
Developments in the Core Cadastral Domain Model

Christiaan Lemmen

Expert Group Meeting
Bangkok 8-9 Dec 2005

Status of land administration systems

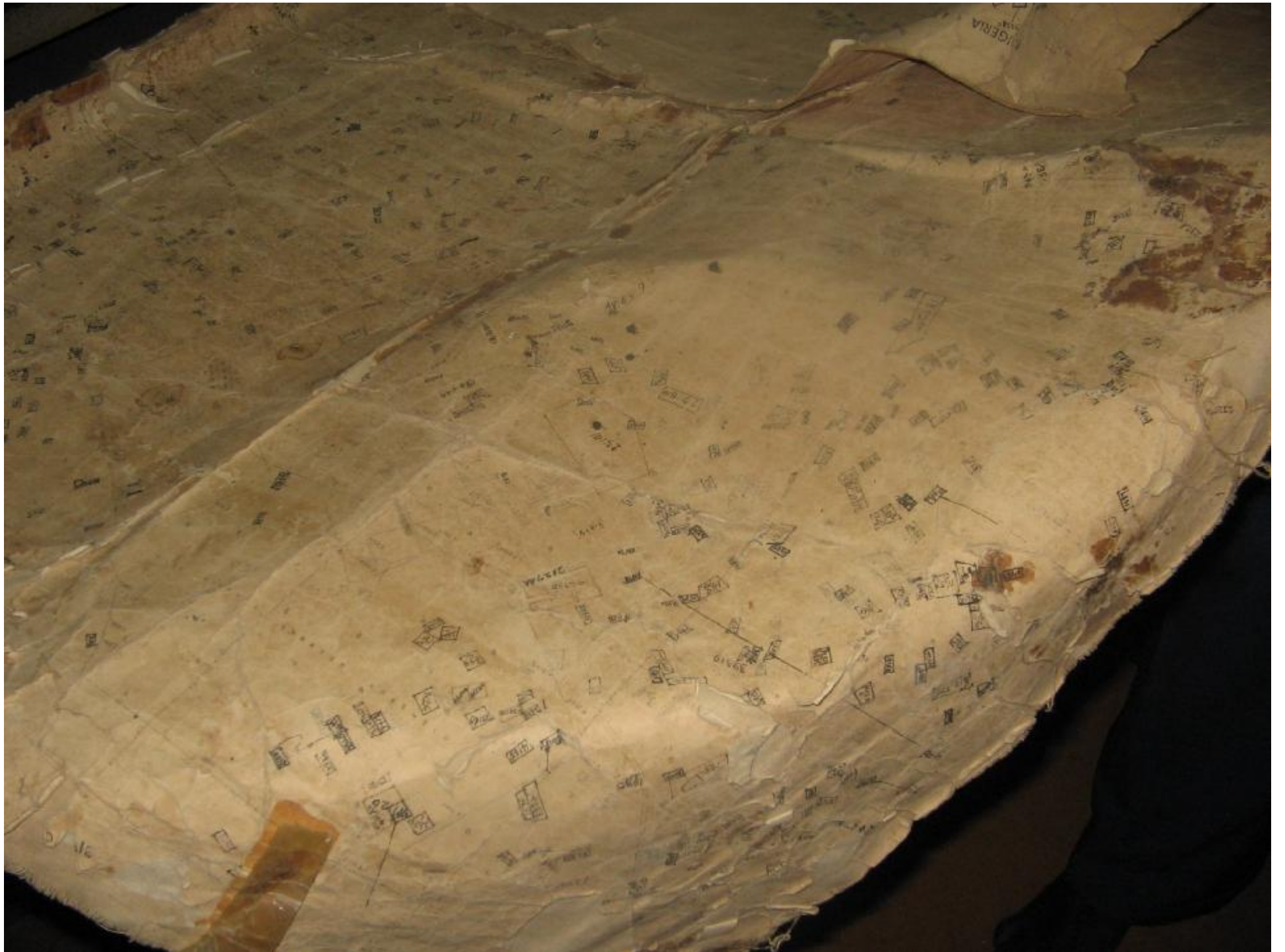
- ❑ **Industrialized countries: quite OK**
- ❑ **Central & Eastern Europe: under development**
- ❑ **Latin America: problems with land reform**
- ❑ **Africa: problems with legal pluralism**
- ❑ **Asia: under development**

