



INSPIRE activiteiten in het jaar 2008

Peter van Oosterom

GISt Rapport No. 52

INSPIRE activiteiten in het jaar 2008

Peter van Oosterom

GISSt Rapport No. 52

Samenvatting

Dit rapport bevat een beknopt verslag van de INSPIRE activiteiten van Peter van Oosterom in 2008. Deze zijn uitgevoerd ten behoeve van Kadaster, TNO Bouw en Ondergrond en TU Delft/RGI-116. Het rapport bevat een flink aantal bijlagen waarin de in 2008 geproduceerde resultaten integraal zijn opgenomen (presentaties, artikelen, analyses, etc.)

ISBN: 978-90-77029-24-4

ISSN: 1569-0245

© 2009 Sectie GIS-technologie
Onderzoeksinstituut OTB
TU Delft
Jaffalaan 9, 2628 BX Delft
Tel.: 015 278 4548; Fax 015-278 2745

Websites: <http://www.otb.tudelft.nl>
<Http://www.gdmc.nl>

E-mail: p.j.m.vanoosterom@tudelft.nl

Niets uit deze uitgave mag worden verveelvoudigd en/of openbaar gemaakt door middel van druk, fotokopie, microfilm of op welke andere wijze dan ook zonder voorafgaande schriftelijke toestemming van de sectie GIS technologie.

De sectie GIS technologie aanvaardt geen aansprakelijkheid voor eventuele schade voortvloeiend uit het gebruik van de resultaten van dit onderzoek of de toepassing van adviezen.

Inhoud

1	Achtergrond	1
2	Activiteiten	3
2.1	Deelname aan het INSPIRE Drafting Team (DT) Data Specification (DS).....	3
2.2	Deelname aan de INSPIRE Thematic Working Group (TWG) Cadastral Parcels (CP).....	3
2.3	Interne Kadaster INSPIRE communicatie.....	4
2.4	Afstemming met ISO 19152 LADM.....	4
3	Afrondend	5
4	Overzicht annexen	7

1 Achtergrond

Kadaster steunde de inzet in 2008 voor 20 dagen. Daarnaast steunde TNO Bouw en Ondergrond voor 15 dagen (hiervan zijn er 7 gebruikt). In totaal zijn er ongeveer 60 dagen aan INSPIRE besteed. Kadaster steunde de inzet in 2008 voor 20 dagen. De overige 33 zijn door de TU Delft/RGI-116 (60/40) gefinancierd. Hoewel niet apert te oormerken zijn de activiteiten te verdelen over het werk voor het INSPIRE Drafting Team Data Specification (voor Kadaster, TNO Bouw en Ondergrond en TUD) en activiteiten voor Cadastral Parcels (voor Kadaster en TUD). In deze korte rapportage worden de belangrijkste activiteiten samengevat, gevolgd door een afrondend woord en de bijbehorende annexen met de geproduceerde bijdragen.

2 Activiteiten

De INSPIRE activiteiten van Peter van Oosterom t.b.v. het Kadaster en TNO in het jaar 2008 zijn grofweg in een viertal categorieën onder te beren: 1. Deelname aan het INSPIRE Drafting Team Data Specification, 2. Deelname aan de INSPIRE Thematic Working Group Cadastral Parcels, 3. Interne Kadaster INSPIRE communicatie en 4. Afstemming met ISO 19152 LADM. Er zijn in 2008 geen besprekingen bij TNO geweest. Elk van deze categorieën zullen nu iets nader worden toegelicht.

2.1 Deelname aan het INSPIRE Drafting Team (DT) Data Specification (DS)

De activiteiten van het DT DS bestonden in 2008 voornamelijk uit het afronden van de belangrijkste producten D2.3, D2.5, D2.6 en D2.7. Hierbij is aardig om te vermelden dat de oorspronkelijke annex C van D2.6, later is gebruikt om als basis voor de template data product specificaties op te baseren D2.8. Meeste activiteiten voor het DT DS vonden plaats in begin 2008 en beperkt daarna (via email en teleconferenties). Via het DT DS is commentaar gegeven op de documenten van de andere INSPIRE drafting teams. Herkenbare Nederlandse bijdragen in deze basis documenten zijn:

- D2.3 Definition of Annex Themes and Scope, Version 3 (2008-03-18): teksten voor Annex I thema's: addresses en cadastral parcels (secties 5.5 en 5.6);
- D2.5 Generic Conceptual Model, Version 3.0 (2008-06-20): NL ideeën vanuit NEN3610 proberen in te brengen/veilig te stellen (id's, versies, etc.) en voorbeelden vanuit NL ingebracht (bijv. NEN3610 lifecycle rules in Annex E);
- D2.6 Methodology for the development of data specifications, Version 3 (2008-06-20): Wederom NL ideeën ingebracht, maar vooral ook aan Annex C (voorbeeld data product specification voor cadastral parcels, mede met input van Chrit Lemmen);
- D2.7 Guidelines for the encoding of spatial data, Version 3.0 (2008-12-07): feedback gegeven op document en met anme op punt van uitwisselingen van raster data aandacht gevraagd (is nog steeds een open punt; ook in ISO en OGC standaarden).

2.2 Deelname aan de INSPIRE Thematic Working Group (TWG) Cadastral Parcels (CP)

De deelname aan de TWG CP was een steeds intensiever wordende activiteit gedurende 2008. Er zijn verschillende bijeenkomsten op locatie in 2008 bijgewoond, tweewekelijkse teleconferenties en heel veel communicatie via email. De meeste ingebrachte documenten zijn de vinden in de annexen van deze rapportage. Het belangrijkste resultaat van de TWG is het beschikbaar komen van de eerste openbare 'DRAFT Guidelines – INSPIRE Data Specification Cadastral Parcels op 1 Decemeber 2008'. Deze staat nu uit voor review bij de LMOs en SDICs. Ook worden op basis van deze specificatie door de verschillende landen nu testen

uitgevoerd, waarvan de resultaten worden teruggekoppeld ten behoeve van de definitieve data product specificatie.

2.3 Interne Kadaster INSPIRE communicatie

Er is afgelopen jaar deelgenomen aan aantal interne INSPIRE bijeenkomsten bij het Kadaster Apeldoorn, zoals:

- dinsdag 11 maart 2008: afstemsessie INSPIRE bij Kadaster met o.a. Martin Salzmann, Ko van Raamsdonk, Ted Schut en Yvette Ellenkamp (VROM);
- vrijdag 15 november 2008: bespreking van testen van de eerste INSPIRE data product specificatie met Haico van der Vegt, Ted Schut en Chrit Lemmen.

Ook zijn er regelmatig meer informele contacten met Kadaster medewerkers geweest, zowel op locatie in Apeldoorn als bij andere gelegenheden en soms ook telefonisch.

Er zijn zeer geregeld email updates richting Kadaster gestuurd. Zo zijn de meeste van de in de annexen getoonde tussenresultaten in vroeg stadium richting een of meer Kadaster medewerkers gestuurd voor afstemming vooraf of ter informatie achteraf.

2.4 Afstemming met ISO 19152 LADM

Gezien het feit dat beide ontwikkelingen min of meer gelijktijdig ontwikkeld worden, is er aan de afstemming tussen INSPIRE CP en ISO LADM ook de nodige tijd besteed (o.a. besprekingen met Chrit Lemmen en voorbereiden/geven van presentaties over LADM tijdens INSPIRE bijeenkomsten en omgekeerd). Ook is er een LADM-gebaseerde versie van de INSPIRE cadastral parcels gemaakt, welke aantonen dat beide ontwikkelingen compatibel zijn. De activiteiten en tijd die aan ISO LADM zelf wordt vallen buiten de scope van deze rapportage.

3 Afrondend

Er is heel veel gebeurd in 2008 op het gebied van de data specificatie binnen INSPIRE. Door Peter van Oosterom is er in 2008 met zeer veel genoegen aan INSPIRE meegewerkt. De eerste concept data product specificaties (voor de Annex I thema's) zijn inmiddels beschikbaar. De openbare review ronde van deze specificaties, de resultaten van het testen door LMO/SDICs en het afstemmen van de thema's onderling zullen met name in de eerste helft van 2009 nog veel inspanning vergen. Daarnaast zullen ook de Annex II en III thema's gaan spelen in 2009. Dit wordt nu voor het eerst ook direct relevant voor TNO met het thema geologie in Annex II en thema's als bodem, energiebronnen en minerale bronnen in Annex III. Daarnaast zitten ook weer thema's waarbij het Kadaster een belang kan hebben; denk aan hoogte, ortofoto's in Annex II en gebouwen, landgebruik (planning) en utilities (kabels en leidingen netwerken) in Annex III. Al met al zal 2009 een heel spannend INSPIRE jaar gaan worden!

4 Overzicht annexen

- A. Peter van Oosterom. TWG Cadastral parcels, D2.3 presentation, TWG Cadastral parcels Kick-off meeting, JRC, Ispra, Italy, 14 and 15 February 2008.
- B. Peter van Oosterom. Identifiers, discussion paper for the INSPIRE TWG Cadastral parcels meeting, Palma, Spain, 14 and 15 April 2008.
- C. Peter van Oosterom. Identifiers, presentation at the INSPIRE TWG Cadastral parcels meeting, Palma, Spain, 14 and 15 April 2008.
- D. Peter van Oosterom. User requirements/raw check-lists EULIS, 25 May 2008.
- E. Peter van Oosterom. User requirements/raw check-lists Soil Protection: The Netherlands, Wkpb (public law restrictions), 22 Mei 2008.
- F. Amalia Velasco and Peter van Oosterom. Soil Protection: 1. EC, Soil Protection Directive, 2. The Netherlands, Wkpb (public law restrictions), presentation at the joint meeting of the INSPIRE TWG cadastral Parcel and EuroGeographics-PCC, Brussels, 3 June 2008.
- G. Peter van Oosterom. Temporal aspects and maintenance, User requirement analysis for the INSPIRE TWG Cadastral parcels, 2 September 2008.
- H. Olav Jenssen, Peter van Oosterom, and Dominique Laurent. Spatial aspects, User requirement analysis for the INSPIRE TWG Cadastral parcels, 27 August 2008.
- I. Peter van Oosterom. Relationship with ISO 19152, LADM Land Administration Domain Model, presentation at the INSPIRE TWG Cadastral parcels meeting, Verona, Italy, 8 and 9 September 2008.
- J. Peter van Oosterom. Temporal aspects and maintenance, presentation at the INSPIRE TWG Cadastral parcels meeting, Verona, Italy, 8 and 9 September 2008.
- K. Peter van Oosterom. INSPIRE process, standardization of geoinformation in Europe, presentation (abstract and slides) at the European Commission, Joint Research Centre, Agriculture Unit LPIS Workshop - Applications and Quality, <http://mars.jrc.ec.europa.eu/mars/content/Sofia>, Bulgaria, 17-18 September 2008.
- L. Peter van Oosterom. LADM-based version of INSPIRE cadastral parcels, Annex F of ISO/WD 19152.3, Geographic information — Land Administration Domain Model (LADM), 14 November 2008.
- M. Jaap Besemer en Peter van Oosterom, INSPIRE, Notitie voor de KNAW (Koninklijke Nederlandse Akademie van Wetenschappen)/ NCG (Nederlandse Commissie voor Geodesie), Delft, 26 Oktober 2008.
- N. Peter van Oosterom. INSPIRE Thema Werkgroep Groep kadastrale percelen. GDMC Nieuwsbrief april/mei 2008 (in Dutch, Elfriede M. Fendel, Ed.) In: Vi Matrix, Volume 16, 2, pp. 34-35

Annex A

Peter van Oosterom. TWG Cadastral parcels, D2.3 presentation, TWG Cadastral parcels Kick-off meeting, JRC, Ispra, Italy, 14 and 15 February 2008.



Kick-off meeting TWG Cadastral parcels

D2.3 presentation

14 and 15 February 2008
at JRC, Ispra



General presentation

- D2.3 „Definition of Annex Themes and Scope“
 - mainly done at the beginning of DT DS work (October 2005 – May 2006)
 - mainly with the previous version of the INSPIRE directive (the „Commission“ one)
 - with undefined objectives

General presentation



- Main sources
 - The Directive itself (definition)
 - Previous Position Papers (developed to prepare the INSPIRE Directive)
 - Reference Material submitted by SDIC/LMO (with priority given to already harmonised works)
 - The expertise of DT DS members

General presentation



- Common structure for all themes
 - Definition (from Directive)
 - Description
 - Scope, use examples
 - Main features and attributes
 - Links and overlaps with other themes (**for the specification development**)
 - Reference documents

Main steps



- Publish draft document (May 2007)
- Review by SDIC/LMO (comments received in July 2007)
- Comment resolution phase (including a workshop)
- Next version of D2.3 to be published by DT DS (as definitive)
- Overview document (definition + description) to be maintained by TWG

Cadastral parcels definition



- (INSPIRE, 2007) directive has serious logic error: '**Areas defined by cadastral registers or equivalent**' → no definition
- defined term is used in definition (e.g. 'car' definition: things produced by car factory)
- not a good start for harmonization
- therefore the following definition added: '**A single area of land or more particularly a volume of space, under homogeneous real property rights and unique ownership**' (source: WG-CPI, 2006)

Description, key elements



- basic unit is parcel
- nationwide unique real property id
- spatial description has adequate accuracy
- register under responsibility of government
- principles of equality, security and justice
- ruled by laws and regulations to protect personal information
- may associate: nature, size, value, RRR
- nationwide coverage: no overlaps or gaps

Scope, use examples



- geo side cadastral IS (land administration)
- not admin/legal side (rights, persons)
- but, strong associations (parcel definition)
- every EU country has system, but due to different legal systems and different national tradition, there is a rich variety → limits interoperability (EULIS), high cost
- FIG proposed harmonized Land Admin Domain Model, LADM nwip to ISO TC211
- aims: legal security, taxation, development

Important types/attributes



- types: Parcel, Boundary, Survey Point
- parcel attr: geometry, source, quality, legal area (calculated area), value, use code, **unique id**, often based on admin hierarchy
- boundary (discontinuity line legal situation) attr: geometry, topology, date, quality, link to survey (coordinates in National reference system → future also ETRS89)
- Trend: space scarce 3D volume parcels
- Not everything always present/needed

Important types/attributes



- joint working group PCC/EuroGeographics identified **core** (id, area, bnd, georef, orgin/history) and **additional** (owner, user, RR, localisation, admin units, buildings, zoning, land use/cover, values, address,..)
- use modularized modeling approach (packages: survey, geom/topol, legal,..)
- pattern reoccur in other themes (harmonize!):
 - ‘spatial object – relationship – person’ or
 - ‘survey objects (o&m) – resulting spatial objects’



Links/overlaps other themes

- admin units (bnd coincide with parcel)
- buildings (for reference & orientation)
- transport networks (rail/road often parcel)
- addresses
- geographical names
- land use
- land cover



Received comments

- patterns, how harmonized?
- cadastral parcels form a partition (no overlaps no gaps), government property
- scope: rights and persons outside (was mentioned many times, but still comments)
- additional ref material (e.g. Australia/New Zealand 'Harmonized Data Model')
- and many textual/editorial (incl. in v2.1)



Open issues

- core/additional features & attributes (e.g. origin and history of parcel, and others)?
- partial implementation by one organization (normally multiple organizations are involved) → effect on conformance?
- how to handle link to rights and persons (outside INSPIRE)?
- how to handle link to other INSPIRE themes (buildings, addresses, admin units,..)?

Annex B

Peter van Oosterom. Identifiers, discussion paper for the INSPIRE TWG Cadastral parcels meeting, Palma, Spain, 14 and 15 April 2008.

Discussion Paper

Author	Peter van Oosterom
Component/element	Identifiers
Date	14 april 2008

1. As-it analysis

Overview (when available)

From the Inventory document of the Joint Working Group of EuroGeographics and the PCC (WG-CPI), 28-2-2006:

“Unique identifier

- each country has a national unique cadastral parcel identifier
- in general available in digital form in map and register, except in Iceland

Remarks:

- we strongly support the importance of the unique identifier
- a change of the national unique identifier should not be necessary, but interoperability has to be guaranteed”

In Iceland the identifier is only available in the register and not in the map according to the survey (one does wonder, how the different parts can be linked together). From the examples of the unique identifier it can be observed that all countries have differently structured identifiers of different lengths (which do not seem to be meaning less: sometimes an hierarchical cadastral division is stored in the identifier, sometimes some lineage can be observed, e.g. when parcel is split). Identifier is often used outside cadastre for linking purposes.

Summary of the as-it analysis done within TWG

Overview of the different types of identifiers (examples from WG-CPI, 28-2-2006):

- Austria: 30133-123/45, behind the / is the result of dividing an (earlier) parcel
- Belgium: 92001A0999/02R999, cadastral division key (5d), section (1l), root (4d), bis ('/' + 2d), alphanum (1l or '/'), numeric (3d)
- Czech republic: 12345612345/123, cadastral district (6d?), parcel number (5d+3d?)
- Denmark: 4ae123456(7)1(234)(abc), cadastral district (max 7d), parcel id (max 4d+3L)
- Finland: 09140300020017, municipality number (3d), village/town (3d), group number (4d) and sequence number (4d)
- France: AB123, probably only the last part (sheet+parcel number)? From BD Parcellaire: municipality (5d), arrondissement/absorbed mun (3d), section (2l), sheet (2d), parcel number (4d)
- Hungary: nnnnn/mmm (only part of last part?), settlement identifier (4d), parcel identifier (max 6d), modification identifier (max 4d), if parcel is rural then parcel

identifier start with '0'. A building within the parcel is identified with 2 additional digits.

- Norway: 1111,2222,333,444,555, municipality number (4d), land number (4d), title number (4d), lease number (4d, only for leased area), unit number (4d, only for sectioned area, that is limited part of building)
- Spain: 12345-12-AB-1234-S-1234-AB (urban parcel with addition '-'), from the as-it analysis, two options:
 1. urban: 9872023 VH5797S 0001 WX, estate/parcel (7d), sheet (7c), flat/unit (4d), control (2l)
 2. rural: 13 077 A 018 00039 0000 FP, province (2d), municip (3d), sector (1l), poligono (3d), parcela (5d), construc (4d), control (2l)
- Switzerland: CH9999999999PP (looks like a 2l country prefix), municipality (4d), cadastral division (typically 2d, but can be 3d), parcel (typically 4d). Currently there are differences between the cantons, but a unique Swiss identifier will be introduced. There can be extensions to the parcel number (e.g. floor ownership)
- The Netherlands: APD00 F 2345, municipality (3l+2d), section (2l), parcel (5d). Part-of-parcels (have addition postfix code 'D0001', d=deel=part and then a sequence number). Apartment complexes also have an identifier (same mun+sec, but own number) and apartment units have additional postfix code 'A0002'). Also utility networks are registered as cadastral objects (special municip-code, section indicates type: water, gas, telecom,...)

It should be noted that there are both variable length (e.g. with expression max 7d) and fixed length identifiers. There are also different ways to handle leading zero's or spaces (keep or remove) and to align right or left (within a sub-field). Different types of separators between the components are used (';', '/', '-', ' ', ..) and there are also identifiers without separators (usually fixed length). There are even differences within a country (cantons or rural/urban parcel identifiers with different rules).

Sometimes (Austria, Hungary,...) predecessor and successor information is partly encoded in the identifiers, but in non of the cases this is sufficient to trace back all parent-child relationship. In these cases one wonders what would happen if one big parcel is developed in many small parcels (over time) and what happens if this number is bigger than the available combinations within the identifier (e.g. Hungary 4 digits, that is 10.000 new parcels)?

There are also other attributes encoded in the identifier (e.g. rural parcel in Hungary).

Identifier also used for other register objects (e.g. legal space building, apartment units, or utilities).

In some countries (Czech Republic, Norway,...) the cadastral parcels are aggregated (with other parcels or buildings) to larger units, which may get their own identifier (in Norway the parcel does not even have a unique identifier, but only the CadastralUnit has).

There are also countries where the parcels have subparcels or smaller units (Hungary), which should also be identifiable; reasons for this can be different applications; e.g. agricultural lots.

Besides the thematic identifier in Denmark a parcel has also an 128 bit non meaningful computer id (which is used by services): uuid.

Besides parcels, also cadastral boundaries can have unique identifiers, both thematic/business/ meaningful and/or non meaningful (e.g. in Denmark). Something similar could be imagined for cadastral points.

As municipalities are sometimes part of the parcel identifiers, changes in municipalities (e.g. merging of municipalities, or boundary correction between two municipalities,..) might in these cases also change the parcel identifiers. A strategy to solve this issue, is to keep the old municipality code (in case of a merging or absorbing situation): France, Netherlands, Norway (in the future), ...

The handling of update rules and re-using old identifiers or assign new identifiers does vary a lot between the different countries and the types of updates (split, merge, correct boundary, change other attribute). In fact of identifiers are 'reused' then per definition they are not unique (and can not identify the right version through time). To make it unique it must be either used together with a version-number or a time-stamp.

In fact in France (BD Parcellaire), there is no single identifier attribute, rather a set of attributes together forming a unique thematic identifier.

When a new parcel identifier has to be assigned there is often a rule how to assign this new value: find the highest number used in the hierarchical set to which this parcel belongs and increment with 1.

2. User requirements

User requirements of "agriculture" use case

No requirement other than identifier should be unique within a country (the structure is left to the member state).

Other user requirements

From the directive, Article 8(2) states:

'The implementing rules shall address the following aspects of spatial data:

- (a) a common framework for the unique identification of spatial objects, to which identifiers under national systems can be mapped in order to ensure interoperability between them;
- (b) the relationship between spatial objects;
- (c) the key attributes and the corresponding multilingual thesauri commonly required for policies which may have an impact on the environment;
- (d) information on the temporal dimension of the data;
- (e) updates of the data.'

Note in (a) the 'unique identification of spatial objects' and also the life-time aspects in (d) and (e).

Another important document in this context is: UNECE, 2004, United Nations, Economic Commission for Europe, 'Guidelines on Real property Units and Identifiers – and their importance in supporting effective national land administration and land management', Geneva, Switzerland. From this document some facts and a view of the hierarchy of: plot - parcel - basic property unit - property unit - portfolio of ownership:

When asked whether buildings are defined as part of the land on which they stand, 18 countries responded as follows (Y= Yes, N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N

When asked whether properties can consist of water areas only, without dry land, 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N

When asked whether a basic property unit can consist of more than one parcel, 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	Y	N	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N

When asked whether the law defines how boundaries should be marked, 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	N	Y	Y	Y	N	N	Y	N	N	Y	N	Y	N	Y	Y	N	N

When asked if, on subdividing a parcel, two new parcels will be created (rather than one old parcel and one new parcel) 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
N	Y	N	Y	N	Y	Y	Y	N	Y	N	Y	Y	N	N	Y	N	Y

When asked whether on subdividing a real property into two parts, does one parcel retain the old real property identifier, 18 countries responded as follows (Y= Yes, N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	Y	Y	Y	Y	N	N	N	Y	N	Y	N	N	Y	Y	N	N	Y

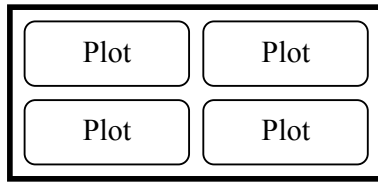
When asked whether buildings were recorded on a separate part of the land register, 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
N	Y	N	Y	N	Y	N	Y	Y	N	N	Y	Y	Y	N	N	N	N

When asked whether a building can be registered as several sub-buildings, they replied:																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	Y	N	Y	Y	Y	N

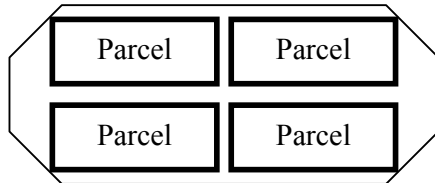
When asked whether each urban real property has an official address, 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	N	Y	Y	N	Y	N	Y	Y	N	N	Y	Y	N	N	N	Y	Y

When asked whether each individual plot such as an identifiable field has an official address, 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N

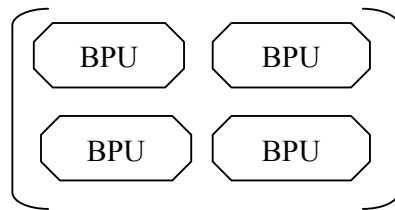
When asked whether each urban real property has a post code, 18 countries replied (Y = Yes; N = No):																	
AT	BE	CH	DE	FI	GR	HR	LT	LV	NL	NO	PO	RU	SE	SK	SI	UK	UA
Y	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	Y	Y	Y	N	Y	N



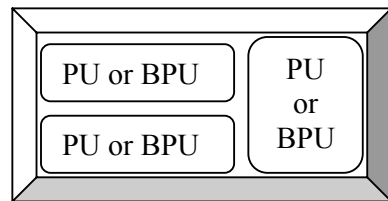
Parcels
are made up of
one or more **plots**



Basic property units
are made up of
one or more **parcels**



Proprietary units
may be made up of
one or more **BPUs**



Portfolios of ownership
are made up of
one or more BPUs or
proprietary units (PUs)

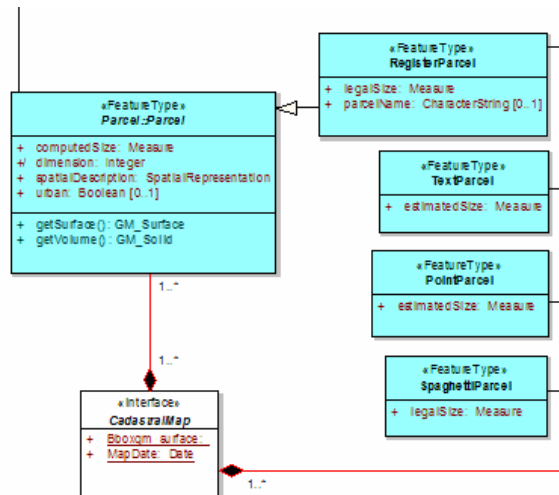
The plot and the parcel have a physical shape and are land-based.
The parcel is defined by a homogeneous set of real property rights.
The BPU and the proprietary unit are in principle abstract and based on single ownership.
The BPU has homogeneous real property rights, the proprietary unit may not.
The portfolio of ownership is a collection of proprietary units and BPUs.

Figure VII. The hierarchy of ownership

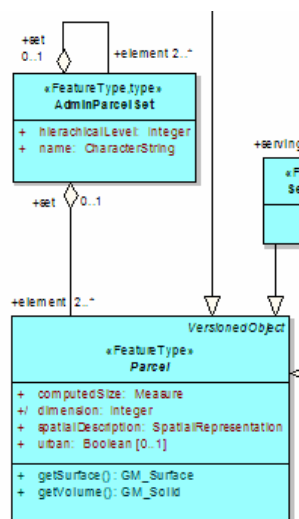
3. Existing standards

Land Administration Domain Model (standard proposed by FIG to ISO)

All object instances from classes in a UML model get a meaningless (system) identifier. However, the RegisterParcel object has an optional attribute parcelName, which could be used as a thematic/meaningful identifier.



