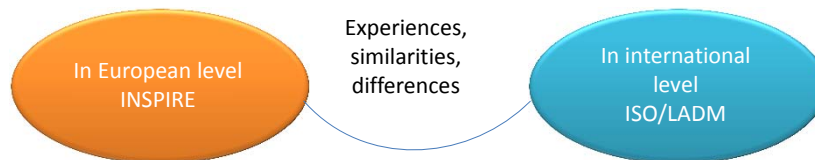2010-04-15   23

Experiences - LADM

❑ The model has been changed quite a lot between meetings
- A lot of comments – indicate difficulty of modelling?
- The model would benefit from some reviews to reach a more stable result

❑ Land administration as a domain is related to legal aspects which limits the freedom of modelling

❑ LADM is a conceptual model and therefore it can be seen in a positive way and accepted more easily than the INSPIRE model

❑ The present stage of LADM work shows that a common model is possible. Then again several country profiles can prove the opposite.

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The third topic

In European level
INSPIRE

Experiences,
similarities,
differences

In international
level
ISO/LADM

Experiences, similarities, differences

❑ The scope of INSPIRE is narrow (spatial cadastral data)

❑ INSPIRE is a model for data product specification and tries to fulfil INSPIRE use case

❑ INSPIRE model is a basis of the automatic production of transfer file format -> model must be exact

❑ The scope of LADM is wider (land administration domain)

❑ LADM is a conceptual model and tries to be a basis for common understanding

❑ LADM can be general with few objects for many purposes

Experiences

"Dream work"

To participate in international work so fully as to create concrete models has been unique and interesting experience. It has also brought along new views to existing system that has been very useful.

"To have an axe to grind"

To be objective in the work is challenging because it is not so easy to break away from the national point of view. It is only natural since the national system is the best known for everyone.

"Money, money, money"

Practically it might be challenging to find motivation and especially resources to adjust national systems to international models or even just to make the harmonised transfer files.

"Future?"

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For more details see the paper!

Thank you!

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