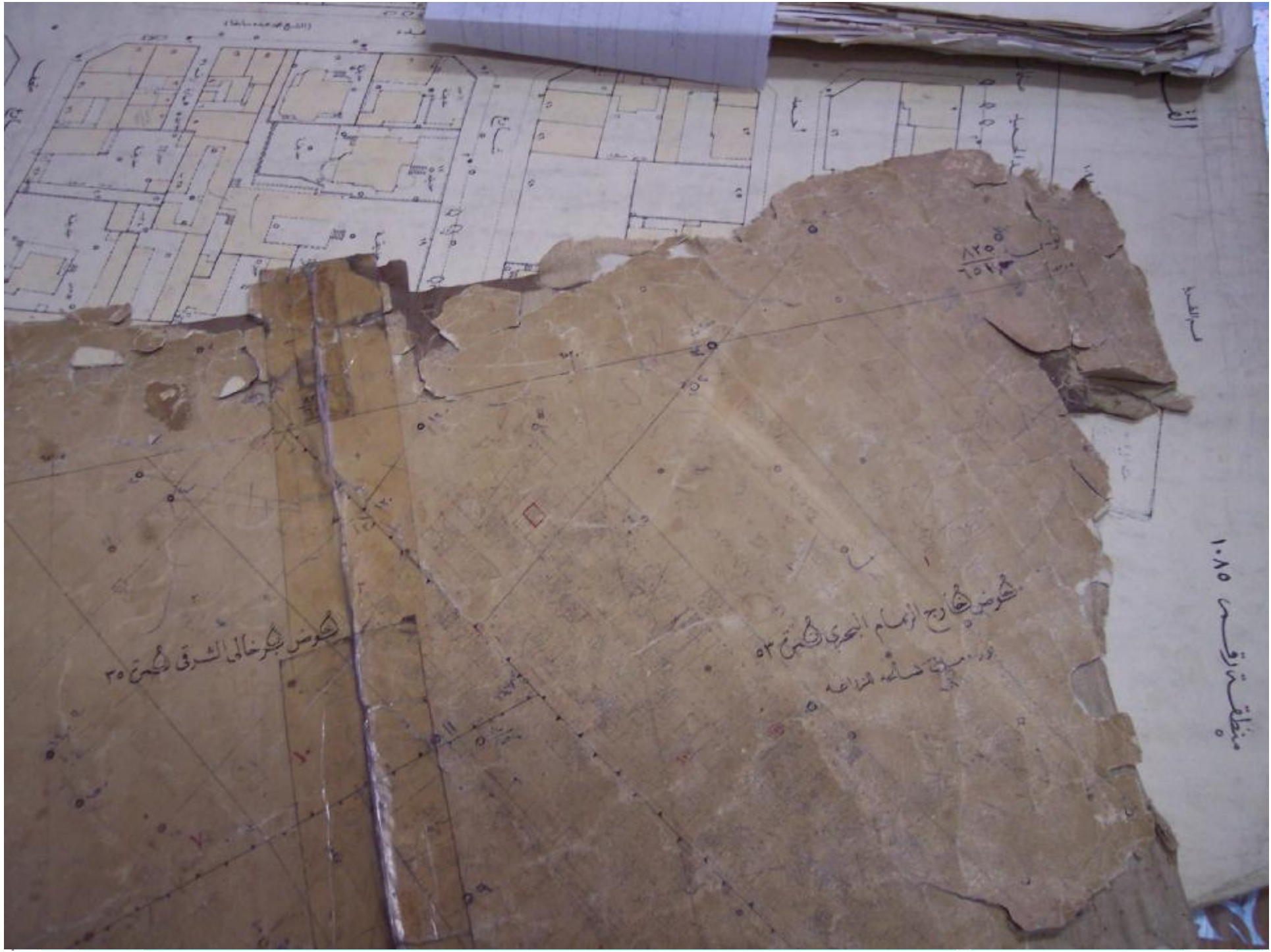
- ❑ **Overall: 50 (OK) - 150 (something) - 50 (not OK)**