Alternatively, as the LADM supports the hierarchical grouping of parcels via the object class AdminParcelSet (which has an attribute name), a method could be defined to create a sequence from the top of the hierarchy to the bottom by concatenating the names (or codes). To be further explored within the LADM (might be country specific).



DT DS documents (mainly Generic Conceptual Model)

D2.5, section 4.3.2, harmonization component ‘(I) Identifier management’ states: Spatial objects from Annexes I and II should have an external object identifier. This component will define the role and nature of unique object identifiers (or other mechanisms) to support unambiguous object identification. Thematic Working Groups may decide to support unique object identifiers also in Annex III themes.

To ensure uniqueness some form of management system will be required. This does not mean that all organisations need to adopt a common form of identifier or other mechanism but the

identifier management mechanisms (e.g. registers) in use at national level will need to be synchronised/mapped to ensure pan European integration.
 Note that the same real-world phenomenon may be represented by different spatial objects (with their own identifiers).

D2.5, section 9.8.2, Identifier states:

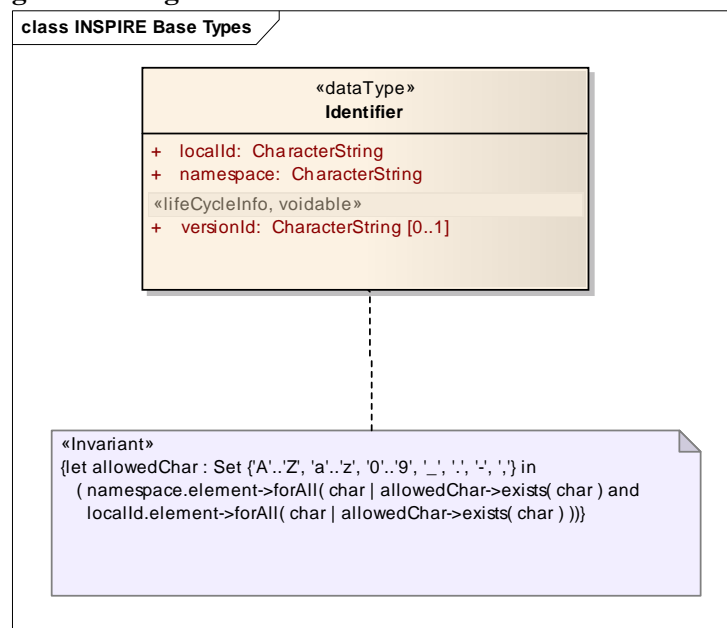
The Identifier data type implements the concepts specified in Clause **Fout! Verwijzingsbron niet gevonden.**

- The property “localId” shall contain the local identifier part of the external object identifier of the spatial object (see Clause **Fout! Verwijzingsbron niet gevonden.**).
- The property “namespace” shall contain the namespace part of the external object identifier of the spatial object (see Clause **Fout! Verwijzingsbron niet gevonden.**).
- If provided, the property “versionId” shall contain the version identifier of the particular version of the spatial object (see **Fout! Verwijzingsbron niet gevonden.** and **Fout! Verwijzingsbron niet gevonden.**). The property shall be void, if the spatial data set does not distinguish between different versions of the spatial object. It shall be missing, if the spatial object type does not support any life-cycle information.

Requirement 31 All spatial object types whose instances are identifiable by an external object identifier (see Clause 14) shall receive a property of type “Identifier”, with cardinality “0..1” or “1”.

Requirement 32 All targets of a navigable association role in an INSPIRE application schema shall be identifiable by an external object identifier.

NOTE External object identifiers are distinct from thematic object identifiers, see Clause **Fout! Verwijzingsbron niet gevonden.**



D2.5, clause 14 ‘Identifier management’ is a quite elaborate clause of identifiers. Below a summary of the requirements:

- 61 Unique identification shall be provided by external object identifiers, i.e. identifiers published by the responsible data provider with the intention that they may be used by third parties to reference the spatial object within INSPIRE.
- 62 All spatial object types of Annexes I and II of the INSPIRE Directive shall carry an external object identifier property as specified in 9.8.2, unless it is known that no requirement exists to identify or reference such object instances.
- 63 Uniqueness: No two spatial objects of spatial object types specified in INSPIRE application schemas shall have the same identifier.
- 64 Persistence: The identifier shall remain unchanged during the life-time of an object. The definition of every spatial object type in an INSPIRE application schema shall state which modifications (e.g. attribute changes, merging with another spatial object) do or may change the identity of a spatial object, i.e. when the existing object is "retired" and a new object with a new identifier is created, and which changes do not change the identity of a spatial object.
- 65 The life-cycle rules for spatial object types in a spatial data set shall be documented in the metadata of the data set.
- 66 Traceability: Since INSPIRE assumes a distributed, service-based SDI, a mechanism is required to find a spatial object based on its identifier. I.e. the identifier shall provide sufficient information about the source of the spatial object so that arrangements can be made that allow to determine the download service(s) that provide access to data from that source.
- 67 Unique identifiers of spatial objects shall consist of two parts:
 - a namespace to identify the data source (owned by a data provider)
 - a local identifier, assigned by the data provider (must be unique within the namespace)
- 68 For all spatial objects, the namespace shall include all relevant information to guarantee uniqueness of the full identifier.
- 69 All namespaces shall start with a code that unambiguously identifies the data provider.
- 70 In case of a data provider associated with a member state this shall be the two letter ISO 3166 code which shall be registered in a register for external object identifier namespaces in INSPIRE.
- 71 In case of a multinational data provider it shall be a code starting with an underscore ("_") to avoid conflicts with ISO 3166. The codes shall be registered in a register for external object identifier namespaces in INSPIRE.
- 72 All remaining characters of the namespace shall uniquely identify the data source within the member state (or multinational organisation).
- 73 As a result, the identifier management will be co-ordinated in the sense that every data provider in INSPIRE
 - shall register their identifier namespaces in the appropriate INSPIRE identifier namespace register,
 - can assign local identifiers arbitrarily within namespaces owned by the data provider as long as each identifier is used only once.
- 74 The namespace and the local identifier parts of an external object identifier in INSPIRE shall only use the following set of characters: "A" ... "Z", "a" ... "z", "0" ... "9", "_", ".", "-", ",", " ". I.e. only letters from the Latin alphabet, digits, underscore, point, comma, and dash are allowed.
- 77 In the case where the application schema contains life-cycle information for a spatial object type with an external object identifier, a version identifier shall be used to distinguish between the different versions of a spatial object (see "versioned" in data type

“Identifier”, 9.8.2). Within the set of all versions of a spatial object, the version identifier shall be unique.

- 78 The version identifier shall be a character string with a maximum length of 25 characters.
- 79 The version identifier shall not be considered as part of the unique identifier of a spatial object.

And in addition also a number of recommendations:

- 21 It is strongly recommended that unique identifiers should be provided for spatial object types where references from other spatial data objects are expected to be applicable.
- 22 Annex III contains themes with spatial objects for which identifiers may be important. Where this is the case, identifier properties should be modelled in the application schema.
- 23 Whenever possible, the use of unique identifiers should be limited to spatial objects. Unique identifiers for other objects, e.g. for geometrical or topological primitives should only be considered where multiple spatial objects use the same geometry or topology primitive and this information needs to be communicated to users.

D2.6, informative annex A.12 provides the following recommendation on identifier management:

- 22 Spatial object life-cycle rules will likely vary from member state to member state, so the requirements on this topic stated in the INSPIRE data product specifications should be as flexible as possible because feasibility is important and needs to be taken into account.
- 23 If thematic identifiers need to be harmonised for some themes, it should be done by the concatenation of a two letters prefix for the member state with the national thematic identifier.

D2.6, informative annex C1 states on identifier management for cadastral parcels:

‘Cadastral parcels must have a unique real property identifier to which the legal status is attached. This identifier is always based on a hierarchy of administrative area's (provinces/districts/cantons/..., municipalities/communes/..., sections/polygons/...) and sometimes to the 'mother' parcel (subdivision of parcel .../.../.../37 means for example .../.../.../37/1 and .../.../.../37/2). Alternatively there could be explicit associations between predecessors and successors. At a European level, the national identifiers should get a country code prefix to make them unique within Europe.

Besides this ‘meaningful’ identifier for parcels (or register objects), all other objects in the model have also unique identifiers (system generated) used in referencing when implementing the associations.’

4. Conclusions

There should be an unique thematic (also used outside Cadastre) id for parcels (if it does not exist, then it can be derived and presented as a view; e.g. in France combining several attributes). The same for cadastral boundaries and cadastral points.

Time (or version) should be considered part of the complete identifier.

The structure of parcel identifiers is different for every country and it is outside the scope/ambition of INSPIRE to make this uniform.

To make parcel identifiers unique within the EU, add a country prefix (according to ISO 3166, 2 letter code).

Besides the thematic/business identifier, there seems to be a future for machine identifiers (uuiid's) to be used within (web) services.

Beside a data content, parcel identifiers also have a presentation/cartographic aspect (when displayed). For example in the Netherlands, they have a label position and rotation angle (if I remember well), in case the label does not fit there is a second position (for drawing a stick to connect the displaced label to a parcel).

In modelling the identifiers, and related set of rules (in case of changes) we might need some refined constraints (in OCL), which may be partly different per country, but also partly the same: e.g. id's have to be unique, next id to be used is 1 higher than previously highest.

There is some relationship with addresses as potential (part of) parcel/property identifier.

An alternative identifier (with) geographic meaning could be a coordinate (reference point within the parcel). This will also be unique (if parcels do not overlap) and may have interesting applications (for geo-coding or spatial clustering). Most likely quite a number of countries will already manage such a reference point (but do not yet consider this as the identifier). When switching to ETRS89 this will then provide uniform and unique European parcel identifiers.

Annex C

Peter van Oosterom. Identifiers, presentation at the INSPIRE TWG Cadastral parcels meeting, Palma, Spain, 14 and 15 April 2008.



TWG Cadastral parcels

Identifiers

14 and 15 April 2008

Unique identifier WG-CPI, 2006



- All countries have it, in both register and map (except Iceland)
- Change national unique identifiers is not needed, but interoperability has to be guaranteed
- Example show many different id 'structures', which are not meaningless, contains
 - Hieratical cadastral division
 - Some lineage
 - Indication of type of parcel

as-it analysis, TWG (1)



- Austria: **30133-123/45**, behind the / is the result of dividing an (earlier) parcel
- Belgium: **92001A0999/02R999**, cadastral division key (5d), section (1l), root (4d), bis (''+2d), alphanum (1l or '/'), numeric (3d)
- Czech republic: **12345612345/123**, cadastral district (6d?), parcel number (5d+3d?)
- Denmark: **4ae123456(7)1(234)(abc)**, cadastral district (max 7d), parcel id (max 4d+3L)
- Finland: **09140300020017**, municipality number (3d), village/town (3d), group number (4d) and sequence number (4d)
- France: **AB123**, probably only the last part (sheet+parcel number)?
From BD Parcellaire: municipality (5d), arrondissement/absorbed mun (3d), section (2l), sheet (2d), parcel number (4d)
- Hungary: **nnnnn/mmm** (only part of last part?), settlement identifier (4d), parcel identifier (max 6d), modification identifier (max 4d), if parcel is rural then parcel identifier start with '0'. A building within the parcel is identified with 2 addition digits.

as-it analysis, TWG (2)



- Norway: **1111,2222,333,444,555**, municipality number (4d), land number (4d), title number (4d), lease number (4d, only for leased area), unit number (4d, only for sectioned area, that is limited part of building)
- Spain: **12345-12-AB-1234-S-1234-AB** (urban parcel with addition '-?'), from the as-it analysis, two options:
 - urban: **9872023 VH5797S 0001 WX**, estate/parcel (7d), sheet (7c), flat/unit (4d), control (2l)
 - rural: **13 077 A 018 00039 0000 FP**, province (2d), municip (3d), sector (1l), poligono (3d), parcela (5d), construc (4d), control (2l)
- Switzerland: **CH9999999999PP** (looks like a 2l country prefix), municipality (4d), cadastral division (typically 2d, but can be 3d), parcel (typically 4d). Currently there are differences between the cantons, but a unique Swiss identifier will be introduced. There can be extensions to the parcel number (e.g. floor ownership)
- The Netherlands: **APD00 F 2345**, municipality (3l+2d), section (2l), parcel (5d). Part-of-parcels and apartment units have additional postfix code. Also utility networks are registered as cadastral objects

as-it analysis, remarks 1



Fixed/variable length, separators (',', '/', '-', ' ', ...),
left/right align, leading 0 or ' ' or nor, ...

CadastralUnit – Parcel – Subparcel

Business vs. machine id's (e.g. 128 bit uuid)

Also id's for boundaries, and points

as-it analysis, remarks 2



Update rules, when new id assigned, what value?

Reusing id: add version/time to make unique
(France id is combination of attr)

Hierarchical name with often municipality included
→ merge or change municipality...

Id's also used for other cadastral objects (apartment,
utility,..)



User requirements

“agriculture” use case: uniqueness

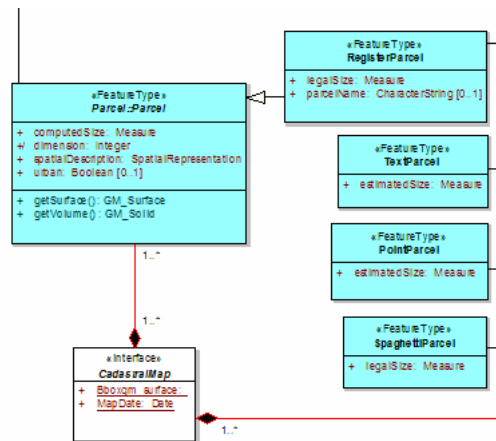
Directive: art 8(2): id's, temporal, updates,...

UNECE, 2004 ‘Guidelines on Real property Units and Identifiers’: practice in 18 countries and a 5 level hierarchy of: plot - parcel - basic property unit - property unit - portfolio of ownership



LADM, Register Parcel

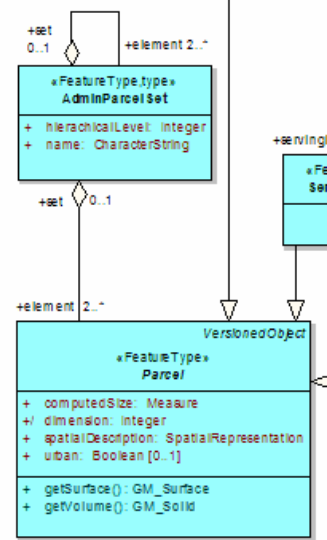
- RegisterParcel has attribute parcelName





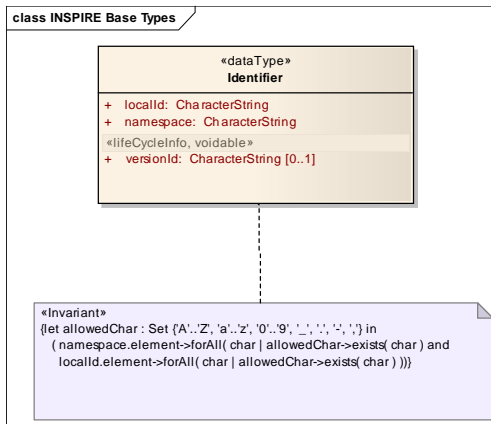
LADM, AdminParcelSet

- hierarchical grouping AdminParcelSet



DT DS documents

- D2.5, section 4.3.2, component I: Identifier
- D2.5, section 9.8.2, Identifier 3 parts:
 - localId
 - namespace
 - versionId
- D2.5, **clause 14** many req's and recommendations
- D2.6, A12+C1





Conclusions (1)

- Must have unique parcel id (via view)
- Should have id's for boundary and point
- Life-cycle rules, time/version needed
- Current structure too different, just harmonize by 2 letter prefix (ISO3166)
- Business/thematic and machine id (uuid)?



Conclusion (2)

- Presentation aspect: label position, rotation angle (if label does not fit there is a second position: stick to displaced label)
- Modeling id (life-time) rules: OCL needed
- Relationship with addresses as parcel id's
- Alternative id: coordinate (ref point in parcel):
 - is unique (if parcels do not overlap),
 - interesting appl: geo-coding, spatial clustering,
 - already maintained
 - and when based on ETRS89 uniform

Annex D

Peter van Oosterom. User requirements/raw check-lists EULIS, 25 May 2008.

Peter van
Oosterom. User
requirements/raw
check-lists EULIS,
25 Mei 2008

Data harmonisation component	User requirements questions	User requirement answers	Generic/specific
(0) Context	Main characteristics of the use case (general purpose geographic extent, level of detail, ...)	A pan European land information system breaking down barriers of the cross-border properties market (including lending) to promote the economy of the European Community. EULIS is building on the national information systems and providing access via portal technology to parcel level admin/legal information (with ambition to provide access/links to the geometric information). Currently, the following countries are part of the organizational framework: Austria, England&Wales, Finland, Iceland, Ireland, Lithuania, Norway, Scotland, Sweden and The Netherlands and the following countries are lined up to join: Czech republic, Italy, Latvia, Poland and Slovak republic (see www.eulis.org)	
(B) Terminology	Which concepts are required ? Is there a document where they are defined? (e.g. a glossary)	Required concepts: land, property, ownership, other rights, easements, mortgages, parcels, boundary, ... All relevant terms/concepts are described in the metadata (Reference Information in a standard structured format maintained by the participating national organizations and including a translation into English)	
(D) Application schemas and feature catalogues	Which features and attributes are required? Which relationships between features?	No EULIS application schema is defined as EULIS is based on the national land information systems (at top level the concepts defined in the Reference Information could be considered an important part of the feature catalogue).	
(E) Spatial aspects (Vector geometry)	Geometries required: - Dimensionality of the geometries (0D, 1D, 2D, 3D)? - Interpolation types for curves and surfaces ?	For reference purposes the display of parcels is wanted, the requirements are again those that apply to the national systems. This might include both straight lines and circular arcs (as included in the Dutch cadastral map) and is mainly 2D, but with growing registration of 3D parcels in EULIS member countries (Norway, Sweden) and other countries, this might change in the near future	
(E) spatial aspects (Topology)	Topological structure? Cadastration of public domain? Gaps and overlaps?	Again this depends on the systems of the member countries (but several of these are indeed topology based). In general should there should not be overlapping parcels, but there could be gaps in the map (depending on the member country)	
(E) Spatial aspects (Coverages)	Is the use of raster data acceptable? Which are the drawbacks? The advantages?	Per member country it is indicated in the Reference Information if vector and/or raster is available.	
(E) Spatial and temporal aspects (Temporal profile)	Which information about time is required? Need of historic data?	The legal/admin information must be very up-to-date (as this is important for legal security) and for reference purposes it is good if the geometric parcel information is also available as soon as possible (but due to the updating process, it is inevitable that there can be some delays). In the reference Information it is indicted what is the up-to-dateness of the geometric information (in a specific country). Only the current information is presented via EULIS (and no historic information).	
(F) Multi-lingual text and cultural adaptability (specification)	Is the data specification (or application schema or feature catalogue) required in several languages, Which?	The information sources are the national information systems (with the own language), but in EULIS context this is translated via a service into the English language. (using the Reference Information). In the future is might become possible to translate into multiple languages	
(F) Multi-lingual text and cultural adaptability (content)	Are geographical names required in several languages ? Which languages?	Geographical names are not translated.	
(G) Coordinate referencing and units model	Reference systems required - Coordinate Reference Systems (horizontal, vertical) - Temporal Reference Systems - Units of measurement	The Reference Information describes which reference system is applicable.	
(H) Object referencing model	Are cadastral parcels (and other cadastral data) used to reference other information? How?	Via parcel number (unique within the national systems) the legal/admin (ownerships, rights, mortgages, etc.) information is linked to the geometric component.	

(J) Portrayal	Which data do you need to display, how (which scale, which symbolisation, ...)?	At least boundaries and parcel identification, depending on the country also other 'reference information' (houses roads, waters, and their names/numbers), again as indicated in the reference information.	
(K) Identifier Management	Are thematic identifiers required? For what? Are external identifiers required? For what?	Besides the parcels numbers (see H), also other identifiers might be used in the system, depending on the country. For example, identification of the legal documents and person identifiers (to link the parcel-right person and the relevant documents).	
(L) Registers and registries	Which registers are required (if any)?	The Reference Information could be considered as a register with reference information. The lage/admin information in the member countries is all maintained in registers and made available via national registrations in EULIS context.	
(M) Metadata	Metadata required : - Discovery level / Exploration level /Exploitation level ? - Which elements? Which language? - ISO 19115 compliant?	In EULIS context more or less equivalent to the Reference Information (goes up to the Exploitation level) Not ISO 19115 compliant.	
(N) Maintenance	Which update frequency is required? Need for incremental updates?	Updates are performed according to the approached in the different countries, often it is a continuous process (Reference Information specifies how up-to-date the information is).	
(O) Data quality	Quality requirements for the application (positional accuracy, completeness, logical consistency,	Again, depends on the country and specified in the Reference Information	
(P) Data transfer	How should the source data be provided : - formats, versions - service interfaces - usage constraints	Information is accessed via Internet portal technology (EULIS portal is connected to the systems of the different countries) in HTML. In the future is information will also be delivered via GML/XML. Only professional users can use the current system (and privacy directive 95/46/EC and database right directive 96/9/EC do apply).	
(Q) Consistency between data (between themes)	Which consistency rules are required (e.g.with administrative units, buildings, ...)?	Addresses are beside parcel numbers and geographic location the other entrance to the system. For reference purpose the cadastral parcels are often visualized with other themes: buildings, street(names), water(names), etc. (also see J); depending on the country and specified in the Reference Information. Parcel numbers are often based on administrative units (municipalities, sections), but again this is country specific.	
(Q)Consistency between data (accross boundaries)	Do you need edge-matching experiences at boundaries? Which boundaries?	No, respective neighboring member states operate independently.	
(S) Data capturing	Which level of detail/scale required? Which selection criteria are necessary?	This completely depends on the country and is specified in the Reference Information, though typical scales ranges from 1:500 (urban areas) to 1:5.000 (rural areas).	
(T)Conformance	Does the data source explicitly conform to any specifications? (e.g any ISO standards etc.)	No.	

Annex E

Peter van Oosterom. User requirements/raw check-lists Soil Protection: The Netherlands, Wkpb (public law restrictions), 22 May 2008.

Peter van Oosterom. User requirements/raw check-lists Soil Protection: The Netherlands, Wkpb (public law restrictions) 22 Mei 2008

Data harmonisation component	User requirements questions	User requirement answers	Generic/specific
0 Context	Main characteristics of the use case (general purpose geographic extent, level of detail, ...)	Uniform access to all the registered public restrictions (limitations on the use of property imposed by government) by owners or buyers of properties is the goal of the Dutch law (Wkpb) and the related systems. Several important categories of public restrictions are environmentally related (e.g. soil protection, 'natural monuments', ...). The system has nationwide coverage and the typical level of detail is comparable to Dutch cadastral maps (1:1.000). There are two approaches to specifying the location of (environmental) public restrictions: via references to cadastral parcels or via specifying their own geometry. Both can occur but this checklist focuses on public restrictions referencing cadastral parcels (the other approach gets very close to	
(B) Terminology	Which concepts are required? Is there a document where they are defined? (e.g. a glossary)	Main concepts are public restrictions (limitations), cadastral parcels, municipalities (administrative areas),... There is a catalogue containing the model, features and attribute description (in Dutch).	
(D) Application schemas and feature catalogues	Which features and attributes are required? Which relationships between features?	Main attributes of the public restriction object class are parcel id (reference to parcel), restriction type, reference to (legal) source document, start and end dates of the restriction. Other object types are cadastral objects (including parcels), municipality (codes), and change objects for both restriction objects and cadastral objects; http://www.vrom.nl/Docs/publicaties/w862.pdf	
(E) Spatial aspects (Vector geometry)	Geometries required: - Dimensionality of the geometries (0D, 1D, 2D, 3D)? - Interpolation types for curves and surfaces?	As specified in '0 Context' (above) geometry is specified via reference to cadastral parcels, which are in the Netherlands specified by 2D boundaries (including both straight lines and circular arcs).	
(E) spatial aspects (Topology)	Topological structure? Cadastration of public domain? Gaps and overlaps?	As in the Dutch cadastral map: based on topology, no overlaps and no gaps (complete coverage of the Netherlands including the government owned land).	
(E) Spatial aspects (Coverages)	Is the use of raster data acceptable? Which are the drawbacks? The advantages?	Raster not acceptable.	
(E) Spatial and temporal aspects (Temporal profile)	Which information about time is required? Need of historic data?	As current as possible information is required as this is relevant in the property transaction. Know restrictions should be accessible though the system within a day. Of course, there is a delay in creating new parcel geometry (because of surveying), but this should typically take the Kadaster no longer than 1 or 2 months (and in the meantime the restrictions are related to parent parcels/part of parcels).	
(F) Multi-lingual text and cultural adaptability (specification)	Is the data specification (or application schema or feature catalogue) required in several languages, Which?	Dutch only.	
(F) Multi-lingual text and cultural adaptability (content)	Are geographical names required in several languages? Which languages?	Dutch only.	
(G) Coordinate referencing and units model	Reference systems required - Coordinate Reference Systems (horizontal, vertical) - Temporal Reference Systems - Units of measurement	Horizontal Dutch reference system (RD), no vertical reference system (but if applicable this would be NAP), temporal information in complete days only (yyyymmdd).	
(H) Object referencing model	Are cadastral parcels (and other cadastral data) used to reference other information? How?	Via parcel number (unique within the Dutch national system) the public restriction information is linked to the geometric component.	
(J) Portrayal	Which data do you need to display, how (which scale, which symbolisation, ...)?	At least parcel boundaries and parcel numbers should be included.	
(K) Identifier Management	Are thematic identifiers required? For what? Are external identifiers required? For what?	Besides the parcels numbers (see H), also identification of the legal source document.	
(L) Registers and registries	Which registers are required (if any)?	Register at national level (containing public restrictions due to government at state, provincial and water board level) maintained by the Dutch Cadastre and the registers of all municipalities (containing their public restrictions)	

(M) Metadata	Metadata required : - Discovery level / Exploration level /Exploitation level ? - Which elements? Which language? - ISO 19115 compliant?	No other metadata than those attached to the cadastral parcels.	
(N) Maintenance	Which update frequency is required? Need for incremental updates?	Daily updating.	
(O) Data quality	Quality requirements for the application (positional accuracy, completeness, logical consistency,	Typical required accuracy of cadastral parcel boundaries between 10 and 50 cm.	
(P) Data transfer	How should the source data be provided : - formats, versions - service interfaces - usage constraints	The system is based on Internet portal technology and the system components/subsystems communicate via both synchronous (question/answer) and asynchronous (change notifications) messages based on the W3C protocols stack (SOAP web services). The content of the messages is defined in http://www.vrom.nl/Docs/publicaties/w863.pdf (and exchanged via the XML based Dutch electronic municipality standard StUF 2). The users access the information via the portal of the Dutch Cadastre:	
(Q) Consistency between data (between themes)	Which consistency rules are required (e.g.with administrative units, buildings, ...) ?	Addresses are beside parcel numbers and geographic location the other entrance to the system (Kadaster Online).	
(Q) Consistency between data (across boundaries)	Do you need edge-matching experiences at boundaries? Which boundaries?	no	
(S) Data capturing	Which level of detail/scale required? Which selection criteria are necessary?	1:1.000 scale (10-50 cm accuracy of cadastral map)	
(T) Conformance	Does the data source explicitly conform to any specifications? (e.g any ISO standards etc.)	no	

Annex F

Amalia Velasco and Peter van Oosterom. Soil Protection: 1. EC, Soil Protection Directive, 2. The Netherlands, Wkpb (public law restrictions), presentation at the joint meeting of the INSPIRE TWG cadastral Parcel and EuroGeographics-PCC, Brussels, 3 June 2008.