ID	Status	Name	Date	1st	2nd	3rd
A597491	00SG	B. Akintayo	8/12/88	1	1	450
A590409	✓	A. Adegbamigbe & Sorollu	✓	2	2	✓
A590293	✓	D. M. Obarinji	✓	3	3	✓
A260719	✓	E. O. Soremi	12/12/88	4	4	✓
A590437	✓	A. O. Akintogunde	✓	5	5	✓
A5098	✓	V. A. Awegbisi (nee Efuntade)	14/2	6	6	✓
A3804	✓	S. Olaboyade	✓	7	7	✓
A5477	✓	E. O. Adegboye	✓	8	8	✓
A2604	✓	K. Adejumo	15/12	9	9	✓
A5540	✓	H. B. Olatun	15/12	9	9	✓
A5588	-	M. O. Ajaja	16-12-88	10	10	✓
A5415	-	L. O. Olorunfemi	19/12/88	11	11	✓
A5660	✓	B & F Isiyola	21/12/88	12	12	✓
A5600	✓	E. A. Abimbola	✓	13	13	✓
A5578	✓	O. Okankiri	23/12/88	14	14	✓
A5608	✓	J. A. Alade	✓	15	15	✓
A5547	✓	I. O. Adalumo	28/12/88	16	16	✓
A5530	✓	G. O. Oyo	29/12/88	17	17	✓









كوض بخرخا الى الشرقى كمن ٣٥

كوض خارج الزمام البحرى كمن ٥٣
در مسقط رأسه كمن

منطقة تاروق ١٠٨٥

١٢٥
١٥١

سالمه

الذ

صحة شمس الصخر

الخارجة الفهم
اسم الخوض

أسماء الصادر منهم التماثل
الأرقام المدونة للتمتع
تقلت الى الأرقام الجديدة
أسماء الصادر لصالحهم

الحراجة الخصيب

العلم
٨٤٦

مجموع المساحة
مطرفة

حركة العمل

الإدارة

الخارجة الفهم

صخرة نزلت عن حوزة (صخرة)

تتمتع بمساحة
١٥٠٠ م^٢ (A)
باعتها ٤٤٠ م^٢ في برمجته
شراءه ٤٥٠ م^٢ بقول - ٤٤٠ م^٢
القطعة في ٤٤٠ م^٢ في برمجته ٤٥٠ م^٢ بقول - ٤٤٠ م^٢
القطعة في ٤٤٠ م^٢ في برمجته ٤٥٠ م^٢ بقول - ٤٤٠ م^٢

روان أشدود
الحد البحري
الحد الشرق
الحد القبيل
الحد الغربي

صبي دورية
وصديق التمسك
٩٦٧/٧/٤٧

١٦/٤/١٦
١١/١٧/٤



شركة البرمجية
٤٥٠ م^٢ سابقا

للمعامل عبارة كمنه منزل
أطلقه صخرة دورية وبالطبع
عز كصحة ولا يزال
جوانب وبنية برزخ
وتمتلكه من قبل
صخرة حوزة



صخرة حوزة
٤٥٠ م^٢ سابقا

فندق صخرة حوزة



MMZ
49

27.10.2004



User Requirements

- **Better performance**
- **Security of tenure**
- **Reduce land disputes**
- **Formalise informal area's**
- **E-governance**

Agenda

1. Introduction
2. Cadastral Data
3. Generic Cadastral Domain Model
4. Conclusions

Standards

- **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*

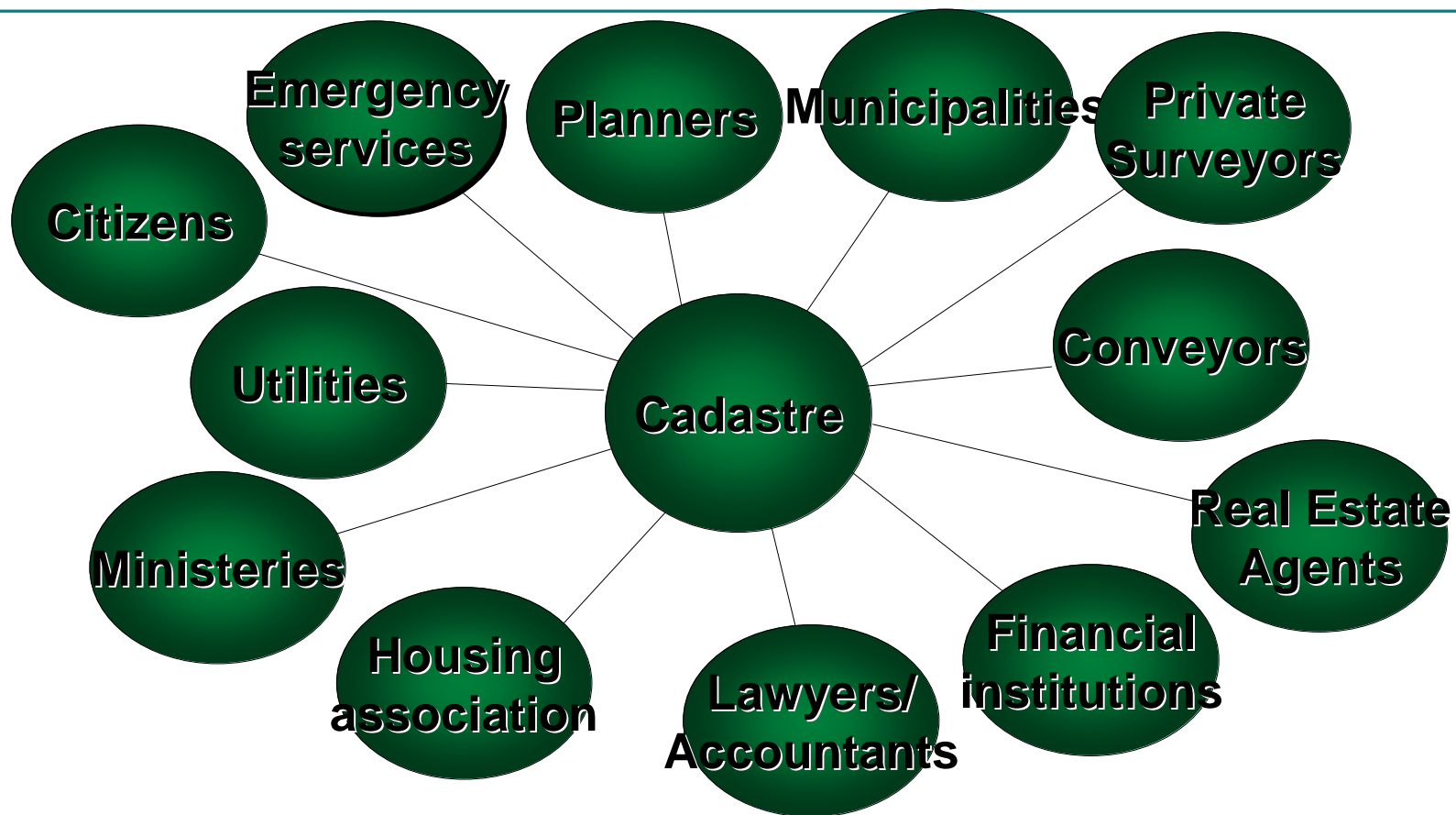
Standards

- **Many countries want to computerise their cadastral data sets: modelling is complex**
- **There are problems in data dissemination in a distributed environment which is a condition in case data are maintained by (many) different and distributed organisations**
- **Lack of a shared set of concepts and terminology in the Cadastral Domain**

Proposal (FIG Washington 2002)

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

Customer Groups: cadastral data exchange



Agenda

- ❑ **Introduction**
- ❑ **Cadastral Data**
- ❑ **Generic Cadastral Domain Model**
- ❑ **Conclusions**