Soil Protection

1. EC, Soil Protection Directive,
2. The Netherlands, Wkpb (public law restrictions)

Bruxels, 3 June 2008



1. EC, Soil Protection Directive

(based on slides Amalia Velasco, Spain)



The role of cadastral parcels in the application of the European Environmental Policies

One of the main objectives of the European Union Policy is to promote measures at international level to deal with environmental problems.

The Community institutions are now obliged to take account of environmental considerations in all their other policies.

- How cadastral information can be used for managing environmental problems?

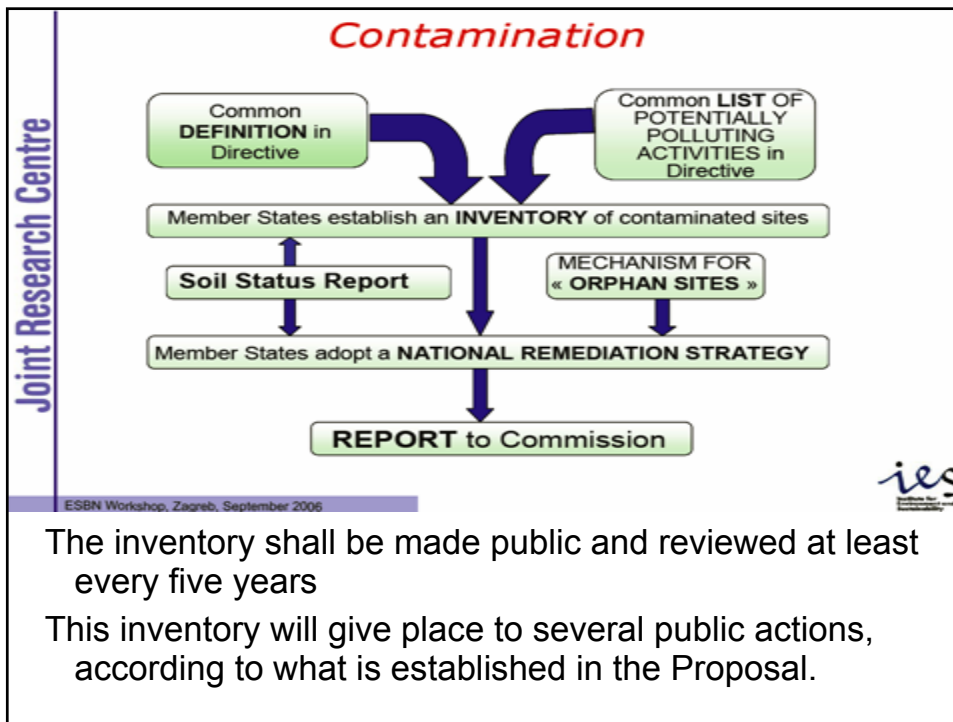



Proposal for a Directive of the EU Parliament & Council establishing a framework for the protection of soil and amending Directive 2004/35/EC

- establishing a system that allows the *identification of precise risk zones*,
- with the purpose of easily intervening over the same with prevention and mitigation actions, and if necessary, restoration of the soils that have been contaminated.
- Member States will establish an “inventory of contaminated soils”

Contamination





- The most significant effects that will derive from this Directive are:**
- 
- when there is an intention of selling a parcel of land where one of the potentially contaminating activities is taking or has taken place
 - the member States will ensure that the possible buyer *receives a report regarding the situation of the soil, issued by an authorised person or public organisation that will define the situation regarding its alleged contamination.*

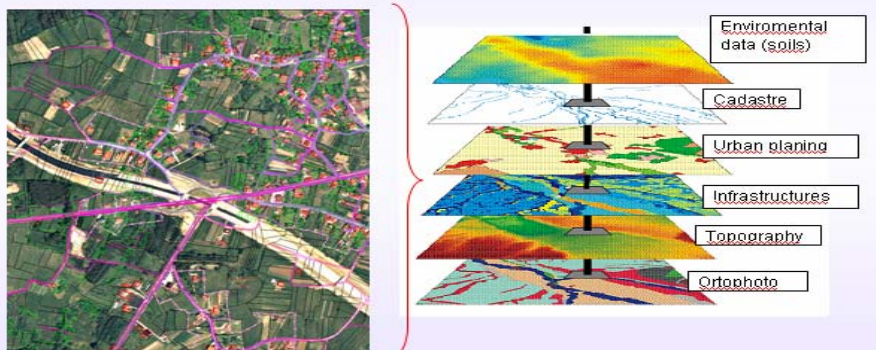
Consideration 25



“In order to assist in the rapid identification of contaminated sites, the owner of a site where, according to official records such as national registers or *cadastres*, a soil polluting activity has taken or is taking place, or the prospective buyer should, prior to completing the land transaction, provide relevant information on the status of the soil to the competent authority and to the other party in the transaction...”.

The importance of the effects this Directive will have over the real-estate market acting in this type of soils is evident

General Administration of the State is responsible of establishing the opportune criterion and procedures in order for the Ministry of Environment to create the inventory of potentially contaminated soils defined by the Directive proposal,



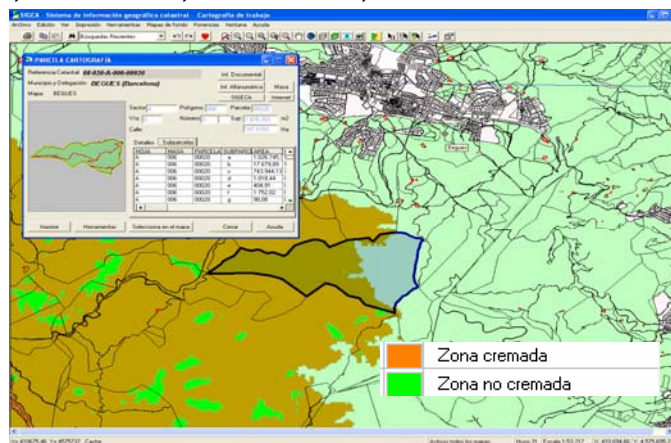
using for this and together with the environmental data that is defined, the cadastral information that is esteemed necessary.

Result



The cadastral information must be the support of the environmental information because the mesh of property distribution and other cadastral data are needed. (interoperability)

Cadastral maps are served using standard WMS that allow external geographical systems to overlay Cadastral information onto their own cartographies, adding to the information about pollution (or fires or ..) all the current associated cadastral information: owner, rights, surface, land uses, land cover, value ...





Besides, it would be possible to incorporate this information into the certification or to elaborate another type of report available by internet.

BORRADOR

**CERTIFICACIÓN CATASTRAL DESCRIPTIVA Y GRÁFICA
BIENES INMUEBLES RÚSTICOS
Municipio de BEGUES Provincia de BARCELONA**

REFERENCIA CATASTRAL DEL INMUEBLE
08020A00600020000000

DATOS DEL INMUEBLE

Parcela inscrita en el Catastro	
Polígono 5 Parcela 20	
MAS TRABAL BEGUES (BARCELONA)	
Parcela rural	Parcela rústica
Agrario	..
Parcela de explotación	Parcela de explotación rústica
100,000000	..
Superficie superficial	Superficie construida
26.800,84	0,00
Superficie construida en m ²	Superficie construida en m ²
..	200

DATOS DE TITULARIDAD

Ayuntamiento de inscripción	
AYUNTAMIENTO DE BARCELONA	
Municipio de inscripción	
08019000	
Propietario	
PP SANT JAUME	
BARCELONA 08002 BARCELONA	
Tipo de titularidad	
100,00% de Propiedad	

DATOS DE LA FINCA A LA QUE PERTENECE EL INMUEBLE

Parcela inscrita en el Catastro	
Polígono 5 Parcela 20	
MAS TRABAL BEGUES (BARCELONA)	
Parcela rural	Parcela rústica
1.878,292	..

INFORMACIÓN GRÁFICA

La presente certificación se inspira a los datos efectivos del uso notificado, y refleja los datos incorporados al catastro de esta localidad en la fecha de su inscripción.
En Barcelona, a miércoles, 25 de abril de 2007

410.000 Coordenada UTM en metros
410.000 Zona Valor
.. Zona Valor
.. Zona Valor



2. Wet kenbaarheid publiekrechtelijke beperkingen (Wkpb, law access to public law restrictions), The Netherlands

Context



- Use case proposed by Dutch Ministry of Housing, Spatial Planning and Environment (VROM)
- Uniform access to all the registered public restrictions (limitations on the use of property imposed by government) by owners or buyers of properties
- Registration of state, provincial, water board imposed restrictions by cadastre, but municipalities must have own registration

Spatial aspects restrictions



- Two options:
 - Have own geometry (then it would become close to situation as in protected sides), option in the 2nd phase of the law
 - Use cadastral parcels (this is the more common situation)
- Using cadastral parcels is scope of this use case
- Nationwide coverage with detail as in Dutch cadastral map (1:1,000)

Interest for INSPIRE



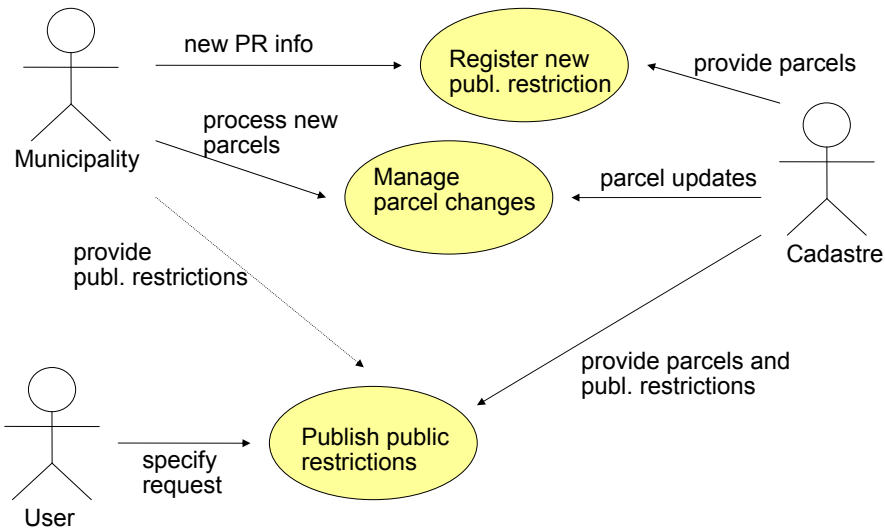
- All types of restrictions are included (some are environmental; e.g. soil protection)
- National use case based on national laws, but in future perhaps also the related to the EC directive for soil protection (which is currently blocked by a minority opposition in EU parliament)
- Links other themes
 - Addresses
 - Administrative units (municipalities)
 - Land use (restrictions due to spatial planning)

Users



- Governmental organizations:
 - Entering restrictions in the system using cadastral parcels as basis and add specifics: type of restriction, legal source, duration, etc. (perhaps after overlay with own geometry to select the right set of parcel)
 - Getting notifications on parcel changes (to potentially update 'attached' restrictions)
- Owners, buyers of properties: wanting to obtain information on public restrictions from the system before transaction takes place

UML Use case diagrams



Requirements towards cadastral parcels



- Application schema:
 - Cadastral parcels
 - Identifier (parcel number)
 - Cadastral boundary
 - Line geometry
 - ParcelSet (municipalities)
 - Name
 - Code
- Terminology
 - Public restrictions (limitations) defined in list with codes
 - Use of cadastral terms as defined by the cadastral data providers

Requirements towards cadastral parcels



- Geometry/topology
 - As in Dutch cadastral map (topology based)
 - Circular arcs and straight line segments
 - Use of 2D data
 - No gaps and overlaps between parcels
 - Use of raster data is not acceptable

Requirements towards cadastral parcels



- Temporal information
 - Within a day, attached restriction should be available to users (buyers)
 - Parcel geometry changes should be make available as soon as possible (typically 1-2 months after change)
 - Keep administration of public law restrictions consistent with the cadastral parcels
 - need for update delivery

Requirements towards cadastral parcels



- Identifier management
 - Unique and persistent identifier
 - To make the link with rights/owners in the cadastral register
- Users access the system via parcel identifier, or address or map (coordinates) via 'Kadaster Online'

Requirements towards cadastral parcels



- Coordinate Reference System
 - RD (Dutch national reference system)
- Dates
 - expressed in days (2nd phase hours, minutes)
- Metadata
 - No other than attached to Dutch cadastral map

Requirements towards cadastral parcels



- Quality
 - Accuracy 10-50 cm, typically: urban area's 20 cm, rural area's 40 cm)
 - Completeness and up-to-dateness very important
- Data transfer
 - XML/SOAP based, Dutch standard StUF2
www.vrom.nl/Docs/publicaties/w863.pdf
 - Both synchronous (question/answer) and asynchronous (change notifications) communication

Requirements towards cadastral parcels



- Portrayal
 - At least cadastral boundaries (black lines) and parcel numbers (black text, can be rotated and 'offset' with stick)
 - Other reference information on cadastral maps includes: buildings (red lines) and house numbers and street names (black text can be rotated)
- Consistency between data (other themes)
 - Addresses
 - Administrative areas (municipalities)

Annex G

Peter van Oosterom. Temporal aspects and maintenance, User requirement analysis for the INSPIRE TWG Cadastral parcels, 2 September 2008.

Discussion paper

Author	PvO
Component/element	Temporal aspects and maintenance
Date	02/09/08
Version	v0

Note there is considerable overlap with the first round discussion paper on Origin/history by Tarja Myllymäki

User requirement analysis

Available check-lists:

- Land market
 - o NATURE GIS (Sweden) x
 - o EULIS x
- agriculture:
 - o LPIS (Europe) x
 - o VINGIS (Hungary) x
 - o Spanish vineyard x
 - o PIR (Hungary) x
- Environment
 - o Soil Directive x
 - o Public restrictions (Netherlands) x
 - o Protected sites (Germany) x
- Spatial planning
 - o GeoPLU (France) x
 - o Urbanism (Spain) x
- Public administration
 - o Public Land Management (generic) x
 - o Public Land Management (France) x
 - o RWOGIS x
- Infrastructures
 - o ADA road data base (Belgium) x
 - o Water management (France) x
 - o Water management (Spain)
 - o High-voltage power line management (Belgium) x
 - o Telephone (Spain) x
- Public safety
 - o Flood directive x
- Socio-economic analysis
 - o Statistics (Spain) x
 - o Cartociudad (Spain) x

Main results (from the check-lists):

Due to the nature of cadastral parcels the objects are changing (at the source) on instance by instance base (when something with the legal status of the land changes). There is a delay between the moment when the process of change has started (e.g. because of a split of a parcel), when the data is surveyed, and again when the new parcels are created in the database. The majority of external application have most interest in the moment when the parcels are created in the database, i.e. date of publication. A few application might also require the date of survey/data capture () and other dates (date of reform of cadastral parcels in Urbanism Spain).

Quite a number of applications (about 1/3 of the applications) require historic information, some of these (GeoPLU) achieve this by managing themselves previously delivered snapshots, most others (LPIS, Soil directive,) expect this historic management from the source.

Due to the more individual update process of cadastral parcels (maintenance) at the source it is not meaningful to speak about the update cycle of the whole data set. However, certain applications require periodic delivery of snapshot moments (e.g. yearly delivery to LIPS, VINGIS, Spanish Vineyard, Water management France, Telefonica,..), while other applications (Public restrictions, Soil directive, Urbanism,...) want the use as much up to date information as possible (i.e. near equal to the source).

Most of the applications using a yearly delivery do not need incremental updates, though there is a clear tendency that the request for delivery via incremental updates is growing. The applications requiring the most up to date information either require incremental updates or go directly to the source (and do not manage copies of cadastral parcels themselves). Incremental updates require a versioning mechanism, which was mentioned explicitly by a few applications. Non of the applications mentioned versioning of individual properties (and will most likely version at object instance level will be sufficient).

Harmonisation approach

From DT DS document, section 9.7 Spatial object life-cycle (D2.5 Generic Conceptual Model, version 3.0)

Requirement 24 In the case where a spatial object may change in a way where it is still considered to be the same spatial object and user requirements for the provision of life-cycle information for a spatial object are identified, the life-cycle information shall be part of the model of the spatial object type as specified in this sub-clause.

Requirement 25 Life-cycle information of a spatial object shall be modelled in a way that allows data providers who do not maintain or track versions of spatial objects to still conform to the data specification. This requirement does not apply in cases where applications with a strong requirement for life-cycle information are known; these string requirements shall be documented in the data product specification that references the application schema.

Requirement 26 Every INSPIRE application schema that distinguishes multiple versions of a spatial object shall require that different versions of the same spatial object shall always be instances of the same spatial object type.

Requirement 27 Every INSPIRE application schema that distinguishes multiple versions of a spatial object shall require that different versions of the same spatial object shall not have different external object identifiers (see Clause 14).

Requirement 28 A property that is considered to be part of the life-cycle information of a spatial object shall receive the stereotype <<lifeCycleInfo>>.

Requirement 29 An association role that ends at a spatial object type shall imply that the value of the property is the spatial object unless the role has the stereotype <<version>> which shall imply that the value of the property is a specific version of the target spatial object.

Recommendation 9 If the spatial objects in a data set are updated individually, then application-specific version information is typically attached to the individual spatial object – in addition to the generic version identifier string specified in 14.6.

The use of timestamps is recommended in INSPIRE (compared, for example, with version counts).

Recommendation 10 If a data set is updated as a whole, then it may be more appropriate to provide the temporal information as part of the metadata associated with the spatial data set instead of associating the information with the individual spatial objects.

From DT DS document, section 10.1 Spatial and temporal characteristics of a spatial object (D2.5 Generic Conceptual Model, version 3.0)

Requirement 35 Temporal characteristics of a spatial object shall be expressed in an application schema in one of the following ways depending on the requirements:

- by specifying properties of the spatial object type with a value that is a temporal geometry or a temporal topology (see ISO 19109 8.6; note that time is a dimension analogous to any of the spatial dimensions and that time, like space, has geometry and topology);
- by specifying properties of the spatial object type with a value that is one of the basic types Date, DateTime and Time. However, this makes the attribute a “thematic attribute” instead of a “temporal attribute” in terms of the General Feature Model, as there is no temporal reference system connected to it (see note in ISO 19109 8.6.1), i.e. this method should be applied with care. The Gregorian calendar shall be the default calendar, UTC the default time zone.

From DT DS document, section 10.3 Profile of the temporal schema (D2.5 Generic Conceptual Model, version 3.0)

Temporal geometry and topology types as specified in ISO 19108 may be used in an INSPIRE application schema without restrictions.

NOTE The temporal relationship of two temporal spatial objects based on specific geometry and topology properties of the objects can in principle be investigated by invoking the operations of the types defined in ISO 19108. However, ISO 19108 does not allow for a computation of relationships between two temporal objects where one of the objects is indeterminate such as “now”, whereas a real time data sets containing data for the last 3 days until “now” has a practical application and a length/duration.

From DT DS document, section 12.3 Temporal reference systems (D2.5 Generic Conceptual Model, version 3.0)

Requirement 52 Temporal reference systems shall be described using the model specified in ISO 19108 5.3 (TM_ReferenceSystem).

NOTE The relationship of temporal and spatial reference systems was discussed in the Editing Committee of the current revision of ISO 19111. There, it was agreed that the scope of ISO 19111 should be limited to spatial referencing by coordinates, except that a compound coordinate reference system may include a temporal coordinate reference system. It was assumed that ISO 19108 will be

amended to change TM_TemporalCoordinateSystem as currently specified in ISO 19108 to TM_TemporalCoordinateReferenceSystem. Since ISO 19108 has not yet been amended, this type is currently specified in ISO 19136 D.3.10 to provide a temporary home.

To support the ESDI, an ISO 19135 conformant register and registry for temporal reference systems and conversions between the systems will be established as part of INSPIRE. Temporal reference systems that are used in INSPIRE spatial data sets as well as conversions between the systems will be registered, where appropriate.

Requirement 53 Every INSPIRE data specification shall specify the list of temporal reference systems that may be used in the encoding of spatial objects defined by that data specification.

Recommendation 13 Whenever possible and appropriate, the Gregorian calendar should be used as the temporal reference system.

From DT DS document, section 14.6 Versions of spatial objects (D2.5 Generic Conceptual Model, version 3.0)

Whenever the application schema contains life-cycle information for a spatial object type with an external object identifier, the version identifier property specified in 9.8.2.4 allows to distinguish between the different versions of a spatial object.

The version identifier is not part of the unique identifier of a spatial object.

From DT DS document, section 19 Maintenance (D2.5 Generic Conceptual Model, version 3.0)

This component is about the documentation of maintenance procedures and life-cycle rules, where known. It does not require any re-engineering of existing data specifications in the Member States.

Requirement 63 Maintenance procedures shall be specified as part of every INSPIRE data specification as required by ISO 19131, where applicable.

Recommendation 24 INSPIRE data specifications should require that data providers document the life-cycle rules for spatial object types as part of the data set metadata, if available.

It is expected that the interface of a download service will be capable of providing information about changed spatial objects since a given point in time. Depending on the final capabilities of the download service, this paragraph will be revised.

From DT DS document (D2.5 Generic Conceptual Model, version 3.0), the complete Annex E (informative) Examples of life-cycle information (from UK MasterMap, NL NEN3610, D AAA model, and ATKIS), not copied here.

From DT DS document D2.6 Methodology and chapter 7.7 Maintenance information (optional)

Where this statement is included, it describes the principles and criteria applied in the maintenance of the data once it has been captured. This includes the maintenance and update frequency (frequency with which changes and additions are made to the data product).

This statement, if provided, is simply a textual description and does not provide for / require any substructure in the information to be provided in the data specification.

Clause 19 of the Generic Conceptual Model spells out requirements for the description of maintenance in INSPIRE data specifications.

And from annex A.15 Maintenance

As-is analysis

See earlier document by Tarja and from the new sources the following are used:

- check-list Germany
- check-list Latvia
- check-list Switzerland
- check-list UK

In the England, Wales, Scotland history is managed by taking snapshot which are held following any finalised change (to me it is not clear what the granularity of these changes are, how often snapshots are taken, and if snapshots cover the whole database). It is stated that the data is updated when legal changes are supplied. This seems to indicate more or less continuous change. For Northern Ireland it is stated that the base mapping is updates with 5 and 10 year policy for resp. 1:1250 and 1:2500 scale maps (not sure if this includes the cadastral parcels or is related to the large scale base map).

Swiss cadastral surveying does not manage the history of single objects; only the change information of transactions, based on life-cycle rules, is being managed. Data is continually updated. There are no incremental updates so far, but it is planned in the future.

In Latvia there are three types of cadastral parcels: planed, surveyed, allocated. The reference point in time for creating a new Cadastral parcel serves cadastral surveying date. The history is managed by creating copies of cadastral map files once a month and archiving all the related documents. Cadastral map is updated based on cadastral surveying. Cadastral surveying can be initiated only by users or owners of cadastral parcels.

In Germany there is a time stamp for creating and deleting the object, changed parcels are stored as versions, deleted data is stored as a historical version of a parcel. A version concept has been implemented. The cadastre will be updated incrementally (whenever a cadastral measurement takes place);

Proposal

The temporal aspects of cadastral data are among the identified key elements and reflect the real world/legal changes on parcel instance level. So, temporal attributes should be included in the model. The question is which temporal attributes exactly. The temporal aspect is also important in most applications (use cases), however quite a number of different aspects are mentioned: Date of update (Veolia), Actuality (High-voltage power line management - Belgium), Date (Telefonica Soluciones -Spain), Original information date (urbanismo en red), Date of publication (GéoPLU), Date of data capture (Spanish vineyard), Validity date (AFTRP),...

It is proposed to include for every CadastralParcel the start and end date/time for a version in the cadastral database (valid publication dates) as an obligatory attribute (at object instance level) using the stereotype <<lifeCycleInfo>>: beginLifespanVersion and

endLifespanVersion. The same is proposed for the CadastralIndexSet as this is already in the current model. This same requirement is also the result of being within a GII: all referenceable objects that can change over time should support versioning as other objects (from outside) may refer to an object which is changed/removed and this should always be traceable. There is no requirement mentioned for the beginLifespanObject and endLifespanObject. So, these could be omitted from the model.

There are some applications with requirements for other dates (date of data capture, original information date). It is proposed to add one optional date, not as part of the <<lifeCycleInfo>>, but as a normal thematic attribute: originalDataCaptureDate. Only to the CadastralParcel (and Boundary) object and not to the CadastralIndexSet.

Some open points:

1. How and where to specify the Temporal reference systems in the model (for dates the Gregorian calendar and for time always universal time, or CET, or also local time)?
2. To uniquely identify a version of an object, both the unique object-id and a version-id is needed. For the version id a temporal attribute could be used (beginLifespanVersion of type DateTime) or a separate id could be used. It is proposed to use the temporal attribute in order not to add the management burden of another attribute.

Annex H

Olav Jenssen, Peter van Oosterom, and Dominique Laurent. Spatial aspects, User requirement analysis for the INSPIRE TWG Cadastral parcels, 27 Augustus 2008.