Basic datamodel

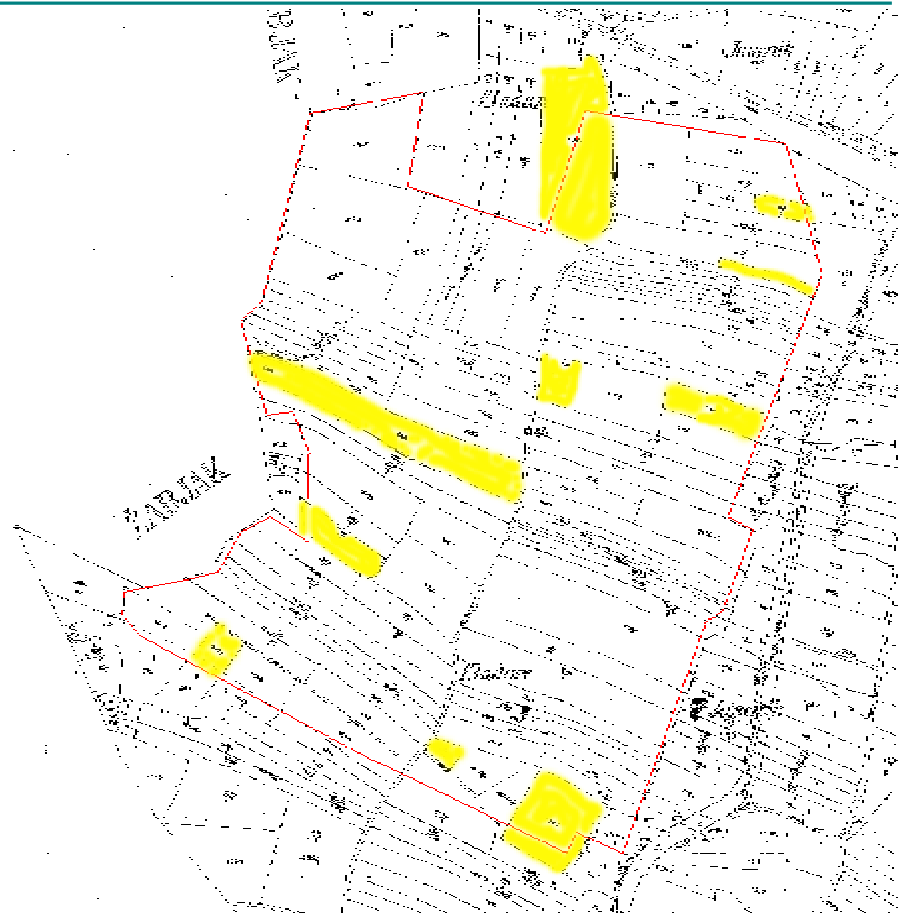
- 1. Parcel
 - 2. Apartment
 - 3. Building
 - 4. Spatial Unit
- One Point
Lines
Polygon (low accuracy)
Polygon (high accuracy)
- Quality labels

- 1. Formal Ownership
 - 2. Miri
 - 3. Milk
 - 4. Waqf
 - 5. Customary
 - 6. Indigenous
 - 7. Tenancy
 - 8. Starter, landhold, freehold
 - 9. Possession
 - 10. Mortgage
 - 11. Usufruct
 - 12. Long Lease
 - 13. Restriction Type 1
 - 14. Restriction Type 2
 - 15. State
 - 16. Informal
 - 17. Unknown
 - 18. Disagreement
 - 19. Occupation
 - 20. Uncontrolled privatisation
 - 21. Conflict
- Overlap

- 1. Natural Person
 - 2. Company
 - 3. Municipality
 - 4. Co-operation
 - 5. Group
 - 6. Ministry
- Biometric identification