User requirement analysis

Author	OJE + PVO + DLA
Component/element	Spatial aspects
Date	27/08/2008
Version	V3

Available check-lists:

- Land market
 - o EULIS
 - o NATURE GIS (Sweden)
- agriculture:
 - o LPIS (Europe)
 - o VINGIS (Hungary)
 - o Spanish vineyard
 - o PIR (Hungary)
- Environment
 - o Soil Directive
 - o Restrictions on land use (Netherlands)
 - o Protected sites (Germany)
- Spatial planning
 - o GeoPLU (France)
 - o Urbanism (Spain)
- Public administration
 - o Public Land Management (generic)
 - o Public Land Management- AFTRP (France)
 - o RWOGIS
- Infrastructures
 - o ADA road data base (Belgium)
 - o Water management (France)
 - o Water management (Spain)
 - o High-voltage power line management (Belgium)
 - o Telefonica Soluciones (Spain)
- Socio-economic analysis
 - o Statistics (Spain)
- Flood Directive
 - o Flood Directive

User requirements analysis

Main results (from check-lists):

- Most users require 2D data
- However, in future, there may be requirements for 2,5D parcels
 - o In case of significant topographic differences (mountains) for State Land Management
 - o because some users would like to combine parcels with 3D data:

- VINGIS : to combine parcels with data derived from DTM, such as elevation, slope, orientation
 - GéoPLU : to wrap 2,5D parcels and 3D parcels on DTM for visibility easements
- Need for 3D parcels is quoted twice :
 - by EULIS: there is a growing registration of 3D parcels in some countries (Norway, Sweden).
 - by Telefonica Soluciones but without any other detail. Not clear if it is 3D parcels or other 3D data (as Spain has only 2D parcels)
- About use of interpolation types:
 - Most users just have not answered this question
 - Some users accept circular arcs, as some national systems include arcs (e.g Protected sites in Germany, Restrictions on land use in Netherlands, EULIS)
 - Some other users just want linear interpolation
 - GÉOPLU: no interest for other types of interpolation
 - AFTRP: other curves not easily manageable by GIS, need for straight lines as simple as possible, with minimum number of vertices (because cadastral parcels often used as background data to capture other features)
 - Statistics (Spain)
- Centroid coordinates required by at least one user (Telefonica Soluciones) in addition to 2D coordinates.
- About topology:
 - one fourth of the users don't have requirements on the topology component
 - need for closed surfaces quoted by some use cases (AFTRP + Véolia + urbanismo en red)
 - The rest requires topology without uncontrolled gaps or overlaps. However, some users seem to have adapted their process to existing data (e.g. GÉOPLU in France, Water management in Spain).
 - Controlled gaps (i.e. non-cadastration of public domain) in some countries is not always considered as an issue (e.g. French use cases and EULIS)
 - But full coverage of the national territory is explicitly required by other use cases (mainly the Spanish use cases).
 - In countries where vector data is available,
- Some users may use raster data, all may use vector data. A few users do not accept raster data only. Several users mention orthophotos as useful background data, but this is not relevant regarding cadastral parcels.
- Use of raster data is generally considered as a “minimum solution”
 - Because only raster data is available (e.g. the French use cases)
 - Because the application is only for viewing (PIR, probably also EULIS)
 - As temporary solution (ADA : in future, raster data will be excluded)
- Drawbacks of using raster data are detailed by the Veolia use case (big data volume, not possible to change symbology, bad results when zooming, bad quality when printing, not possible to make requests or modifications/simulations)

Other requirements:

Some TWG CP members think that 3D parcels will be required in the near future, with the following rationale:

In a growing number of countries 3D data is used more and more to describe 'volume' parcels explicitly and applications not aware of this would have an incomplete ownership (and other rights, restrictions and responsibilities) picture. There may be environmental applications requiring the 3D parcels explicitly; e.g. the ownership registration of the legal space around utilities (or pipelines with dangerous material) in Rotterdam. For non-environmental use cases the need for 3D parcels is very clear (subsurface constructions, larger buildings) as the 2D parcels are not sufficient anymore to describe the ownership (RRR) situation of the ever increasing dense and complex use of space.

In current situation, many GIS are not able to manage 3D data; it is why D2.5 recommends the use of Simple Feature (where 3D data are excluded). So, all users must be offered the option to receive only 2D - 2,5D data.

Discussion – Proposal

About raster data:

OJE: Raster data is only used as an option when no vector data is available. Therefore the model should only include vector data.

DLA:

The CT considers vectorisation of raster data as new capture. So, MS with raster data won't have to vectorise their cadastral raster data before the deadline to conform to INSPIRE (2016). MS may do vectorisation if and when they want. So, there won't be any feasibility issue if TWG CP requires only vector data.

Moreover, the results of the questionnaire sent about cadastral data and vectorisation projects has shown that most countries having still only cadastral data in raster form have vectorisation projects. Most of these projects will be achieved before 2016. Only few countries have uncertainties about date of achievement (France). So, there will be only few gaps in the geographic extent of available cadastral data conform to INSPIRE due to the existence of only cadastral data.

About circular arcs:

OJE: As several Member States allows circular arcs we must consider this requirement

DLA: specific discussion paper on this topic.

About 3D data:

OJE: The conclusion is that most requirements are common. It is obvious that the requirements will change in the near future. As some users say, 3D will be more common, at least in some countries. I think we must include 3D data in the model, and leave the decision to use 2D or 3D to the user

PVO: We should also consider a land-market use case as this is an important application area of cadastral parcels. Without considering the most dominant applications, the result may be quite deformed data specifications. Also the major application areas are needed for a healthy cost-benefit analysis.

DLA: TWG CP already agrees (cf minutes of Palma meeting) that land market should not be considered as an INSPIRE use case

- INSPIRE is for applications which may have an impact on environment which is not the case for land market or very indirectly
- INSPIRE is for the Commission, the public bodies and the citizens whereas land market is more for economic stakeholders (owners/buyers, conveyors, notaries, ...).

Moreover, I am not sure that including land market in INSPIRE will imply a better cost-benefit result as it would imply far bigger costs (with the need of harmonising more data) and won't probably provide so many additional benefits (as the cross-border land market is already working quite well, even without INSPIRE).

There are 2 main reasons for not including 3D parcels in INSPIRE:

- the definition given by the INSPIRE Directive "areas defined in cadastral registers or equivalent"
- the Simple Feature recommendation due to the fact that many users or rather their software won't be able to read/receive 3D data.

It would be possible to make arrangements with the Simple Feature recommendation by having 3D parcels in a separate package/extension/option/application schema (mechanism to be found).

However, I am still very reluctant to include 3D parcels as:

- it would contradict the INSPIRE definition
- it would make the model more complicate
- requirements do not really exist; they are just potential in the future; they are ill-defined; for me, it is far from obvious that flats in buildings, subsurface constructions or LegalSpace around utilities should be considered as within the scope of INSPIRE "cadastral parcels"; it might be also in themes "buildings" or "utilities", if really required by INSPIRE users.

But, TWG CP should probably recommend 2,5D parcels (when available).

About topology

PVO: Concerning topology there are a number of reasons to include both a (spaghetti) polygon and a topologically structured alternative in the model (conceptual and encoding for data transfer), because both solutions do occurs a lot in the practice of cadastral organizations and their users. Also mixed solutions are possible, have both geometry and topology for different primitives (point, line, area, and volume). The advantage of polygons is their ease of use. The advantages of the topology structure are:

- avoids data redundancy (representing the same geometry twice)
- supports analysis applications (find the neighbours of a given parcel)
- boundaries can be series of straight lines and circular arcs, which fits well in the topology model (however, polygons can often not include circular arcs)
- data quality attributes (such as accuracy) are often attached to boundaries (edges and nodes) and can not simply be transferred to faces (polygons) as the different boundaries may have very different quality
- better supports data consistency (no overlaps and no gaps)

- it is easier to convert from the topology model to geometry than going in the reverse direction

DLA: During Ispra meeting, it was decided that:

- For TWG dealing with surfaces (CP and AU), topology should not be included because too heavy to provide. Moreover, download services do not have any topological operators but only geometrical ones.
- TWG CP and TWG AU shall keep the simple geometry model. They may provide quality recommendation about topological consistency and ask data providers to report in metadata if data is conformant to this recommendation or how conformant it is (e.g. % of overlapping parcels).

Annex I

Peter van Oosterom. Relationship with ISO 19152, LADM Land Administration Domain Model, presentation at the INSPIRE TWG Cadastral parcels meeting, Verona, Italy, 8 and 9 September 2008.



TWG Cadastral parcels

Relationship with ISO 19152, LADM Land Administration Domain Model

8 and 9 September 2008

Overview



1. **Intro/Standards**
2. LADM version ISO 19152 WD2a
3. Examples
4. LADM based INSPIRE cadastral parcels
5. Conclusions



Intro/standards: Cadastral Data

- object (parcel, apartment, spatial unit)
- right (ownership (.....), usufruct, mortgage, restriction, informal, unknown, conflict...)
- person (natural, non natural, group, group of groups), person can be represented
- identifiers
- value
- Area (GIS area and legal area)
- classification
- geographic name
- person name
- date (birth, establishment, acceptance, transaction, survey, check-in)
- ranking order
- source document
- forms
- Point (x1, y1, x2, y2)
- boundary
- face, edge, node: topology
- GIS Layers
- apartment - 3d
- land use
- share
- transaction type
- purchase price
- history (check-in, check-out, mother-child, history class)
- right relation
- mortgage, interest

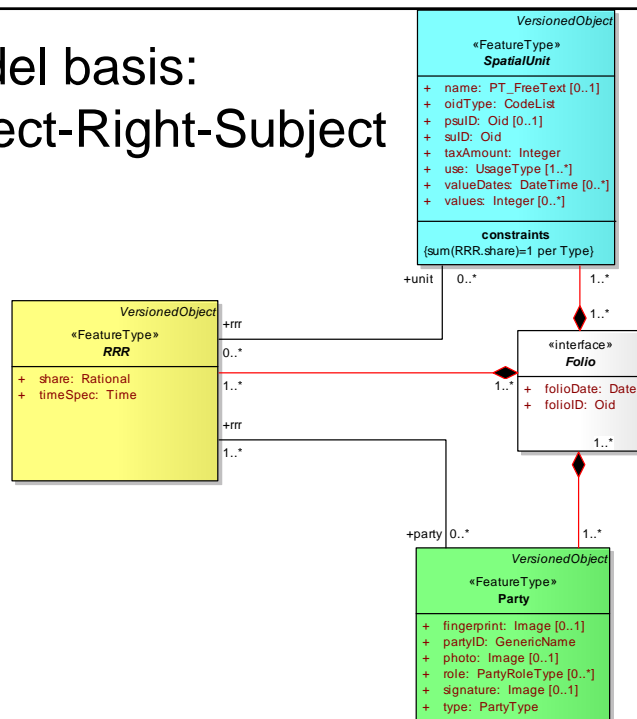
Intro: see ppt Chrit



Overview

1. Intro/Standards
2. LADM version ISO 19152 WD2a
3. Examples
4. LADM based INSPIRE cadastral parcels
5. Conclusions

Model basis: Object-Right-Subject



LADM:Legal-administrative

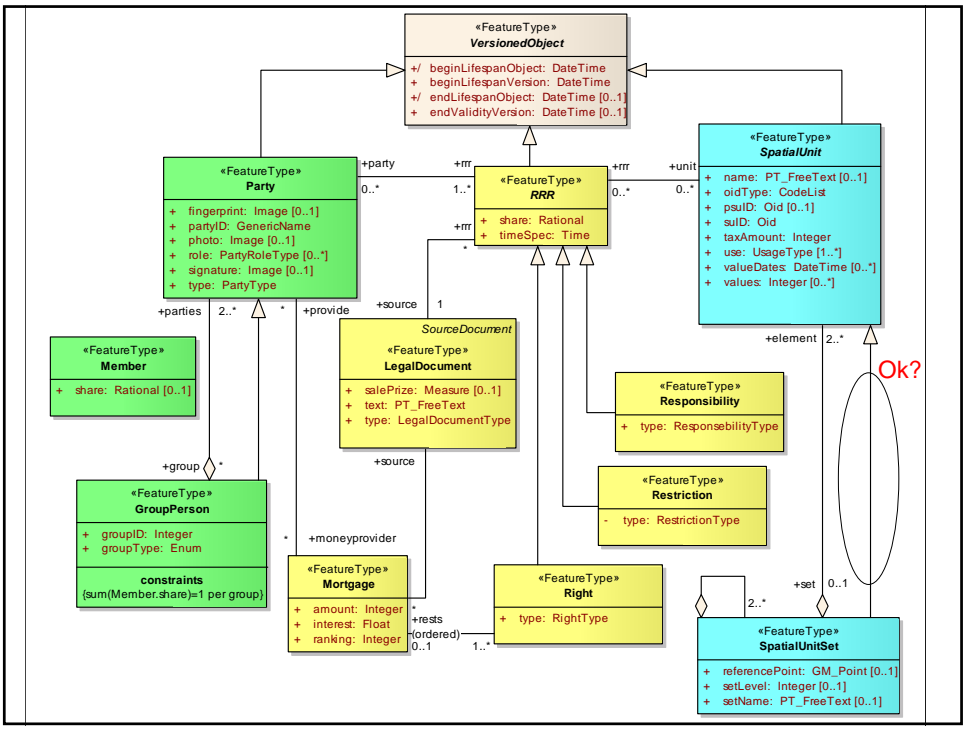
- RRR (Right Restriction Responsibility) has associations with Party (Person) and SpatialUnit (RegisterObject)
- Mortgage and RRRs are based on **legal documents** or decisions
- Parties can be natural or non natural (private, gov, groups, etc.)
- Surveyor, farmer, notary, money provider are included, role types of the Party class
- A RRR can be temporal





Spatiotemporal objects

- Temporal/dynamic aspect relevant:
 - Long lease (or ownership for limited time)
 - Nomadic behaviours
 - Time-sharing (mon-fri:X, sat-sun:Y)
 - Fishing/hunting rights during certain season





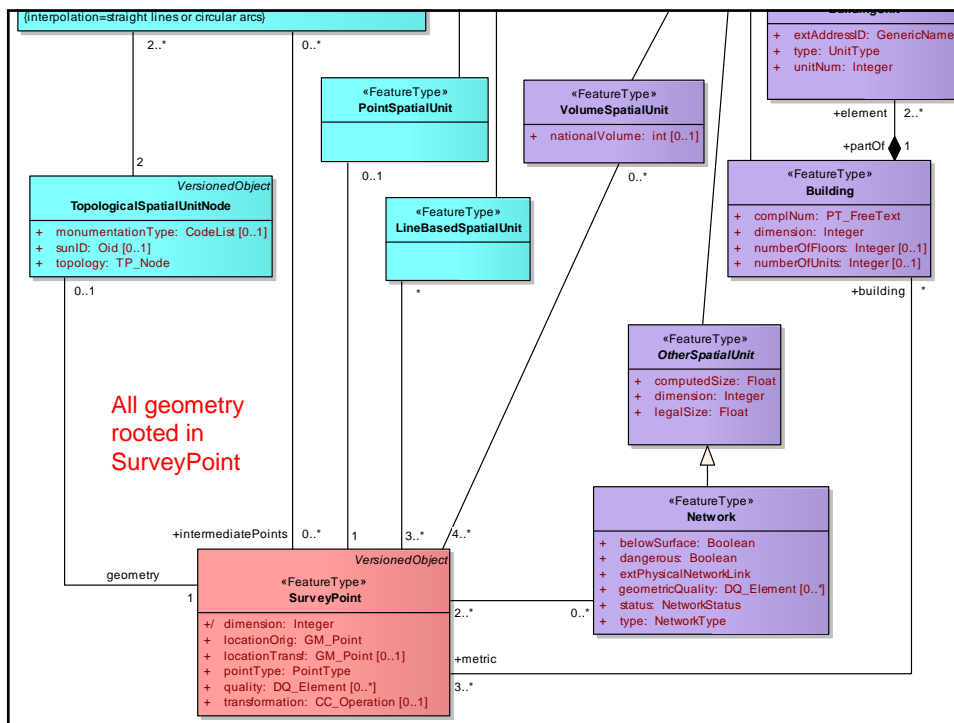
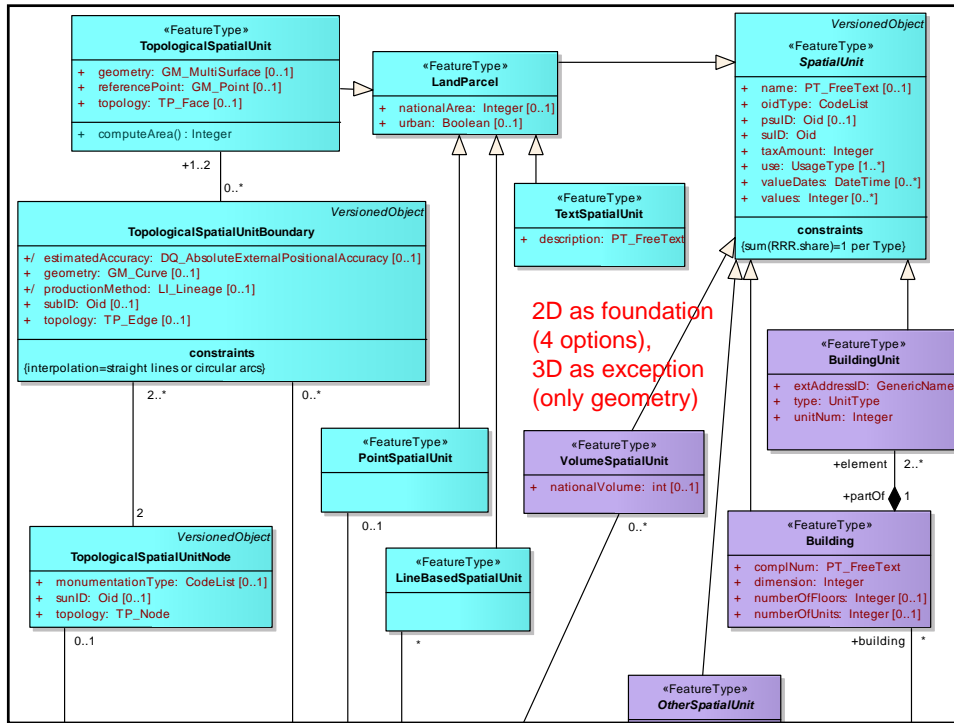
LADM: Geometry

- SpatialUnit with specialisations, e.g. LandParcel (text, point, line, topology), VolumeSpatialUnit, Building(Unit), and Other (Network).
- Agregations like SpatialUnitSet, Building
- Link to surveying and survey documentation
- Link to ISO/OGC standard (both geometry and topology parts)



LandParcels...

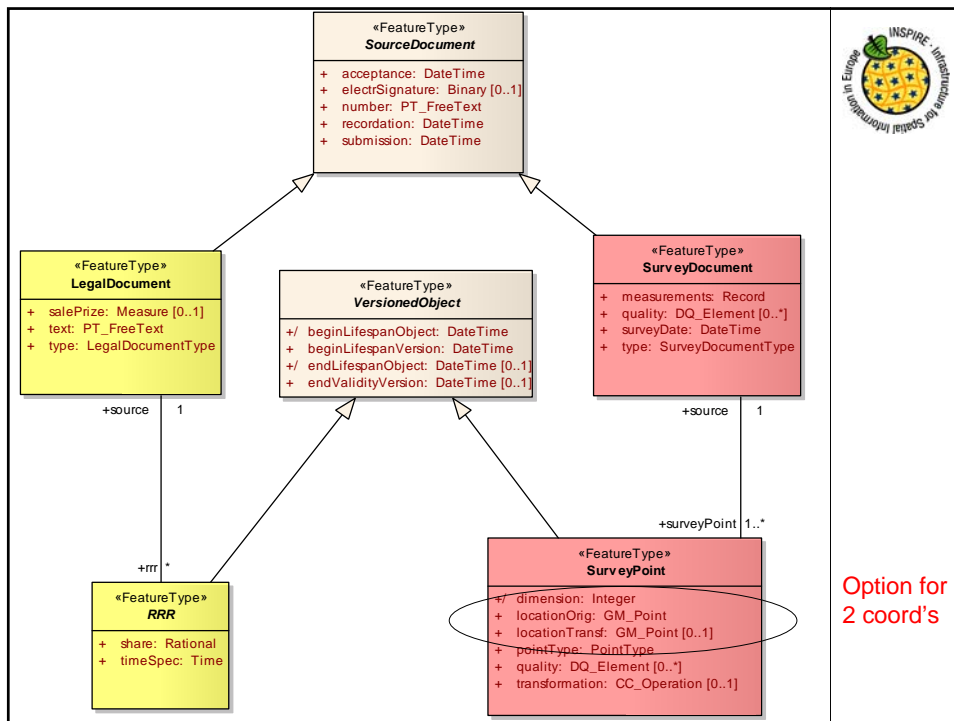
- Not always available in the format of a planar partition
- Sometimes just one references point available or 'unconnected' polygon (or spaghetti) → these solutions may be sufficient (and cost effective)



Documents



- Source documents: legal of survey
- Survey or spatial data capture:
 - Different accuracy in different area's
 - It should be more easy to combine different data acquisition methods with available data sources
 - Lidar, Ikonos, Quickbird, GPS, Galileo, Cyclomedia, Tape measurements, Total stations, Ortho Photo's, Aerial Photographs

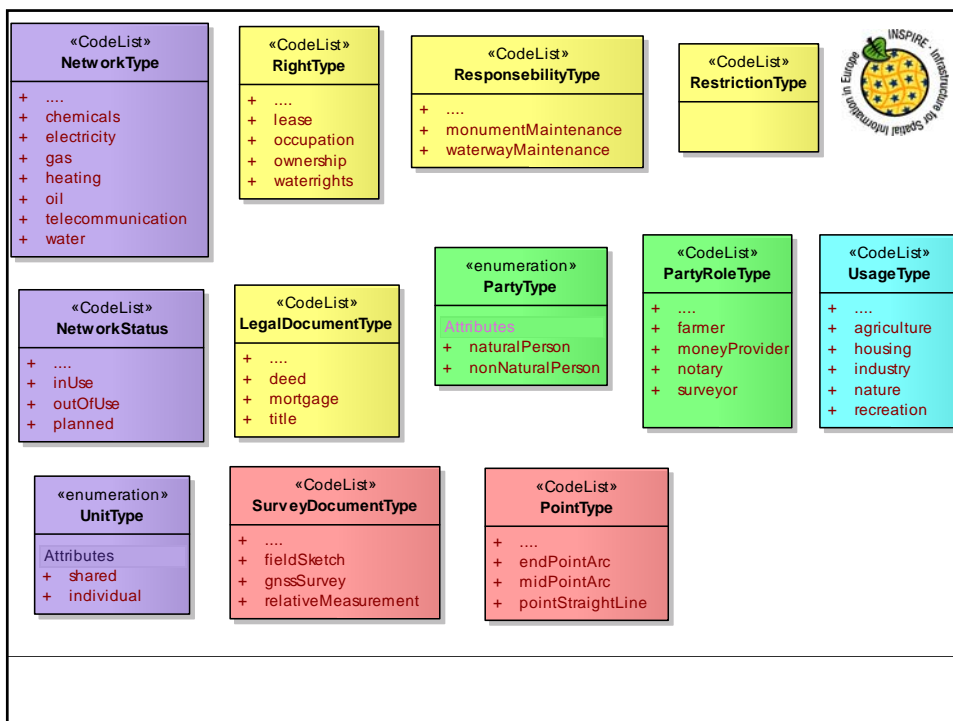


Option for 2 coord's



Data types

- Enumeration (fixed set of values)
- CodeList (extensible sets of values)
- Union



Overview



1. Intro/Standards
2. LADM version ISO 19152 WD2a
3. **Examples**
4. LADM based INSPIRE cadastral parcels
5. Conclusions

Examples, instance level UML (annex C, currently 29 cases)

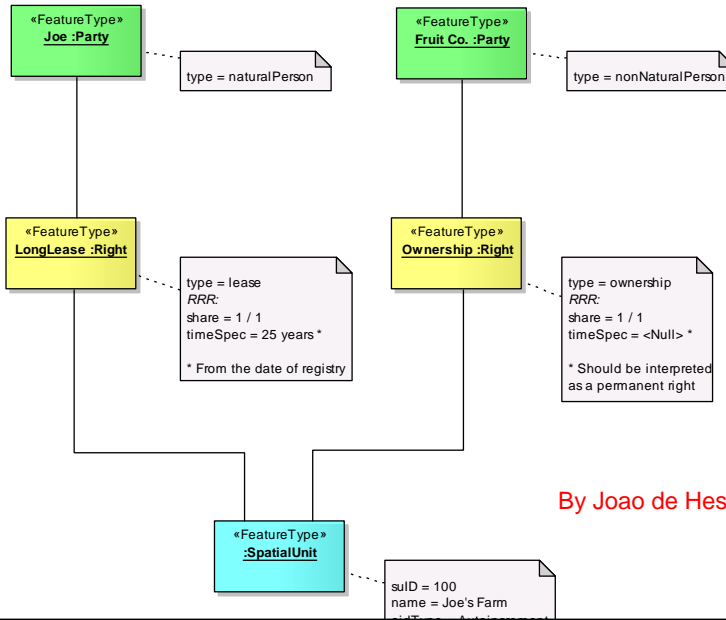


- 1 natural person is leaseholder another non-natural person is owner, ownership and lease hold based on civil code for one country
- 2 persons hold a share in a right (e.g. one person a share 1/2 and the other person a share 1/2 , or 2/3 and 1/3)
- A serving parcel provides access to 4 parcels, and the serving parcel is not public
- A group person holds property right on a spaghetti parcel
- A legal space building contains individual units (apartments) and a shared unit, with one common threshold on 1 ground parcel
- A timeshare ownership for the month of February
- A restriction not to change a building because of its monumental status
- Mortgage on ownership, bank included as person
- Mortgage on usufruct on ownership, money provider included as person
- 20 others...

Object Diagram, Case 01 - Lease on a Parcel (Formal Rights)

Description:

A natural person is a leaseholder; another non-natural person is a owner, ownership and lease hold based on civil code for one country.



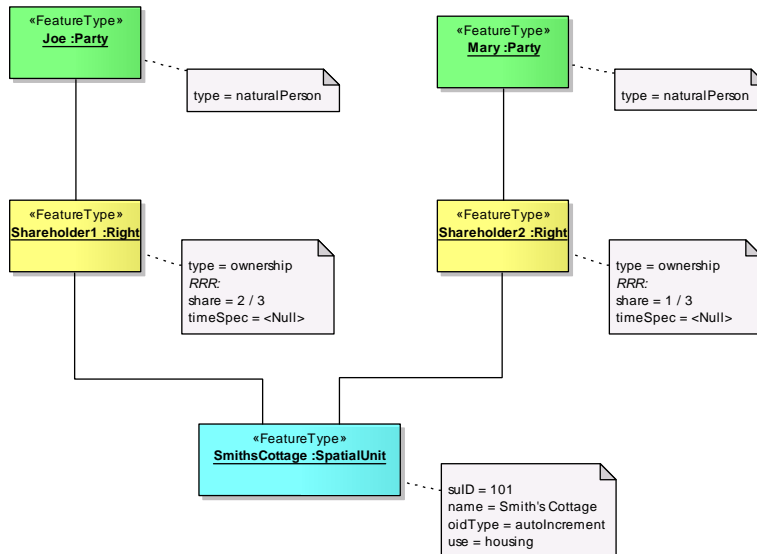
By Joao de Hespana



Object Diagram, Case 03 - Sharing ownership situation (Formal Rights)

Description:

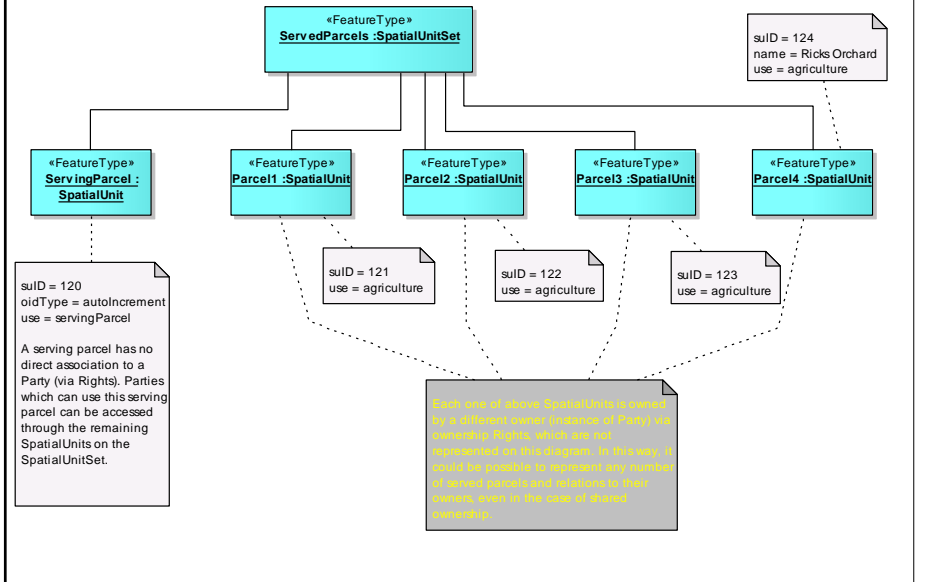
Two persons hold a share in a right (one person a share of 2/3 and the other person a share of 1/3).



Object Diagram, Case 04 - Serving Parcel situation (Formal Rights)

Description:

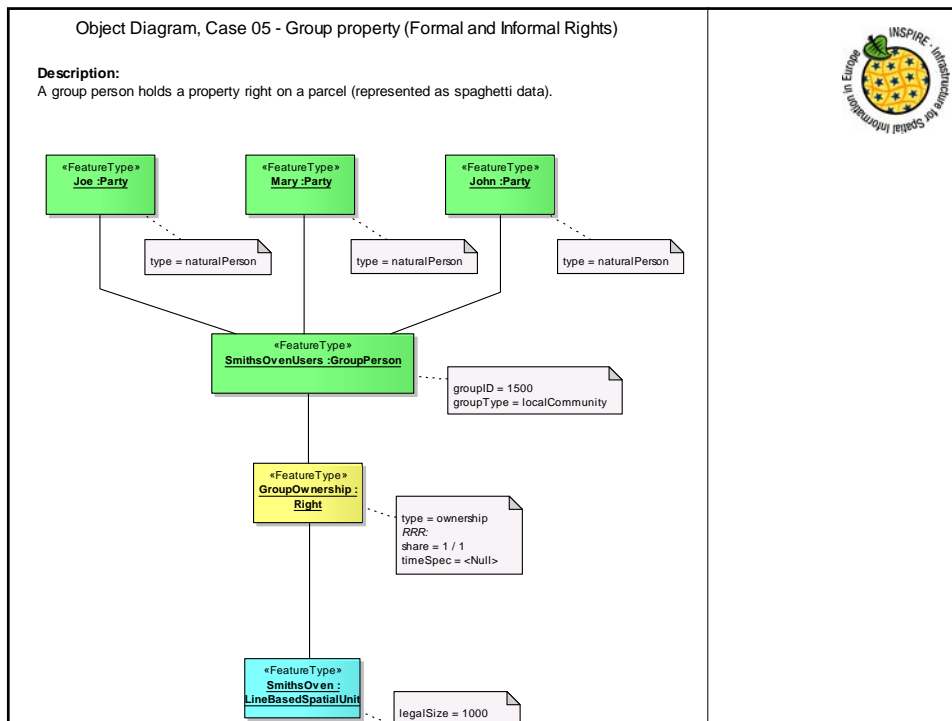
A serving parcel provides access to four parcels, and the serving parcel is not public.

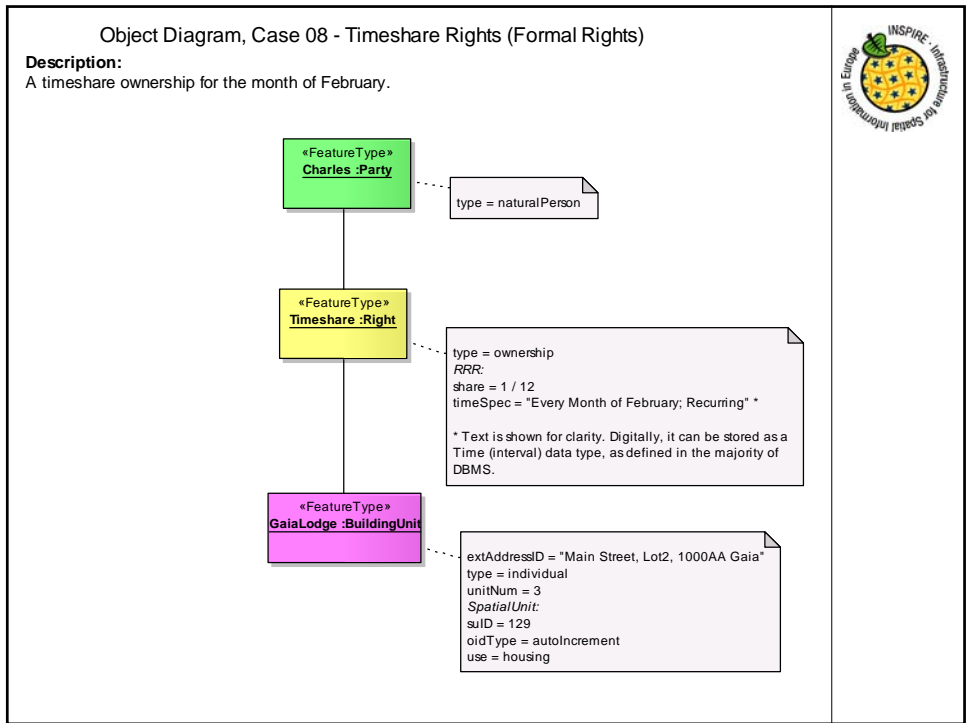
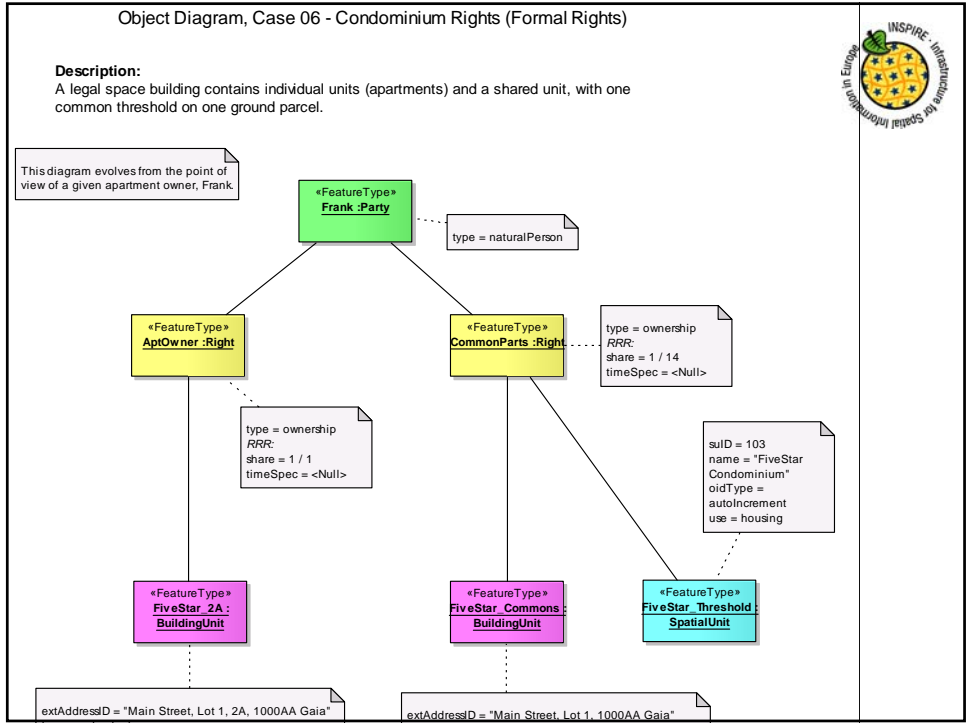


Object Diagram, Case 05 - Group property (Formal and Informal Rights)

Description:

A group person holds a property right on a parcel (represented as spaghetti data).

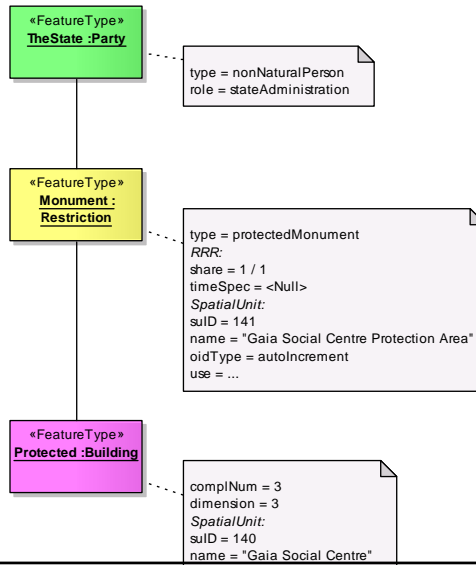




Object Diagram, Case 09 - Public Restriction on a Building (Formal Rights)

Description:

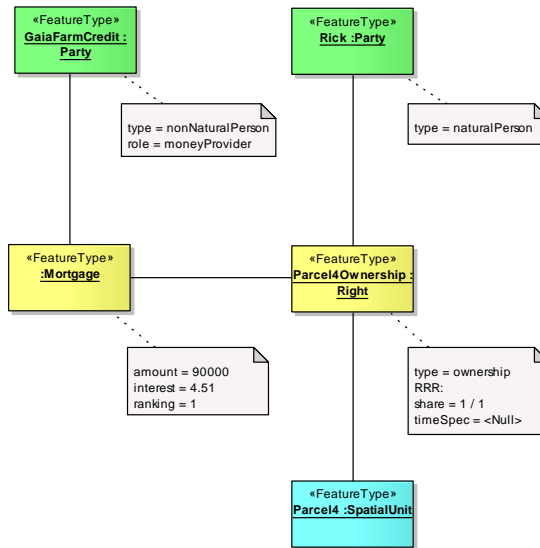
A restriction not to change a building because of its monument status.



Object Diagram, Case 10 - Mortgage on Ownership (Formal Rights)

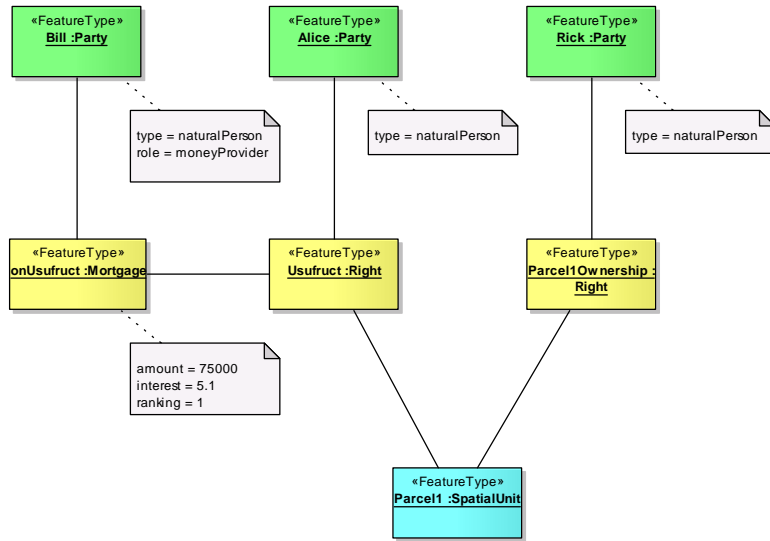
Description:

Mortgage on ownership, Bank included as Person.



Object Diagram, Case 11 - Mortgage on Usufruct (Formal Rights)

Description:
Mortgage on Usufruct on Ownership, money provider included as Person.



Overview

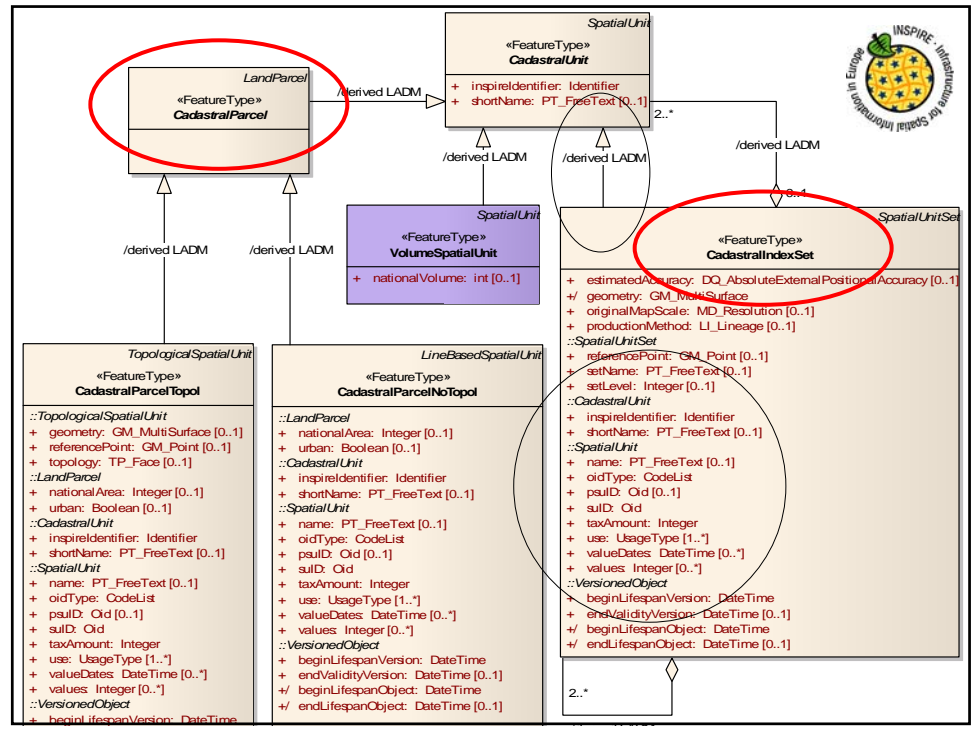


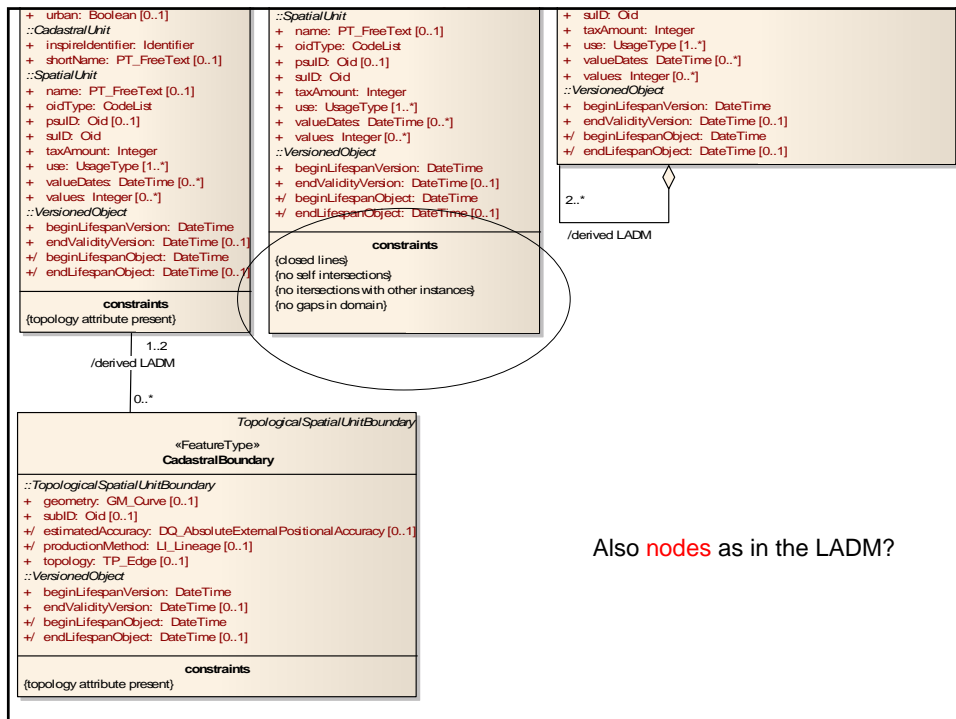
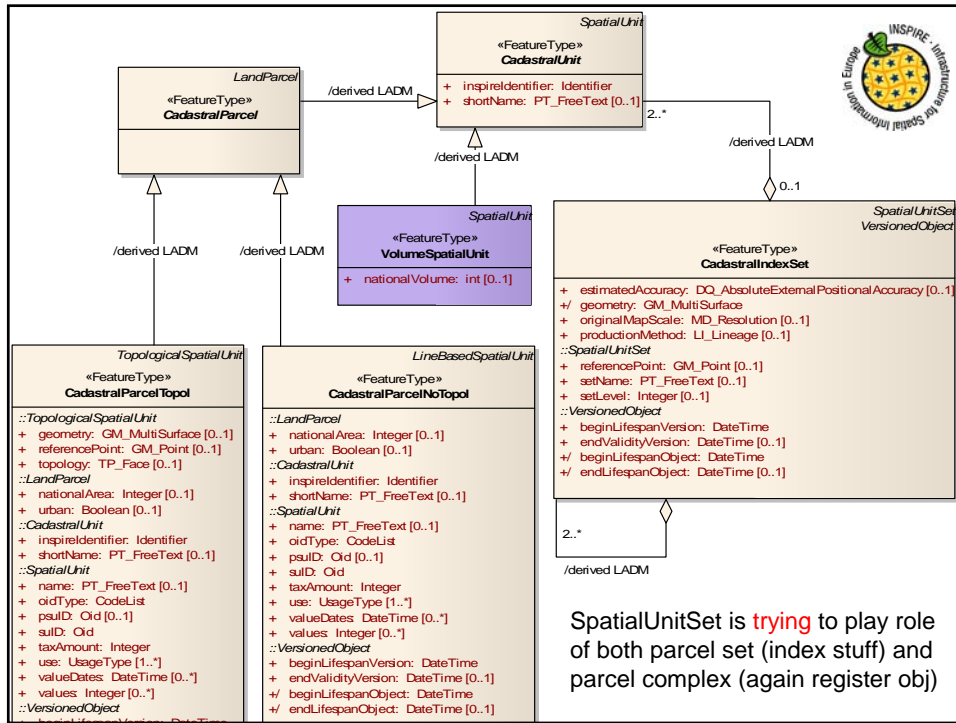
1. Intro/Standards
2. LADM version ISO 19152 WD2a
3. Examples
4. **LADM based INSPIRE cadastral parcels**
5. Conclusions

LADM based INSPIRE cadastral parcels



- Selection of relevant classes
- Based on inheritance
- Add attributes
- Add constraints (to refine meaning)





Overview



1. Intro/Standards
2. LADM version ISO 19152 WD2a
3. Examples
4. LADM based INSPIRE cadastral parcels
5. **Conclusions**

Conclusions

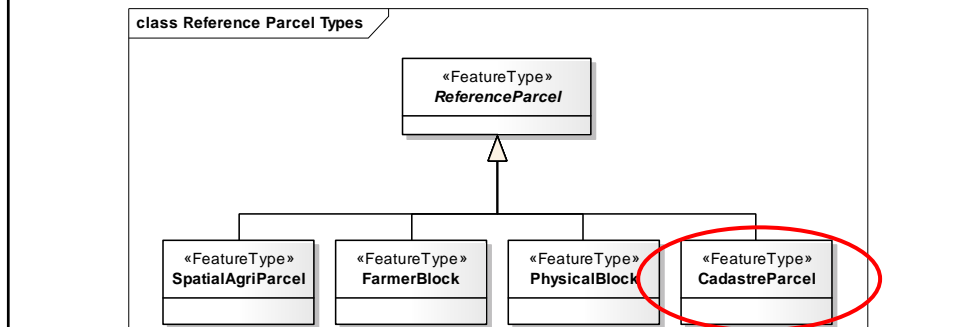


- LA standardization is feasible (at a generic level)
- LADM (started as CCDM in 2002) gets more and more support due to the consensus based process
- First within FIG (workshops, meetings), now within ISO TC211
- Very open to INSPIRE cooperation
- It would give INSPIRE cad parcels **roots**

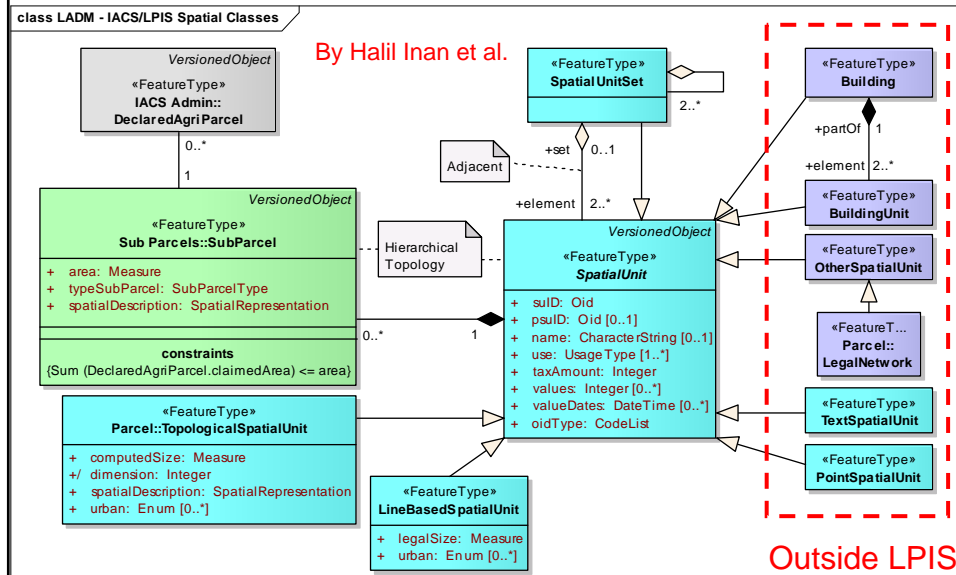
Integration of LADM with Land Parcel Identification Systems



- Common Agricultural Policy (CAP) of EU
- Integrated Administration and Control System (IACS), including LPIS
- New Annex F of ISO 19152



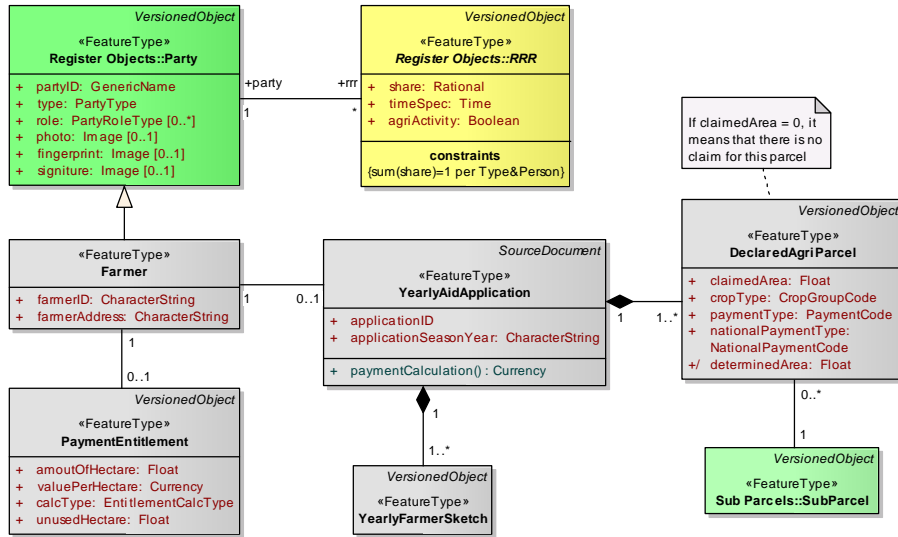
Spatial side (note SubParcel)



Admin side



class LADM - IACS/LPIS Administrative Classes



Annex J

Peter van Oosterom. Temporal aspects and maintenance, presentation at the INSPIRE TWG Cadastral parcels meeting, Verona, Italy, 8 and 9 September 2008.



TWG Cadastral parcels

Temporal aspects and maintenance

8 and 9 September 2008

(note also see first round discussion paper by Tarja on origin/history, 14 and 15 April 2008)

User requirements (1/3)



- Parcel instances change 'continuously'
- Delay between start of change process (e.g. split of parcel), survey date, inclusion in database, publication date, etc.

- Most apps want database (publication) date
- Few apps want other dates
- About 1/3rd of apps need history

User requirements (2/3)



- No meaningful update lifecycle of data set
- Little less than half want (yearly) snapshots, while the others want the most up to date
- Yearly snapshots do not require incremental updates (though some appls want them)
- Most up to date, two options: 1. direct to source (web), 2. frequent incremental updates based on versioning

User requirements (3/3)



- No appl required versioning of attributes (only versions of complete objects)
- No appl required events (causing the changes), focus on states
- No appl required begin and end dates objects (only begin and end dates versions)
- No appl required successor/predecessor info

Harmonisation approach (1/2)



DT DS documents

- **Many** D2.5 requirements concerning life cycle and maintenance: 24, 25, 26, 27, 28, 29, 35, 52, 53, 63
- Several D2.5 recommendations: 9, 10, 13, 24
- Some D2.6 related text and recommendation 24

Recommendation 9 D2.5: If the spatial objects in a data set are updated individually, then application-specific version information is typically attached to the individual spatial object

The use of timestamps is recommended in INSPIRE (compared, for example, with version counts).

Harmonisation approach (2/2)



- **Requirement 35** Temporal characteristics of a spatial object shall be expressed ...
 - by specifying properties of the spatial object type with a value that is a temporal geometry or a temporal topology (see ISO 19109 8.6; ...);
 - by specifying properties of the spatial object type with a value that is one of the basic types Date, DateTime and Time... The Gregorian calendar shall be the default calendar, **UTC the default time zone**.

As-is analysis



- See first round (14 and 15 April 2008)
- Most new check-list (Germany, Latvia, Switzerland and UK) info is in-line with first round: continuous change/instances
- Latvia mentioned also **planned** parcels
- Germany mentioned incremental updates now and Switzerland mentioned this for the future.