Situation in field

Situation on Cadastral map



 Parcels with unsolved ownership

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

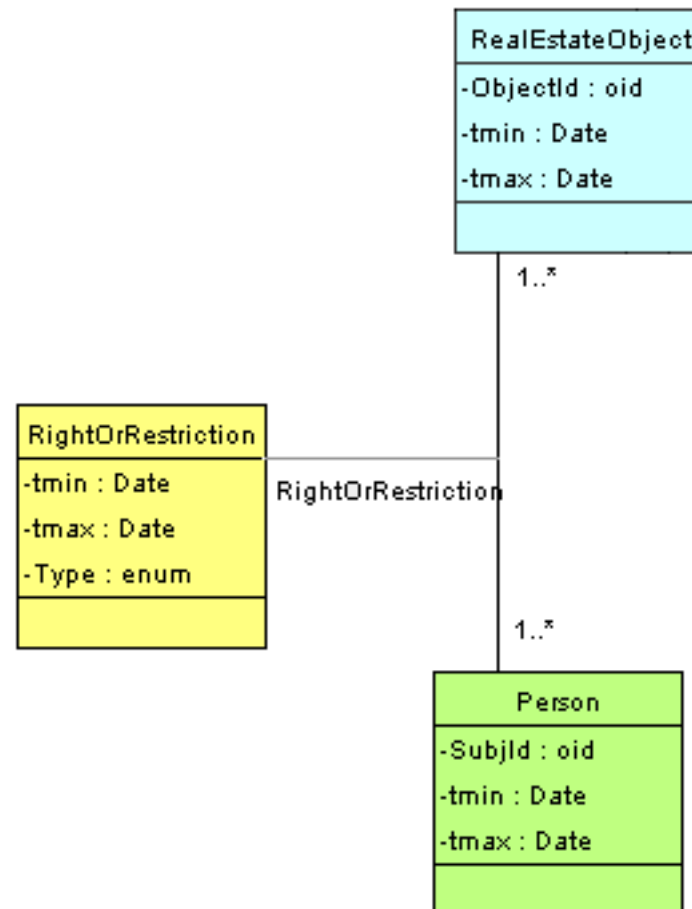
Cadastral Update Process Data

- ❑ Transactions
- ❑ Customers request (application)
- ❑ Quality (accuracy, reliability, collection mode)
- ❑ Name of Conveyor, Surveyor, etc
- ❑ Signature (digital)
- ❑ Process step
- ❑ Archive data in use
- ❑ Next open identifier
- ❑ Type of instrument
- ❑ Distance in km
- ❑ Letters to buyer and seller
- ❑ Car in use, fuel
- ❑ Date and time
- ❑ Site
- ❑ Buyer/seller do not agree
- ❑ Authorisation
- ❑ Computer availability
- ❑ Topological erros
- ❑ Production norm
- ❑ Time regsitration
- ❑ Objection, complaint
- ❑ Salary scale
- ❑ Team
- ❑ Teammembers
- ❑ Responsible manager
- ❑ Status code
- ❑ Out of tolerance
- ❑ Line code
- ❑ Point code
- ❑ Transformation parameters
- ❑ Historical data used
- ❑ Cluster identifier
- ❑ IT Support

Agenda

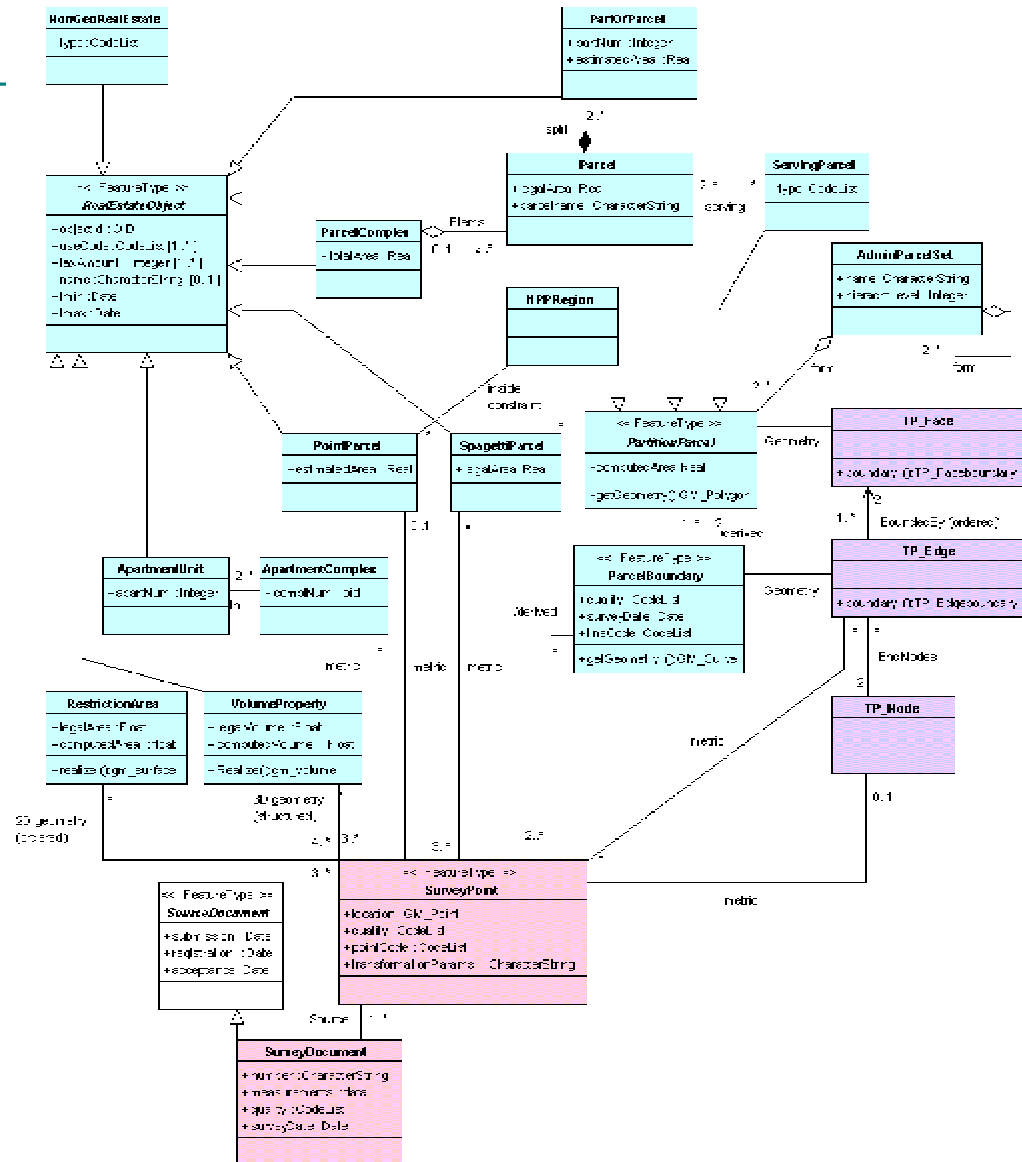
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Model basis: Object-Right-Subject