Proposals



WG-CPI survey

- Origin and history are one of the five core elements in the WG-CPI survey

For CadastralParcel and CadastralIndexSet

- Obligatory <<lifeCycleInfo>> with beginLifespanVersion and endLifespanVersion
- No beginLifespanObject and endLifespanObject
- Optional beginOriginalDataCaptureDate and endOriginalDataCaptureDate (only for CadastralP)

GII requires version management (others might refer to your data, that is changing)



Open Points

- How to specify temporal reference systems in the model (date=Gregorian c, time: some alternatives: local, CET, UTC,...)? Uniform over....?
- No version_id to identify a specific version of object, just object_id and beginLifespanVersion, agreed?
- Is there a need for planned parcels (Latvia)? With own geometry/topology?

Annex K

Peter van Oosterom. INSPIRE process, standardization of geoinformation in Europe, presentation (abstract and slides) at the European Commission, Joint Research Centre, Agriculture Unit LPIS Workshop - Applications and Quality, <http://mars.jrc.ec.europa.eu/mars/content/Sofia>, Bulgaria, 17-18 September 2008.

INSPIRE process, standardization of geoinformation (in Europe)

LPIS Workshop 17-18 September 2008, Sofia, Bulgaria

Peter van Oosterom

September 17, 2008

1

GIS technology



Overview

1. INSPIRE data specification
(part sheets from Paul Smits, JRC)
2. INSPIRE cadastral parcels
3. ISO 19152 Land Administration Domain Model

September 17, 2008

2



Harmonizing geoinformation in Europe

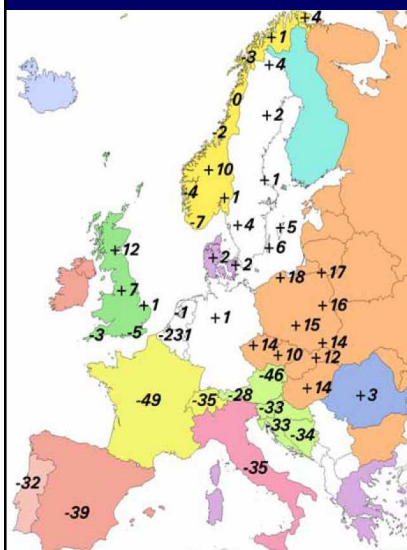
- Concerns about 34 different types of data sets
- 27 different countries with 22 languages (and more influence; e.g. Iceland, Norway and Switzerland are also involved)
- Agreement on content during **exchange**, considering consistency (within, but also) between:
 - Themes
 - Scales (levels of detail)
 - Borders

September 17, 2008

3

TUDelft

Differences in sea-level (in cm, source BKG)



14 jan'04

Bridge near Laufenburg collapsed due to altitude measurement difference of 0.54 m between Swiss and German side

Source www.laufenburg.ch



4

TUDelft

Themes (annex I and II)

Annex I:

- Coordinate reference systems
- Geographical grid systems
- Geographical names
- Administrative units
- Addresses
- Cadastral parcels
- Transport networks (water,..)
- Hydrography
- Protected sites

Annex II:

- Elevation
- Land cover
- Orthoimagery
- Geology (aquifers,..)

September 17, 2008

5



Themes (annex III)

- Statistical units
- Buildings
- Soil
- Land use
- Human health and safety
- Utility and Government services (water supply, sewage,..)
- Environmental monitoring facilities
- Production and industrial facilities (water abstraction,..)
- Agricultural and aquaculture facilities
- Population distribution – demography

- Area management/restriction/ regulation zones & reporting units (areas around drinking water,..)
- Natural risk zones
- Atmospheric conditions
- Meteorological geographical features
- Oceanographic geographical features
- Sea regions
- Bio-geographical regions
- Habitats and biotopes
- Species distribution
- Energy resources
- Mineral resources

September 17, 2008

6



INSPIRE components (drafting teams)

- metadata*
- data specification*
- network services*
- access and rights of use for Community institutions and bodies**
- monitoring and reporting mechanisms**

* *technical: under JRC responsibility*

** *legal/procedural: under Eurostat responsibility*

INSPIRE is a Framework Directive

Detailed technical provisions for the issues above will be laid down in Implementing Rules. Once adopted, Implementing Rules become European legislative acts and national law in 27 Member States and in some EFTA countries

September 17, 2008

7



Time table metadata and data in years after 15 may 2007

	Implementing rules metadata	Metadata (+after rules)	Implementing rules data	New data (+after rules)	Existing data (+after rules)
Annex I	1 2008	(+2 =) 3 2010	2 2009	(+2 =) 4 2011	(+7 =) 9 2016
Annex II	1 2008	(+2 =) 3 2010	5 2012	(+2 =) 7 2014	(+7 =) 12 2019
Annex III	1 2008	(+5 =) 6 2013	5 2012	(+2 =) 7 2014	(+7 =) 12 2019

September 17, 2008

8



Data specifications, results until today

Deliverable	Status
D 2.3: Scope and Definition of Annex I/II/III Themes based on INSPIRE position papers, Selected reference materials submitted by the SDICs and LMOs	Version 3.0
D 2.5: Generic Conceptual Model based on ISO 19101, 19103, 19107, 19108, 19109, 19110, 19111, 19112, 19115, 19123, 19126, 19131, 19136, 19139, ISO/IEC 19501, OGC 06-103r3	Version 3.0
D 2.6: Methodologies for data specifications based on Methodology developed by the RISE project Selected reference materials submitted by the SDICs and LMOs	Version 3.0
D 2.7: Implementing rules for exchange of spatial data based on ISO 19118, 19136, 19139 INSPIRE Generic Conceptual Model	Comment resolution

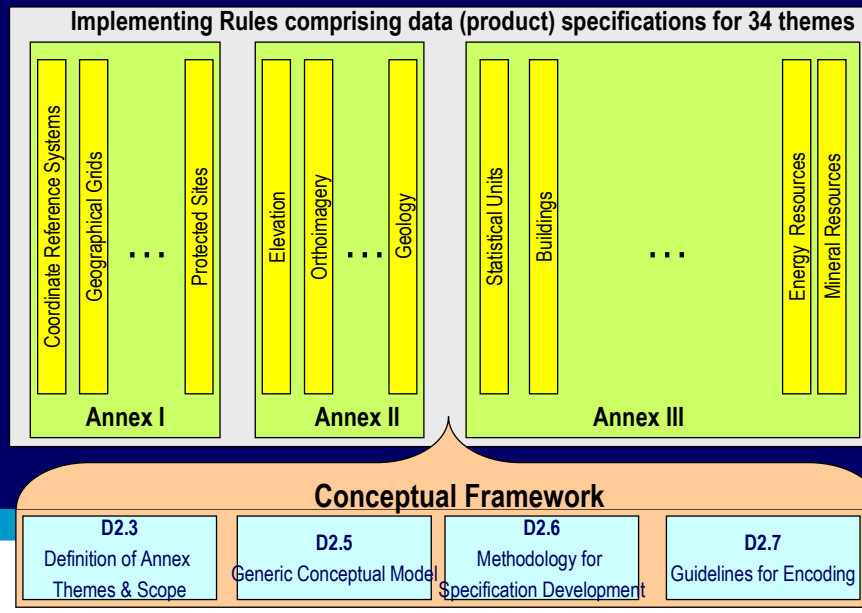
September 17, 2008

9

not yet theme specific data specification



Data Specifications - Approach



General principles

INSPIRE lays down general rules to establish an infrastructure for spatial information in Europe

- for the purposes of Community **environmental** policies and
- policies or activities which may have an impact on the **environment**

INSPIRE must be based on existing data

Harmonisation in INSPIRE must be done based on user requirements:

- pan-european use cases
- cross-border use cases
- linked with **environment**

Harmonisation has to be feasible and cost-benefits have to be analysed.

September 17, 2008

11

Overview

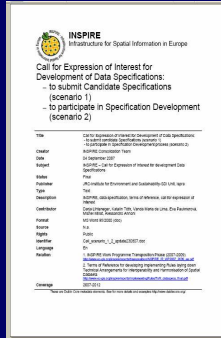
1. INSPIRE data specification
2. **INSPIRE cadastral parcels**
(part sheets from Dominique Laurent, IGN France)
3. ISO 19152 Land Administration Domain Model

September 17, 2008

12

Stakeholders' participation

Data specifications are developed by Thematic Working Groups consisting of domain experts proposed by the stakeholders (SDIC/LMO) and a facilitator and editor nominated by the Commission



8 Thematic Working Groups on Annex I data



September

The context

1. Identification of main stakeholders:
 - PCC
 - EuroGeographics Expert Group on Cadastre
 - FIG
 - UN WPLA
 - EURODIN (*eContent* + project)
2. Identification of relevant standards : LADM a new work item proposal to ISO/TC 211 (by FIG)
3. Use a classification based on the one provided by WG-CPI survey
 - Land market - Agriculture
 - Environment - Spatial planning
 - Infrastructures - Public administration
 - Public safety - Socio-economic analysis

September 17, 2008

14

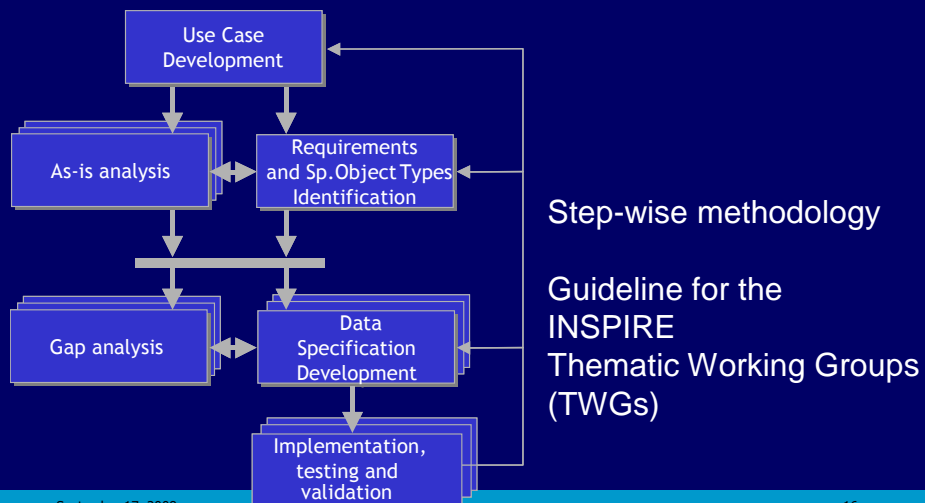
Definition of parcel

- In the INSPIRE Directive:
 - “areas defined by cadastral registers or equivalent”
 - not very explicit (specially for MS having sub-parcels or “over-parcels”)
- TWG CP explanation
 - **single** part of earth surface with homogeneous **rights**
- 5 Core elements (WG-CPI): Geometry, Surface (area/size), Identifier, Georeferencement, Temporal information, and many optional ones...

September 17, 2008

15

D2.6 Methodology for the development of data specifications



September 17, 2008

16

The first three steps...

- As-is analysis
 - General overview (from WG-CPI survey in 2005)
 - More detailed information on 11 countries
- Requirements
 - INSPIRE (D2.5)
 - Available use cases/check-lists
 - TWG CP members expertis
- Gap analysis/first proposals
 - Discussion papers
 - Discussion during TWG CP meetings

September 17, 2008

17



Content Data Product Specification ISO 19131 based

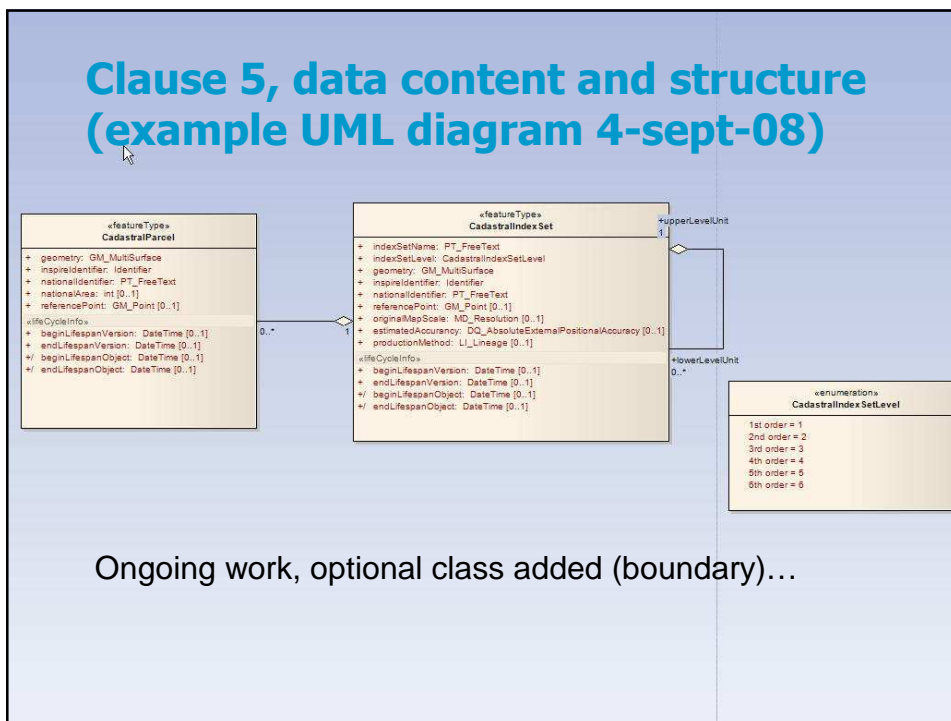
1	Scope (of the Document)	8	Metadata
2	Overview	9	Delivery
3	Specification scopes	10	Data Capture (optional)
4	Data product identification	11	Portrayal
5	Data content and structure	12	Additional information (optional)
6	Reference systems		Annex A (normative) Abstract Test Suite
7	Data quality		

September 17, 2008

18



Clause 5, data content and structure (example UML diagram 4-sept-08)



Roadmap TWG Annex I themes

- Kick-off meeting: February 2008
- Evaluation of user requirements: June 2008
- As-it analysis and gap analysis: August 2008
- First draft of data product specification: September 2008
- Internal review of first draft (DT DS, CT, EIONET): October 2008
- Second draft of data product specification: November 2008
- Review by SDIC/LMO: January 2008
- **Testing, revised DPS: March 2008**
- Submission to the INSPIRE Committee: May 2009

September 17, 2008

20

Overview

1. INSPIRE data specification
2. INSPIRE cadastral parcels
3. ISO 19152 Land Administration Domain Model
(part sheets from Chrit Lemmen, ITC/Kadaster NL)

September 17, 2008

21

Standardization in Land Administration?

- There are supposed to be huge differences between cadastral and land registry systems
- Look to the common area's:
 - Standardised Model (adaptable, extensible)
 - Avoid re-inventing the wheel
 - Enable involved parties to communicate
- Lack of a shared set of concepts and terminology in the Land Administration Domain

September 17, 2008

22

Proposal (FIG, Washington 2002) by Lemmen/van Oosterom

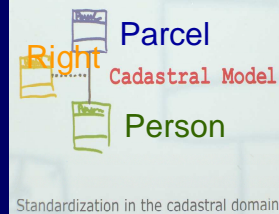
- Develop standard Core Cadastral Domain Model (CCDM), including:
 - Spatial part (geometry, topology)
 - Extensible frame for legal/admin part
 - Based on core **object-right-subject**
- Object-orientation → express in UML
- Model Driven Architecture (MDA)
- Accepted by large community: FIG, OGC, UN, ISO, user support, this means it can be **adapted by the industry**
- Maximize co-operation, minimize double effort

September 17, 2008

23

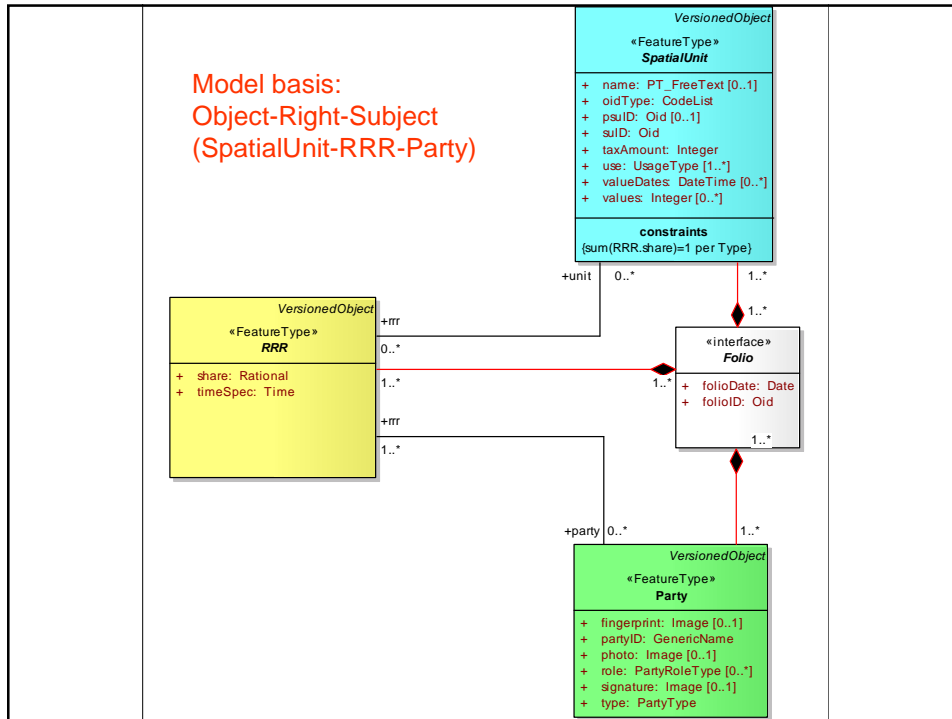
CCDM/LADM

- Workshops:
 - Enschede, The Netherlands, 2003
 - Bamberg, Germany, 2004
- Reviews by many experts
- Several Publications
- Many persons involved in this development
- Version 1.0 presented in Munich 2006, Germany
- FIG proposed LADM to ISO TC211, January 2008
- Accepted after voting by P-members
- ISO 19152 – started in Copenhagen in May 2008



September 17, 2008

24

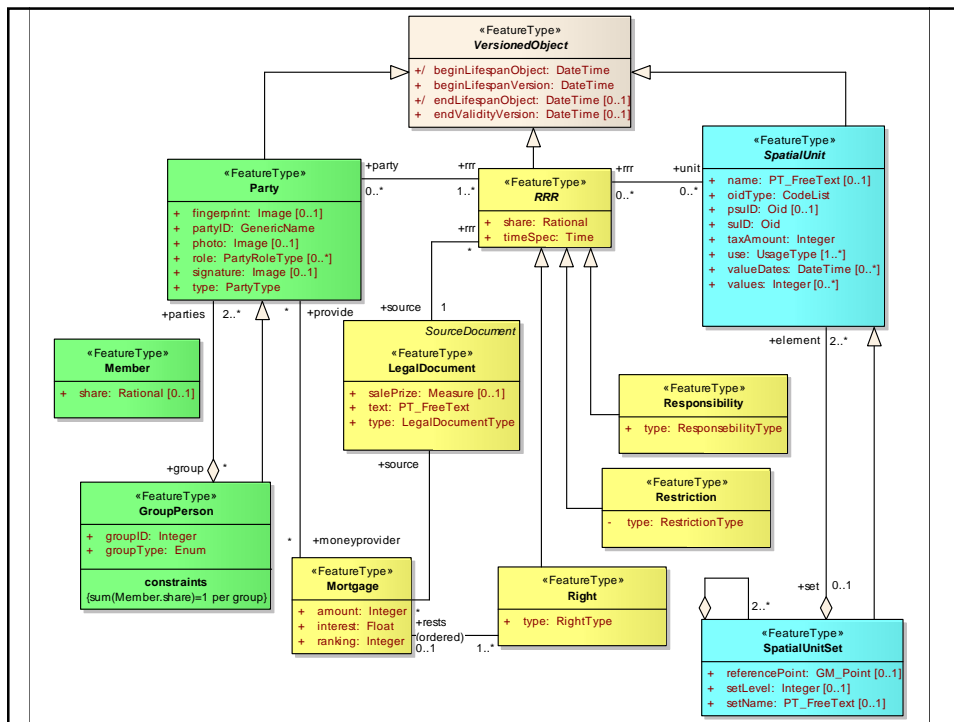


LADM: Legal-administrative

- RRR (Right Restriction Responsibility) has associations with Party (Person) and SpatialUnit (RegisterObject)
- Mortgage and RRRs are based on **legal documents** or decisions
- Parties can be natural or non natural (private, gov, groups, etc.)
- Surveyor, farmer, notary, money provider are included, role types of the Party class
- A RRR can be temporal:
 - Long lease (or ownership for limited time)
 - Nomadic behaviour
 - Time-sharing (mon-fri:X, sat-sun:Y)
 - Fishing/hunting rights during certain season

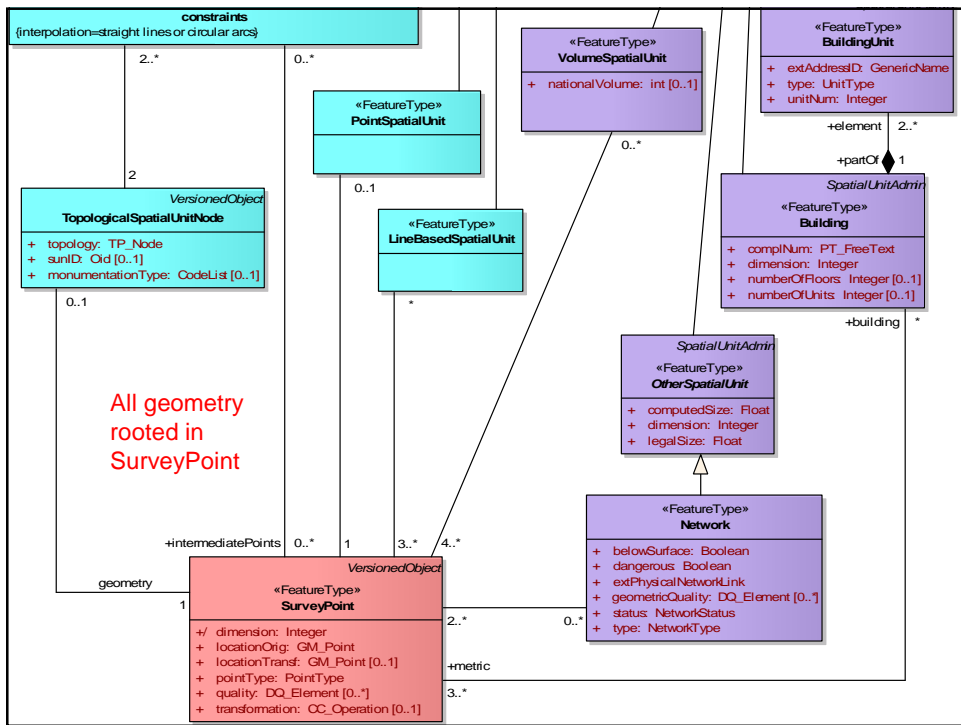
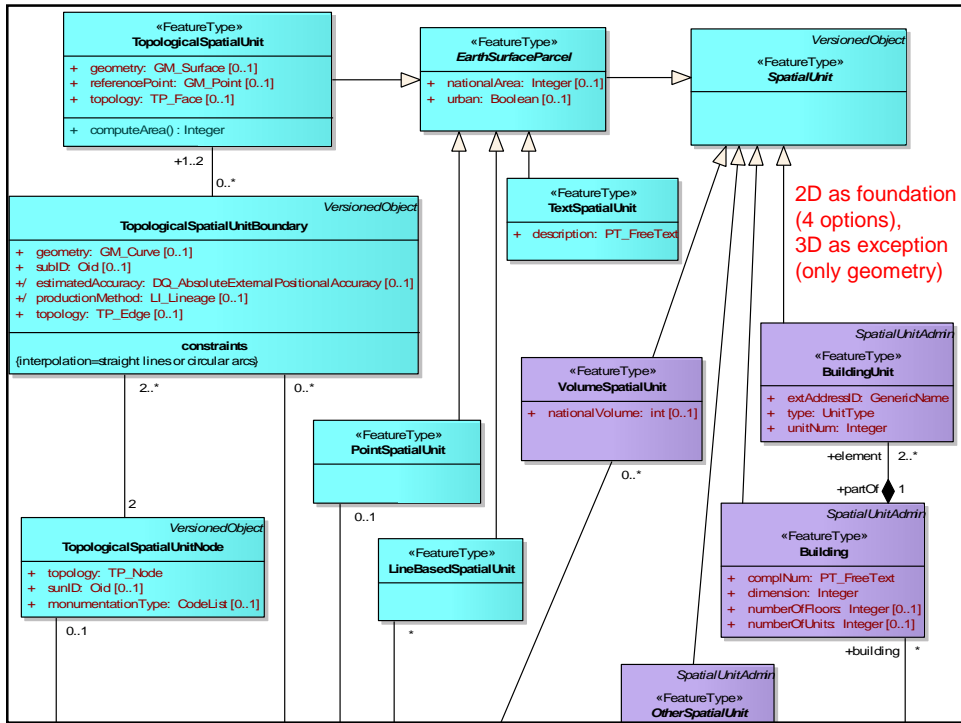
September 17, 2008

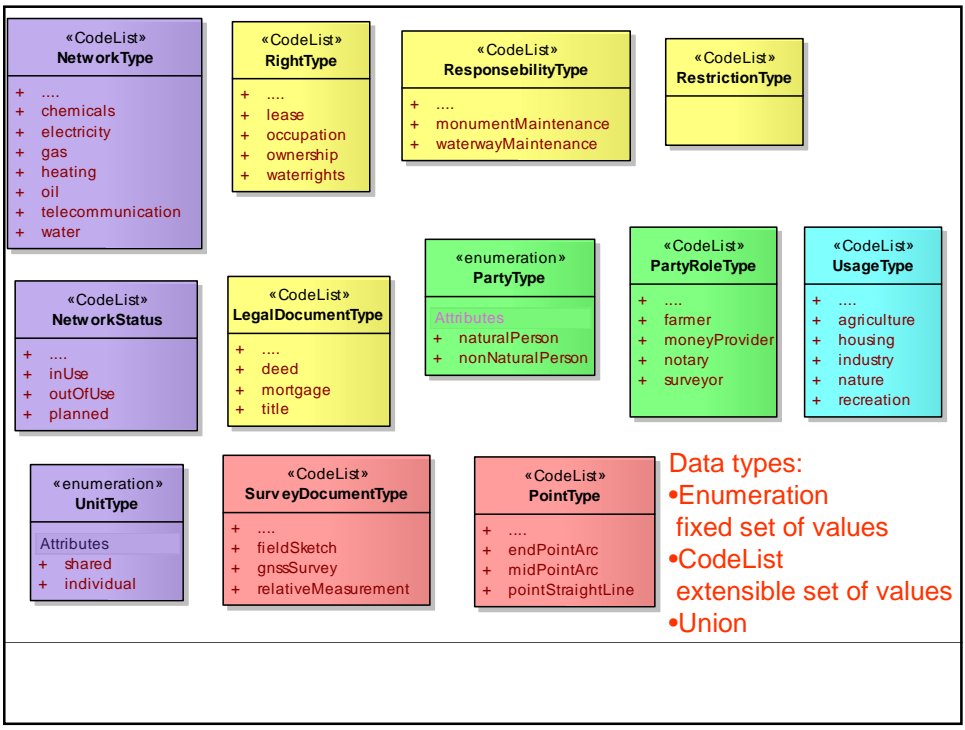
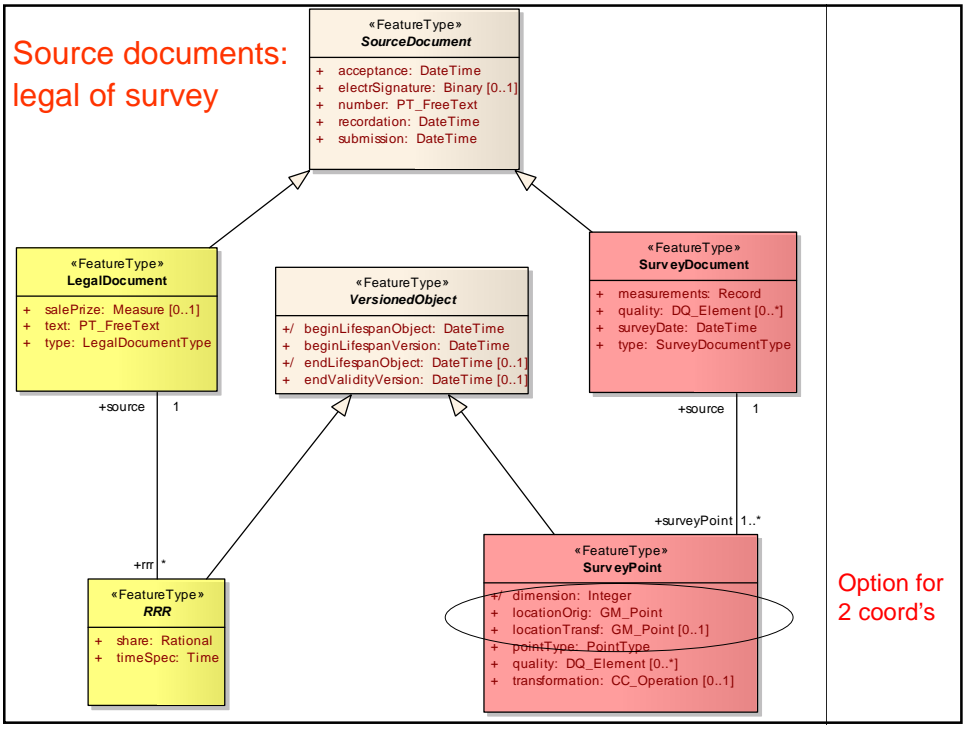
26



LADM: Geometry

- SpatialUnit with specialisations, e.g. EarthSurfaceParcel (text, point, line, topology), VolumeSpatialUnit, Building(Unit), and Other (Network).
- Agregations like SpatialUnitSet, Building
- Link to surveying and survey documentation
- Link to ISO/OGC standard (both geometry and topology parts)



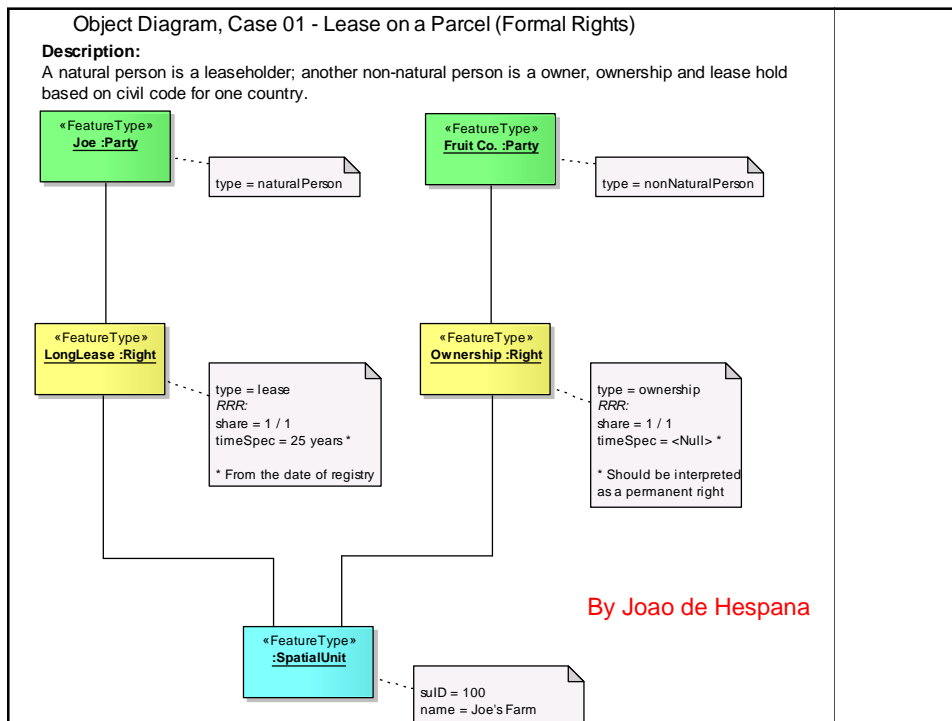


Examples, instance level UML (annex C, currently 29 cases)

- 1 natural person is leaseholder another non-natural person is owner, ownership and lease hold based on civil code for one country
- 2 persons hold a share in a right (e.g. one person a share 1/2 and the other person a share 1/2 , or 2/3 and 1/3)
- A serving parcel provides access to 4 parcels, and the serving parcel is not public
- A group person holds property right on a spaghetti parcel
- A legal space building contains individual units (apartments) and a shared unit, with one common threshold on 1 ground parcel
- A timeshare ownership for the month of February
- A restriction not to change a building because of its monumental status
- Mortgage on ownership, bank included as person
- Mortgage on usufruct on ownership, money provider included as person
- 20 others...

September 17, 2008

33

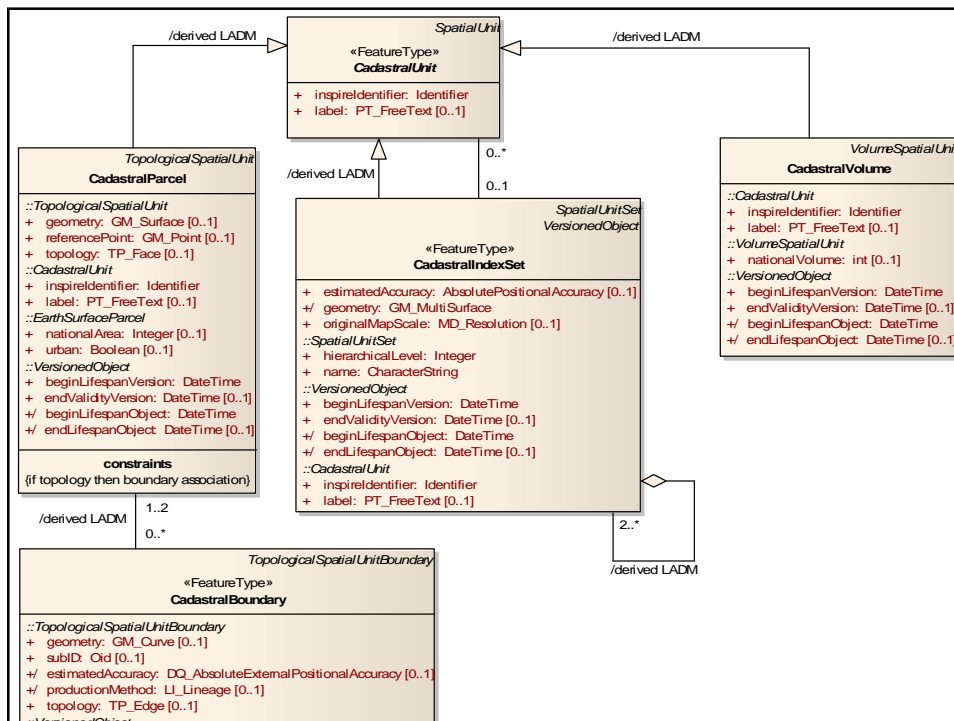


LADM based INSPIRE cadastral parcels

- Selection of relevant classes
- Based on inheritance
- Add attributes
- Add constraints (to refine meaning)

September 17, 2008

35



Conclusion

- Standardization is a condition for realizing the GII
- Domain models (themes) contain knowledge
- INSPIRE is mega-construction
- ISO (TC211) is often the foundation
- ISO 19152 / LADM and INSPIRE cadastral parcel have different scope, but the overlap does fit
- Other LADM use... in the context of LPIS
(see presentation 18 sept'08, 11:20-11:40 hours)

- Thanks for your attention!

September 17, 2008

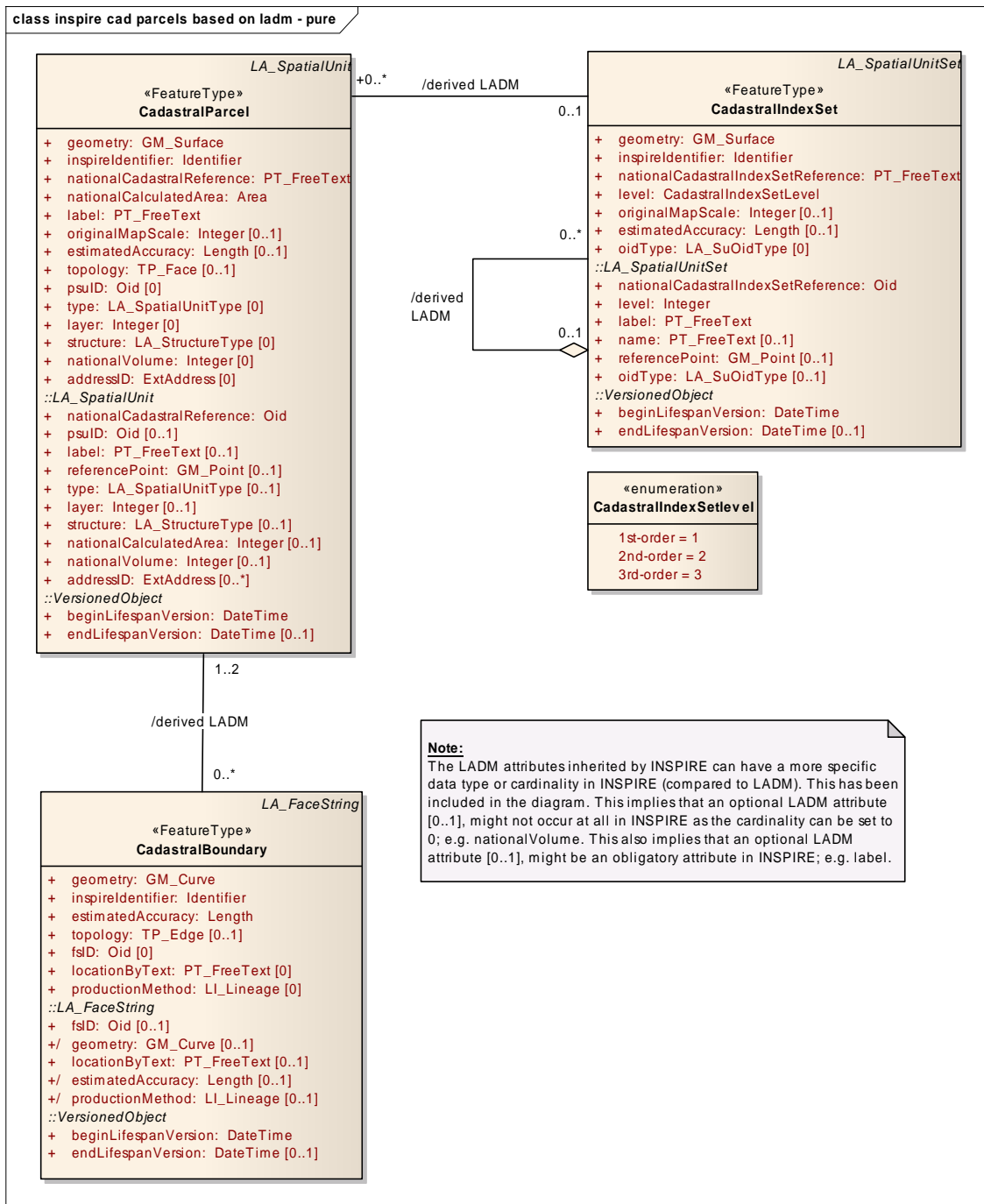
37

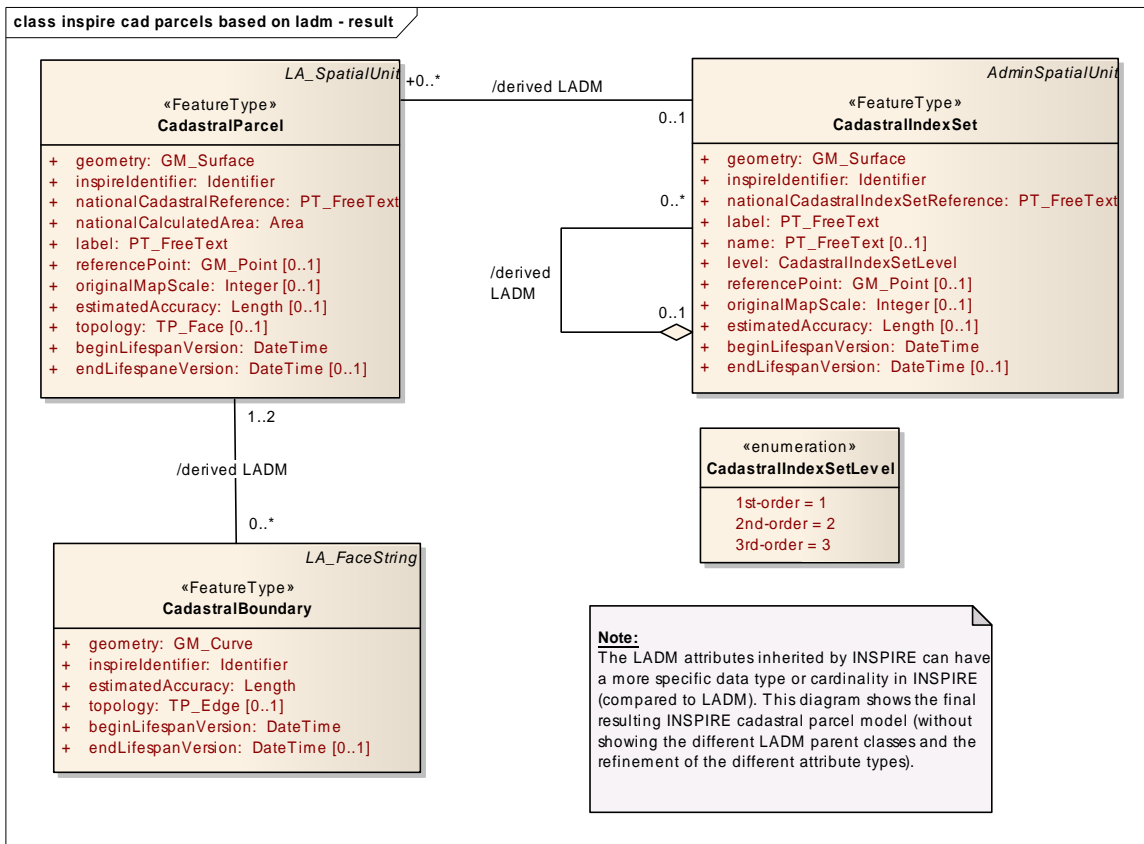
Annex L

Peter van Oosterom. LADM-based version of INSPIRE cadastral parcels, Annex F of ISO/WD 19152.3, Geographic information — Land Administration Domain Model (LADM), 14 November 2008.

1 LADM and INSPIRE (p.m.)

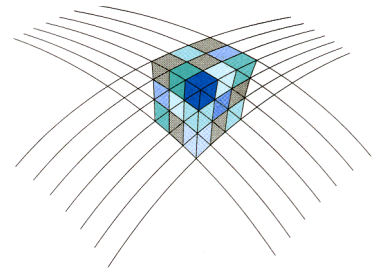
To be included in future ISO 19152 (as Annex G): a LADM-based version of INSPIRE cadastral parcels, showing that the INSPIRE development fits within the LADM and that there are no inconsistencies. When the implementing rule and guidance material for INSPIRE cadastral parcels are published (target date 15 may 2009), then this annex will be completed.





Annex M

Jaap Besemer en Peter van Oosterom, INSPIRE, Notitie voor de KNAW (Koninklijke Nederlandse Akademie van Wetenschappen)/ NCG (Nederlandse Commissie voor Geodesie), Delft, 26 oktober 2008.



INSPIRE

Jaap Besemer en Peter van Oosterom, 26-10-2008

1. INSPIRE, inhoud

Op 15 mei 2007 is richtlijn 2007/2/EG, genaamd INSPIRE, in werking getreden. Het doel van de richtlijn is een wettelijk kader te creëren voor de oprichting en de werking van een infrastructuur voor ruimtelijke informatie in Europa ter ondersteuning van het communautaire milieubeleid. Het doel van de infrastructuur is de opstelling, uitvoering en evaluatie van communautaire beleidsmaatregelen en het toezicht op deze maatregelen op alle niveaus te vergemakkelijken en informatie te verschaffen aan de burgers. Dit moet gebeuren door de exploitatiemogelijkheden van reeds beschikbare gegevens te vergroten. De richtlijn is gericht op ondersteuning van het communautaire milieubeleid en beleidsmaatregelen die direct of indirect van invloed zijn op het milieu. De richtlijn heeft betrekking op de aanwezigheid en bijhouding van metagegevens en stelt, zij het op hoog abstractieniveau, eisen aan de interoperabiliteit van verzamelingen ruimtelijke gegevens en van diensten met betrekking tot ruimtelijke gegevens. Het gaat op dit punt om zaken als harmonisatie en uitwisselbaarheid. De richtlijn eist ten derde, dat de lidstaten zorgen voor zaken als zoekdiensten, raadpleegdiensten, up- en downloaddiensten en verwerkingsdiensten, die gemakkelijk bruikbaar en toegankelijk zijn via internet of via andere telecommunicatiemiddelen waarover het brede publiek beschikt. De diensten moeten aan bepaalde kwaliteitseisen voldoen. De toegankelijkheid mag alleen beperkt worden uit overwegingen van veiligheid, privacy en bescherming van bepaalde belangen, zoals een behoorlijke rechtsgang. Zoek- en raadpleegdiensten dienen voor het publiek gratis te zijn.

Ten aanzien van de overige diensten is de vraag of deze gratis zullen zijn of tegen betaling geleverd worden in beginsel een zaak van de lidstaten.

In de vierde plaats legt de richtlijn aan de lidstaten op om maatregelen goed te keuren voor het uitwisselen van verzamelingen ruimtelijke gegevens en diensten met betrekking tot ruimtelijke gegevens tussen overheidsinstanties. Gebruiksbeperkingen van met name commerciële, procedurele, juridische, institutionele of financiële aard mogen daarbij niet worden opgelegd. Tenslotte eist de richtlijn, dat de lidstaten een aantal maatregelen treffen om tot coördinatie te komen.

De richtlijn gaat over een groot aantal ruimtelijke gegevenssoorten, zoals coördinatenstelsels, geografische gridsystemen, geografische namen, administratieve eenheden, vervoersnetwerken, hydrografische elementen, beschermingszones, hoogtemodellen, eigendomsidentificatoren, kadastrale percelen, bodembedekkinggegevens, orthobeeldvormingsgegevens (in totaal 34, zie bijlage A). De verschillende thema's zijn georganiseerd in drie annexen waar verschillende regels en tijdschema's voor gelden.

De richtlijn zal vooral effect hebben op de standaardisatie van de meer technische kant van de geoinformatie infrastructuur. Het beleidseffect, bijvoorbeeld op leveringsvoorwaarden en prijsbeleid, is vermoedelijk redelijk marginaal.

Hoewel de richtlijn formeel gericht is op ondersteuning van het communautaire milieubeleid en beleidsmaatregelen die direct of indirect van invloed zijn op het milieu, zitten wellicht de grootste baten niet op Europees niveau, maar op nationaal en lokaal niveau. Ook is gezien de aard van de 34 gedefinieerde geografische thema's te verwachten dat de gebruikers niet alleen uit de milieuhoeke zullen komen.

2. Uitwerking, Europese uitvoeringsregelgeving

De richtlijn moet op onderdelen op Europees niveau worden uitgewerkt. Dat is nu gaande. Belangrijke praktische zaken, zowel op technisch als op niet-technisch vlak, moeten volgens een bepaald tijdschema, zoals in de INSPIRE richtlijn aangegeven, eerst worden afgesproken. De resultaten hiervan worden vastgesteld in zogenaamde 'regels voor de tenuitvoerlegging', in het Engels 'implementing rules'. Hieronder staat een tabel waarin voor metadata en data het tijdschema is weergegeven. Dit betreffen steeds de uiterste termijnen voor de uitvoering van INSPIRE richtlijn (in aantallen jaren na 15 mei 2007, laatste deadline is 12 jaar later, dus uiterlijk 15 mei 2019 zou INSPIRE geheel ingevoerd moeten zijn):

	Regels voor de tenuitvoerlegging (metadata)	Metadata zelf (+ na regels)	Regels voor de tenuitvoerlegging (data)	Nieuwe data (+ na regels)	Bestaande Data (+ na regels)
Annex I	1	(+ 2 =) 3	2	(+ 2 =) 4	(+ 7 =) 9
Annex II	1	(+ 2 =) 3	5	(+ 2 =) 7	(+ 7 =) 12
Annex III	1	(+ 5 =) 6	5	(+ 2 =) 7	(+ 7 =) 12

De regels voor de tenuitvoerlegging van metadata zijn inmiddels al vastgesteld.

De metadata zelf voor de annex I en II thema's moeten nu uiterlijk 15 mei 2010 beschikbaar zijn. Voor data zelf wordt er op dit moment nog hard gewerkt aan de 9 Annex I thema's met als doel de data product specificaties uiterlijk 15 mei 2009 gereed te hebben. Hierbij moet worden opgemerkt dat annex I thema's bevat die over het algemeen meer als referentie worden gezien, denk hierbij vooral Coördinaten referentiesystemen en Geografische grids. Nieuwe data binnen een bepaald annex I thema moeten dan uiterlijk 15 mei 2011 volgens de INSPIRE product specificatie worden geleverd (bestaande data moeten uiterlijk binnen nog eens 5 jaar later te leveren zijn volgens de INSPIRE richtlijn).

In het najaar van 2008 worden de Annex I concept specificaties voor het eerst extern bekend gemaakt, waarbij deze vervolgens getest kunnen worden door betrokken partijen.

De testresultaten en het overige ontvangen commentaar zal dan worden gebruikt door het definitief vaststellen van de data product specificaties. In de data product specificaties worden zaken vastgelegd als het model (applicatieschema, objecten en attributen catalogus), referentiesystemen, data kwaliteit (actualiteit, nauwkeurigheid, compleetheid, consistentie, etc.), leveringsmechanismen en formaten, standaard weergave of visualisatieregels, etc. De annex II en III data product specificaties moeten uiterlijk gereed zijn op 15 mei 2012.

Op dit moment (2008) wordt bij de herziening van het Nederlandse NEN3610 'basismodel Geo-informatie' al rekening gehouden met de INSPIRE harmonisatie. Zodat vervolgens bij de revisie van de Nederlandse standaard informatiemodellen, op NEN3610 gebaseerd, deze dan al dichterbij INSPIRE komen te liggen; denk hierbij aan topografie (IMTOP/IMGEO/TOP10NL) en informatiemodellen voor ruimtelijke ordening (IMRO), water (IMWA), kabels en leidingen (IMKL), welstand (IMWE), cultuurhistorie (IMKICH), bodem en landschap (IMBOD), kadaster (IMKAD) en openbare orde en veiligheid (IMOOV).

Naast data en metadata wordt er nog op drie andere terreinen gewerkt aan de regels voor de tenuitvoerlegging, te weten de netwerkservices, data en service sharing en monitoring en reporting. De laatste twee set regels betreffen niet-technische aspecten en liggen meer op het juridische, financiële en organisatorische vlak.

3. Nationale wetgeving

De richtlijn moet voorts worden omgezet in nationale wetgeving. Die zou uiterlijk op 15 mei 2009 in werking moeten treden. De Nederlandse regering heeft een wetsvoorstel in voorbereiding om aan deze verplichting te voldoen. Het wetsvoorstel is nog niet bij de Tweede Kamer aanhangig gemaakt. Voordat dit wetsvoorstel in werking kan treden, zal er ook nog de nodige uitvoeringsregelgeving tot stand gebracht moeten worden. De inhoud hiervan is deels afhankelijk van de uitvoeringsregelgeving op Europees niveau.

Zodra alle regelgeving tot stand is gebracht en in werking getreden, zal, zoals gezegd, het effect op de technische kant van de geo-informatie infrastructuur fors zijn. In onze opvatting gaat de richtlijn in ieder geval uit een oogpunt van techniek/technische toepassingen standaardiseren. Welke technische oplossingen worden gekozen, zal voor een goed deel bepaald worden in de uitwerkingsregelgeving op Europees niveau. Het effect op juridische, financiële en institutionele vraagstukken is lastiger in te schatten.

Nederland heeft als beleidslijn Europese regelgeving letterlijk te volgen, m.a.w. Nederland regelt wat er geregeld moet worden, niet minder (dat zou ook niet mogen) en niet meer. Dat gebeurt ook nu. Daarbij doet Nederland verrassend een extraatje.

INSPIRE schrijft voor, dat de Commissie op communautair niveau een INSPIRE-geoportaal opzet en exploiteert. De lidstaten moeten via tenminste dat portaal toegang verlenen tot de diverse voorgeschreven hiervoor genoemde diensten. Zij mogen die toegang ook verlenen via hun eigen 'toegangspunten'. Het wetsvoorstel schrijft inrichting van een nationaal toegangspunt voor. Nederland maakt dus gebruik van de ruimte in dit opzicht in de richtlijn maar beperkt de toegang meteen door te kiezen voor een toegangspunt.

Gelet op het tempo, waarin de wetgeving en overige regelgeving tot stand lijken te worden gebracht en de afhankelijkheden daarin is inwerkingtreding van het gehele complex per 15 mei 2009 volstrekt onhaalbaar.

4. INSPIRE en de NCG

De keuzen hoe de geo-informatie infrastructuur er informatietechnologisch uit gaat zien, worden in deze tijd gemaakt. Europese keuzen zullen (feitelijk) bindend zijn voor nationale. VROM werkt uit de invoering van INSPIRE in Nederland en levert, deels via de wetenschap (prof.dr. P. van Oosterom), zijn bijdrage op Europees niveau. GEONOVUM is aangewezen als centraal punt voor de invoering van INSPIRE in Nederland onder politieke verantwoordelijkheid van VROM. Het is nog niet duidelijk wie het nationale geo-portaal gaat beheren.

Voor de NCG rijst de vraag of zij haar diensten wil aanbieden bij de thans lopende werkzaamheden op Europees en nationaal niveau en, zo ja, welke dat dan zijn.

De Nederlandse tekst van de INSPIRE richtlijn is te vinden in het Publicatieblad van de Europese Unie en via het Internet beschikbaar:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:108:0001:0014:NL:PDF>

Bijlage A

De 34 geografische thema's van INSPIRE

Annex I:

1. Coördinaten referentiesystemen
2. Geografische grids
3. Geografische namen
4. Administratieve eenheden
5. Adressen
6. Kadastrale percelen
7. Vervoersnetwerken
8. Hydrografie
9. Milieubeschermingzones

Annex II:

1. Hoogte
2. Bodembedekking
3. Orthobeelden
4. Geologie

Annex III:

1. Statistische eenheden
2. Gebouwen
3. Bodem
4. Landgebruik
5. Menselijke gezondheid en veiligheid
6. Nuts- en Overheidsdiensten
7. Milieubewakingsfaciliteiten
8. Productie- en industriële faciliteiten
9. Faciliteiten voor landbouw en aquacultuur
10. Bevolkingsspreiding en demografie
11. Gebiedsbeheer
12. Gebieden met natuurrisico's
13. Atmosferische omstandigheden
14. Meteorologische kenmerken
15. Oceanografische kenmerken
16. Zeegebieden
17. Bio-geografische gebieden
18. Habitats en biotopen
19. Spreiding van soorten
20. Energiebronnen
21. Minerale bronnen

Annex N

Peter van Oosterom. INSPIRE Thema Werkgroep Groep kadastrale percelen. GDMC Nieuwsbrief april/mei 2008 (in Dutch, Elfriede M. Fendel, Ed.) In: Vi Matrix, Volume 16, 2, pp. 34-35.

Wereldwijde belangstelling voor Kadasters

maart/april 2008

In deze nieuwsbrief staat het thema Kadaster en Landadministratie centraal. Een aantal ontwikkelingen rondom modelering en systeemontwikkeling komt aan de orde. Landadministratie staat wereldwijd volop in de belangstelling, een goede landadministratie draagt bij aan goed bestuur. Geo-ICT draagt bij aan de oplossingen en daar ligt een belangrijke rol voor het GDMC.

INSPIRE Thema Werkgroep Groep kadastrale percelen

Na een aantal jaren van voorbereidingen op het gebied van INSPIRE, zijn op 14 en 15 februari 2008 de verschillende themawerkgroepen (TWGs) gestart met het maken van dataspecificaties voor de zogenaamde annex I-thema's, waaronder ook de kadastrale percelen vallen. Het INSPIRE drafting team dataspecificatie heeft al de nodige basisdocumenten opgeleverd, zoals:

- de uitgebreidere tekstuele beschrijving van de verschillende thema's en hun samenhang (D2.3),
- een generiek conceptueel model met algemene zaken als unieke objectidentificaties, temporele objecten, etc. (D2.5),
- een methodiek voor het maken van de dataproductspecificatie (D2.6), en:
- de codering van de data bij uitwisseling op basis van XML schema (D2.7).



Nog voor het einde van dit jaar moet de TWG kadastrale percelen, waaraan het GDMC een belangrijke bijdrage levert, een productbeschrijving maken uitgaande van de analyse van de gebruikersbehoeften en van de bestaande registraties van kadastrale percelen binnen de EU lidstaten. Op basis hiervan wordt getracht een geharmoniseerd model te maken. Dit model wordt ontwikkeld in Unified Modeling Language en zal bestaan uit een UML 'class diagram' met bijbehorende objecten- en attributen-catalogus. Naast de eerder genoemde analyses wordt hierbij ook gebruik gemaakt van ingediend referentiemateriaal, zoals het Land Administration Domain Model (zie elders in deze nieuwsbrief). Een bijzondere uitdaging is, naast de harmonisatie van de gegevens bij representatie van kadastrale percelen in 27 landen, ook de afstemming

van de kadastrale percelen met andere thema's binnen INSPIRE. Denk hierbij aan administratieve gebieden, geografische namen, adressen, transportnetwerken (wegen), gebouwen, grondgebruik, etc. Nadat de nodige instanties commentaar hebben geleverd, zal het geheel aan juristen van de Europese Unie worden overgedragen. Deze zullen dan uiterlijk 15 mei 2009 de regels voor de tenuitvoerlegging moeten produceren, die dan per 15 mei 2011 van kracht worden. Peter van Oosterom maakt in aanvulling op zijn lidmaatschap van het drafting team dataspecificatie nu ook deel uit van de TWG kadastrale percelen. Er zijn nog twee Nederlanders betrokken bij andere TWGs en wel Yvette Ellenkamp (ministerie van VROM bij het thema adressen) en Huibert-Jan Lekkerkerk (IDSW bij het thema hydrografie).

Gastpromovendi uit Turkije



Op dit moment zijn bij de TU Delft/het GDMC twee promovendi van de Karadeniz Technical University, Trabzon, Turkije te gast: Halil Ibrahim Inan en Fatih Doner. Beiden doen onderzoek op kadastergerelateerde thema's. Halil Ibrahim Inan kijkt naar de (mogelijke) relatie tussen de landbouw en de kadastrale percelenregistraties. Fatih Doner onderzoekt de opzet van een 3D/4D Kadaster in de context van de Geo-Informatie Infrastructuur (GII). In deze GII-gebaseerde aanpak wordt het temporele aspect belangrijk, omdat het ene systeem verwijst naar objecten in een ander systeem. Gedurende het onderzoek van Fatih zullen testen worden gedaan met zowel de Turkse als Nederlandse situatie.

Landadministratie en conflictafhandeling

Deze zomer komt het boek 'Registering the Human Terrain: A Valuation of Cadastre' uit. Het is geschreven door Douglas E. Batson, van de US National Defense Intelligence College, Washington DC. Het is het resultaat van een onderzoek met een bijdrage vanuit het GDMC, het Kadaster en het ITC. Batson constateert dat land enerzijds vaak een wezenlijke factor is bij het ontstaan van gewelddadige conflicten, maar anderzijds ook een kritiek onderdeel is bij vredesonderhandelingen en economische wederopbouw na een conflict. In het boek wordt onderzocht op welke wijze kadastrale informatie gebruikt kan worden bij voorspelling van conflicten. Er wordt besproken op welke wijze gebruik van kadastrale data kan bijdragen bij herstel na oorlogen.

Er wordt nagegaan op welke wijze de oorzaken van conflicten in de 21e eeuw en ook de grondgerelateerdheid daarvan een rol spelen, zoals snelle verstedelijking, gewelddadige verdrijvingen en een gebrek aan rechtszekerheid. Batson herkent dat er tot op heden geen internationaal erkende standaard voor landadministratiesystemen bestaat. Maar volgens hem is het 'Land Administration Domain Model' (LADM) flexibel genoeg om zowel de in de Westerse landen gebruikelijke landrechten als ook de gewoonterrechten en informele rechten - zoals de traditionele rechten in minder ontwikkelde landen - te registreren. Volgens Batson verdient het model de aandacht van de NATO, het Amerikaanse Ministerie van Defensie en de Amerikaanse Ontwikkelingsautoriteit (USAID), omdat het één van de belangrijkste hulpmiddelen van landadministratie vertegenwoordigt, en wel in het bijzonder in landen waar deze administratie niet functioneert of afwezig is.

Model Driven Architecture en constraints



João Paulo da Fonseca Hespanha de Oliveira (University of Aveiro, Portugal) is bij de TU Delft bezig met promotieonderzoek op het gebied van Geo-ICT/Kadaster. Samen met Jaap Zevenbergen (TU Delft) en Jesper Paasch (Lantmateriet, Zweden) heeft hij het juridische gedeelte van het LADM verder uitgewerkt. Tevens heeft hij een specialisatie van het model gemaakt voor de situatie in Portugal: LADM-P. João is bezig met het semantisch verfijnen van het LADM via geldigheidsregels die aan het model met objectklassen, attributen, associaties en operaties in UML worden toegevoegd door middel van OCL, 'Object Constraint Language'. Vervolgens wordt getracht om zo automatisch mogelijk uit dit verfijnde LADM-P model een databaseschema af te leiden, volgens de principes van de 'Model Driven Architecture'. Aandachtspunten zijn hierbij het vertalen van de geldigheidsregels en het ervoor te zorgen dat de ruimtelijke attributen ook goed in het databaseschema komen.



Gerelateerd onderzoek wordt verricht door Jan van Benekom-Minnema, adviseur bij het Deense COWI A/S. Hij kijkt voor zijn afstuderen naar verdere uitwerking van het landmeetkundig deel van het LADM met als één van de doelen het kunnen uitvoeren van een analyse van gemeten punten en hun tegenhangers in de kadastrale kaart. Ook hij is bezig met de modelgedreven aanpak en kijkt hierbij specifiek naar het omgaan met geldigheidsregels.

Samenwerking met UN Habitat

Standaardisatie van kadasters is zeer belangrijk voor ontwikkelingslanden. Onduidelijkheid over eigendom en grondgebruik betekent dat er onvoldoende basis is voor ruimtelijke planning en in de praktijk resulteert dit in ongecontroleerde verstedelijking. Er zijn vaak heel veel grondgerelateerde conflicten, wat de ontwikkeling niet ten goede komt. Sommigen zijn in deze omstandigheden in staat grondroof te plegen. En: bijna een miljard mensen wonen in sloppenwijken. De inrichting van kadasters draagt bij aan de rechtszekerheid en een betere basis voor planning. Voor verschillende gebieden kan zo'n kadaster verschillend worden ingericht. In een sloppenwijk ziet het er anders uit dan in gebieden waar het gewoonterrecht van toepassing is. En daar weer anders dan in gekoloniseerde gebieden. Al deze opties zijn mede uitgangspunt geweest bij het ontwerp van het zgn. Social Tenure Domain Model (STDM), een specialisatie van het LADM. Dit Social Tenure Domain Model wordt in samenwerking tussen het GDMC, het Kadaster en UN Habitat te Nairobi ontwikkeld. Vorig jaar is dit model tijdens verschillende sessies in Nairobi voorgesteld. Ook is het model pas geleden geïntroduceerd bij de Wereldbank in Washington. Testen van het model op het Afrikaanse continent zijn gepland. De behoefte aan goede software voor het opzetten van kadasters in ontwikkelingslanden is enorm. Daarnaast is er ook belangstelling van de UN-FAO 'Food and Agriculture Organization' met nadruk op het realiseren van open source oplossingen.

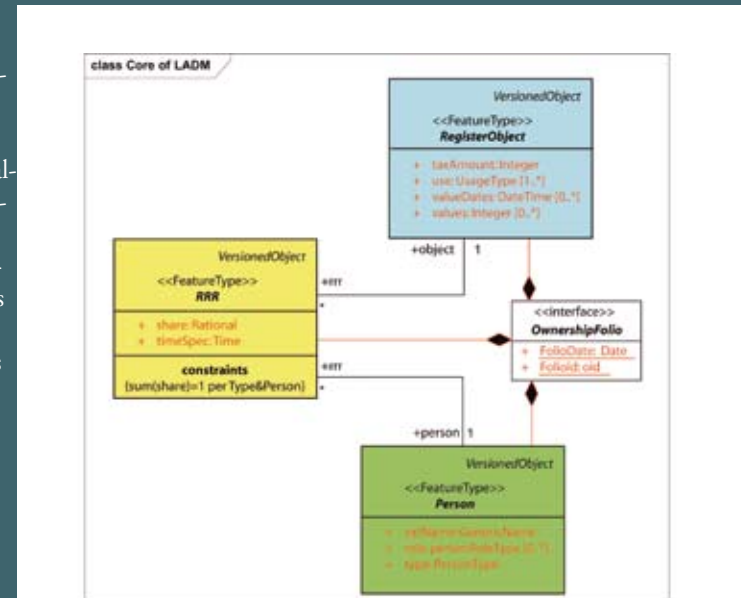
Land Administration Domain Model ingediend bij ISO

Bij de ontwikkeling van landadministraties heeft vrijwel ieder land een eigen benadering gekozen. Dit geldt zowel voor de procedures bij vastgoedtransacties als voor de gegevens die worden opgeslagen in het systeem - en de betekenis van die gegevens. Dit maakt gegevenswisseling tussen landen niet makkelijk. Verder is de ervaring in landen met een geautomatiseerd kadastraal systeem, dat de systeemontwikkeling een kostbare zaak is, elk systeem is immers uniek. Toch zijn er behalve verschillen tussen kadasters en kadastrale systemen vooral ook veel overeenkomsten: het gaat overall over de relaties tussen mensen en grond. Daarom is de Commissie Cadastre & Land Management van de Internationale Landmeters Federatie in 2002 begonnen met de ontwikkeling van een Land Administration Domain Model (LADM). Dit initiatief is genomen door Peter van Oosterom (TU Delft) en Chrit Lemmen (Kadaster/ITC). Dit model zou als standaard voor alle landen in de wereld kunnen dienen. Dit is van belang bij gegevensuitwisseling, bijvoorbeeld binnen Europa, denk aan INSPIRE. En ook voor de inrichting van kadasters in ontwikkelingslanden.

Inmiddels heeft dit model redelijk vorm gekregen en daarom is het in januari 2008 bij de ISO Technische Commissie 211 (geo-informatie) ingediend in de vorm van een zogenaamd 'New Work Item Proposal - NWIP'. De voorgestelde internationale standaard beschrijft zowel de 'administratieve/juridische' component als de 'ruimtelijke/landmeetkundige' component van landadministratie.

Het model omvat de gemeenschappelijke aspecten van kadastrale registratie in de verschillende nationale en internationale systemen. Er is getracht het model zo eenvoudig mogelijk te houden om de praktische toepasbaarheid te stimuleren. Het LADM moet harmonisatie en daardoor ook zinnige cross-border gegevensuitwisseling mogelijk maken. Het LADM dient twee belangrijke doelen: het voorkomen van het steeds weer herontdekken en herhaaldelijk implementeren van dezelfde functionaliteit en het mogelijk maken van zinvolle communicatie voor de verschillende partijen zowel binnen een land als tussen landen op basis van een gedeeld begrippenkader, dus een ontologie zoals door het model wordt geïmplementeerd.

Vóór 1 mei 2008 moeten de ISO TC211 leden met stemrecht aangeven of ze het NWIP LADM ondersteunen, d.w.z. er moeten meer voor- dan tegenstemmers zijn. Tevens zullen er minimaal uit 5 verschillende landen experts genomineerd moeten worden voor de uitwerking van het LADM. Een spannende periode.



Het hart van het LADM: Person, RRR (Right, Restriction, Responsibility) & RegisterObject.

Redactie

Elfriede M. Fendel, (projectmanager sectie GIS-technologie):
tel. 015-278 4548, e-mail e.m.fendel@tudelft.nl
www.gdmc.nl



Eerder verschenen rapporten in deze reeks

1. GISSt Report No. 1, Oosterom, P.J. van, Research issues in integrated querying of geometric and thematic cadastral information (1), Delft University of Technology, Rapport aan Concernstaf Kadaster, Delft 2000, 29 p.p.
2. GISSt Report No. 2, Stoter, J.E., Considerations for a 3D Cadastre, Delft University of Technology, Rapport aan Concernstaf Kadaster, Delft 2000, 30 p.
3. GISSt Report No. 3, Fendel, E.M. en A.B. Smits (eds.), Java GIS Seminar, Opening GDMC, Delft 15 November 2000, Delft University of Technology, GISSt. No. 3, 25 p.p.
4. GISSt Report No. 4, Oosterom, P.J.M. van, Research issues in integrated querying of geometric and thematic cadastral information (2), Delft University of Technology, Rapport aan Concernstaf Kadaster, Delft 2000, 29 p.p.
5. GISSt Report No. 5, Oosterom, P.J.M. van, C.W. Quak, J.E. Stoter, T.P.M. Tijssen en M.E. de Vries, Objectgerichtheid TOP10vector: Achtergrond en commentaar op de gebruikersspecificaties en het conceptuele gegevensmodel, Rapport aan Topografische Dienst Nederland, E.M. Fendel (eds.), Delft University of Technology, Delft 2000, 18 p.p.
6. GISSt Report No. 6, Quak, C.W., An implementation of a classification algorithm for houses, Rapport aan Concernstaf Kadaster, Delft 2001, 13 p.
7. GISSt Report No. 7, Tijssen, T.P.M., C.W. Quak and P.J.M. van Oosterom, Spatial DBMS testing with data from the Cadastre and TNO NITG, Delft 2001, 119 p.
8. GISSt Report No. 8, Vries, M.E. de en E. Verbree, Internet GIS met ArcIMS, Delft 2001, 38 p.
9. GISSt Report No. 9, Vries, M.E. de, T.P.M. Tijssen, J.E. Stoter, C.W. Quak and P.J.M. van Oosterom, The GML prototype of the new TOP10vector object model, Report for the Topographic Service, Delft 2001, 132 p.
10. GISSt Report No. 10, Stoter, J.E., Nauwkeurig bepalen van grondverzet op basis van CAD ontgravingsprofielen en GIS, een haalbaarheidsstudie, Rapport aan de Bouwdienst van Rijkswaterstaat, Delft 2001, 23 p.
11. GISSt Report No. 11, Geo DBMS, De basis van GIS-toepassingen, KvAG/AGGN Themamiddag, 14 november 2001, J. Flim (eds.), Delft 2001, 37 p.
12. GISSt Report No. 12, Vries, M.E. de, T.P.M. Tijssen, J.E. Stoter, C.W. Quak and P.J.M. van Oosterom, The second GML prototype of the new TOP10vector object model, Report for the Topographic Service, Delft 2002, Part 1, Main text, 63 p. and Part 2, Appendices B and C, 85 p.
13. GISSt Report No. 13, Vries, M.E. de, T.P.M. Tijssen en P.J.M. van Oosterom, Comparing the storage of Shell data in Oracle spatial and in Oracle/ArcSDE compressed binary format, Delft 2002, 72 p. (Confidential)
14. GISSt Report No. 14, Stoter, J.E., 3D Cadastre, Progress Report, Report to Concernstaf Kadaster, Delft 2002, 16 p.
15. GISSt Report No. 15, Zlatanova, S., Research Project on the Usability of Oracle Spatial within the RWS Organisation, Detailed Project Plan (MD-NR. 3215), Report to Meetkundige Dienst – Rijkswaterstaat, Delft 2002, 13 p.
16. GISSt Report No. 16, Verbree, E., Driedimensionale Topografische Terreinmodellering op basis van Tetraëder Netwerken: Top10-3D, Report aan Topografische Dienst Nederland, Delft 2002, 15 p.
17. GISSt Report No. 17, Zlatanova, S. Augmented Reality Technology, Report to SURFnet bv, Delft 2002, 72 p.
18. GISSt Report No. 18, Vries, M.E. de, Ontsluiting van Geo-informatie via netwerken, Plan van aanpak, Delft 2002, 17 p.
19. GISSt Report No. 19, Tijssen, T.P.M., Testing Informix DBMS with spatial data from the cadastre, Delft 2002, 62 p.
20. GISSt Report No. 20, Oosterom, P.J.M. van, Vision for the next decade of GIS technology, A research agenda for the TU Delft the Netherlands, Delft 2003, 55 p.
21. GISSt Report No. 21, Zlatanova, S., T.P.M. Tijssen, P.J.M. van Oosterom and C.W. Quak, Research on usability of Oracle Spatial within the RWS organisation, (AGI-GAG-2003-21), Report to Meetkundige Dienst – Rijkswaterstaat, Delft 2003, 74 p.
22. GISSt Report No. 22, Verbree, E., Kartografische hoogtevoorstelling TOP10vector, Report aan Topografische Dienst Nederland, Delft 2003, 28 p.
23. GISSt Report No. 23, Tijssen, T.P.M., M.E. de Vries and P.J.M. van Oosterom, Comparing the storage of Shell data in Oracle SDO_Geometry version 9i and version 10g Beta 2 (in the context of ArcGIS 8.3), Delft 2003, 20 p. (Confidential)
24. GISSt Report No. 24, Stoter, J.E., 3D aspects of property transactions: Comparison of registration of 3D properties in the Netherlands and Denmark, Report on the short-term scientific mission in the CIST – G9 framework at the Department of Development and Planning, Center of 3D geo-information, Aalborg, Denmark, Delft 2003, 22 p.
25. GISSt Report No. 25, Verbree, E., Comparison Gridding with ArcGIS 8.2 versus CPS/3, Report to Shell International Exploration and Production B.V., Delft 2004, 14 p. (confidential).
26. GISSt Report No. 26, Penninga, F., Oracle 10g Topology, Testing Oracle 10g Topology with cadastral data, Delft 2004, 48 p.
27. GISSt Report No. 27, Penninga, F., 3D Topography, Realization of a three dimensional topographic terrain representation in a feature-based integrated TIN/TEN model, Delft 2004, 27 p.
28. GISSt Report No. 28, Penninga, F., Kartografische hoogtevoorstelling binnen TOP10NL, Inventarisatie mogelijkheden op basis van TOP10NL uitgebreid met een Digitaal Hoogtemodel, Delft 2004, 29 p.
29. GISSt Report No. 29, Verbree, E. en S.Zlatanova, 3D-Modeling with respect to boundary representations within geo-DBMS, Delft 2004, 30 p.
30. GISSt Report No. 30, Penninga, F., Introductie van de 3e dimensie in de TOP10NL; Voorstel voor een onderzoekstraject naar het stapsgewijs introduceren van 3D data in de TOP10NL, Delft 2005, 25 p.
31. GISSt Report No. 31, P. van Asperen, M. Grothe, S. Zlatanova, M. de Vries, T. Tijssen, P. van Oosterom and A. Kabamba, Specificatie datamodel Beheerkaart Nat, RWS-AGI report/GISSt Report, Delft, 2005, 130 p.
32. GISSt Report No. 32, E.M. Fendel, Looking back at Gi4DM, Delft 2005, 22 p.
33. GISSt Report No. 33, P. van Oosterom, T. Tijssen and F. Penninga, Topology Storage and the Use in the context of consistent data management, Delft 2005, 35 p.

34. GISSt Report No. 34, E. Verbree en F. Penninga, RGI 3D Topo - DP 1-1, Inventarisatie huidige toegankelijkheid, gebruik en mogelijke toepassingen 3D topografische informatie en systemen, 3D Topo Report No. RGI-011-01/GISSt Report No. 34, Delft 2005, 29 p.
35. GISSt Report No. 35, E. Verbree, F. Penninga en S. Zlatanova, Datamodellering en datastructurering voor 3D topografie, 3D Topo Report No. RGI-011-02/GISSt Report No. 35, Delft 2005, 44 p.
36. GISSt Report No. 36, W. Looijen, M. Uitentuis en P. Bange, RGI-026: LBS-24-7, Tussenrapportage DP-1: Gebruikerswensen LBS onder redactie van E. Verbree en E. Fendel, RGI LBS-026-01/GISSt Rapport No. 36, Delft 2005, 21 p.
37. GISSt Report No. 37, C. van Strien, W. Looijen, P. Bange, A. Wilcsinszky, J. Steenbruggen en E. Verbree, RGI-026: LBS-24-7, Tussenrapportage DP-2: Inventarisatie geo-informatie en -services onder redactie van E. Verbree en E. Fendel, RGI LBS-026-02/GISSt Rapport No. 37, Delft 2005, 21 p.
38. GISSt Report No. 38, E. Verbree, S. Zlatanova en E. Wisse, RGI-026: LBS-24-7, Tussenrapportage DP-3: Specifieke wensen en eisen op het gebied van plaatsbepaling, privacy en beeldvorming, onder redactie van E. Verbree en E. Fendel, RGI LBS-026-03/GISSt Rapport No. 38, Delft 2005, 15 p.
39. GISSt Report No. 39, E. Verbree, E. Fendel, M. Uitentuis, P. Bange, W. Looijen, C. van Strien, E. Wisse en A. Wilcsinszky en E. Verbree, RGI-026: LBS-24-7, Eindrapportage DP-4: Workshop 28-07-2005 Geo-informatie voor politie, brandweer en hulpverlening ter plaatse, RGI LBS-026-04/GISSt Rapport No. 39, Delft 2005, 18 p.
40. GISSt Report No. 40, P.J.M. van Oosterom, F. Penninga and M.E. de Vries, Trendrapport GIS, GISSt Report No. 40 / RWS Report AGI-2005-GAB-01, Delft, 2005, 48 p.
41. GISSt Report No. 41, R. Thompson, Proof of Assertions in the Investigation of the Regular Polytope, GISSt Report No. 41 / NRM-ISS090, Delft, 2005, 44 p.
42. GISSt Report No. 42, F. Penninga and P. van Oosterom, Kabel- en leidingnetwerken in de kadastrale registratie (in Dutch) GISSt Report No. 42, Delft, 2006, 38 p.
43. GISSt Report No. 43, F. Penninga and P.J.M. van Oosterom, Editing Features in a TEN-based DBMS approach for 3D Topographic Data Modelling, Technical Report, Delft, 2006, 21 p.
44. GISSt Report No. 44, M.E. de Vries, Open source clients voor UMN MapServer: PHP/Mapscript, JavaScript, Flash of Google (in Dutch), Delft, 2007, 13 p.
45. GISSt Report No. 45, W. Tegtmeier, Harmonization of geo-information related to the lifecycle of civil engineering objects – with focus on uncertainty and quality of surveyed data and derived real world representations, Delft, 2007, 40 p.
46. GISSt Report No. 46, W. Xu, Geo-information and formal semantics for disaster management, Delft, 2007, 31 p.
47. GISSt Report No. 47, E. Verbree and E.M. Fendel, GIS technology – Trend Report, Delft, 2007, 30 p.
48. GISSt Report No. 48, B.M. Meijers, Variable-Scale Geo-Information, Delft, 2008, 30 p.
49. GISSt Report No. 48, Maja Bitenc, Kajsa Dahlberg, Fatih Doner, Bas van Goort, Kai Lin, Yi Yin, Xiaoyu Yuan and Sisi Zlatanova, Utility Registration, Delft, 2008, 35 p.
50. GISSt Report No 50, T.P.M. Tijssen en S. Zlatanova, Oracle Spatial 11g en ArcGIS 9.2 voor het beheer van puntenwolken (Confidential), Delft, 2008, 16 p.
51. GISSt Report No. 51, S. Zlatanova, Geo-information for Crisis Management, Delft, 2008, 24 p.