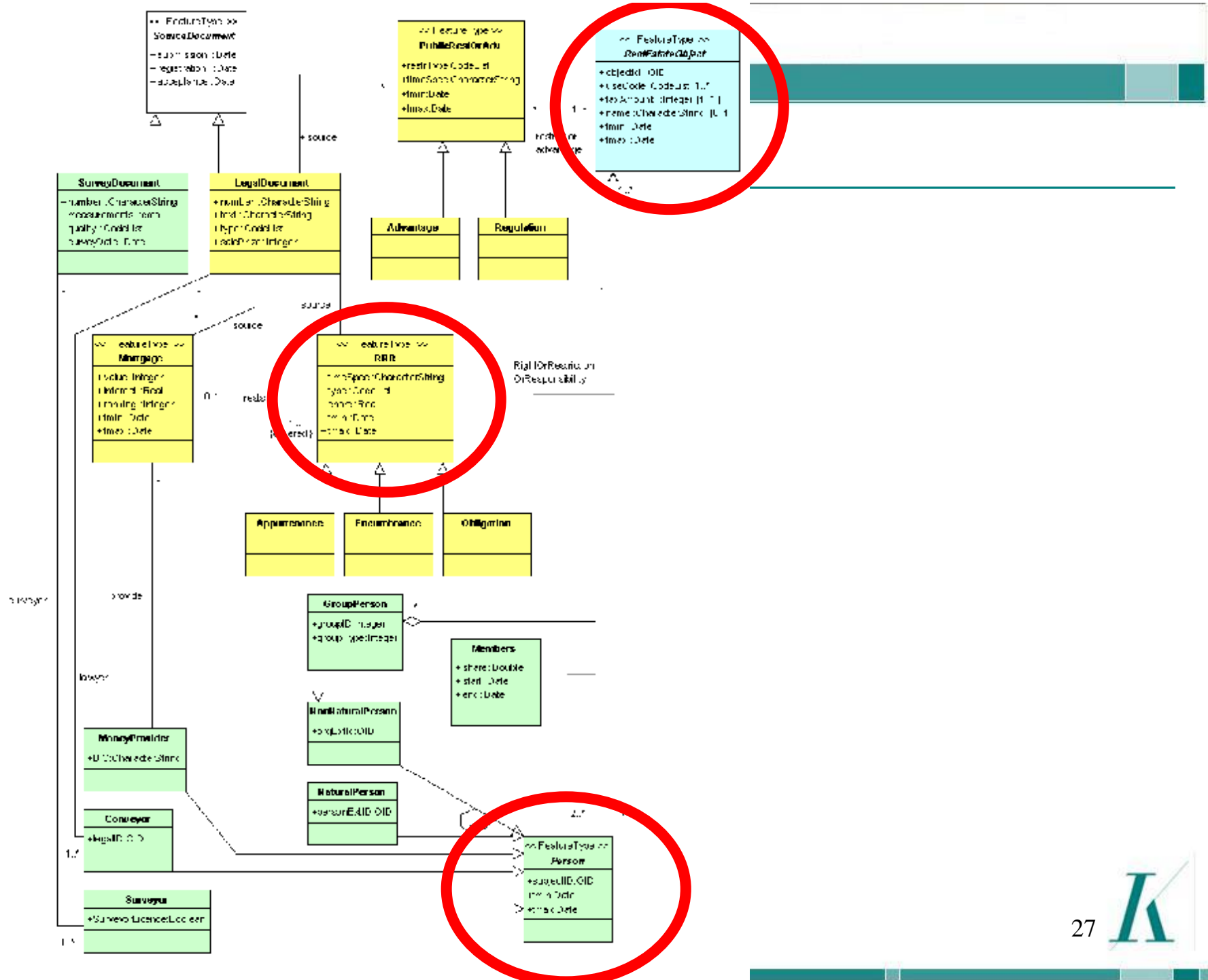
Core Cadastral Domain Model: Geometry

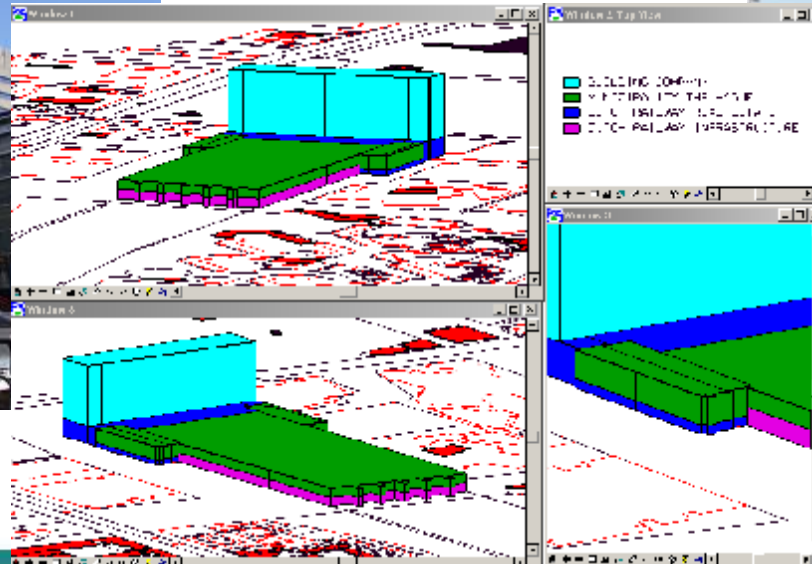
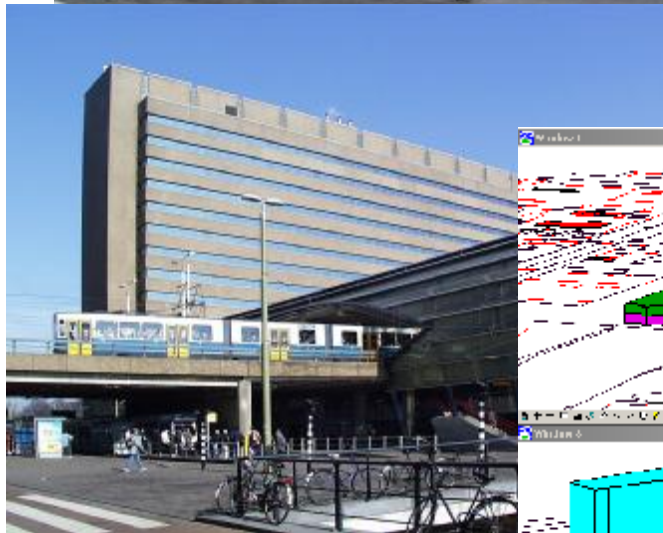
- Real estate object with specialisations, e.g. parcel, parcel-complex, volume property, restriction area, point parcel, apartment unit, based on topological structure or not
- Agregations like parcels set, parcel complex, apartment complex
- Link to surveying and survey documentation
- Link to OGC standards (Nodes, Edges and Faces)



Core Cadastral Domain Model: Legal-administrative

- ❑ **RRR is an association class between Person and RealEstateObject**
- ❑ **Mortgage, restriction and RRR are based on legal documents or decisions**
- ❑ **Person are specialised as natural or non natural**
- ❑ **Surveyor, conveyor and money provider are included, specialisations of the Persons class**
- ❑ **A RRR can be temporal**





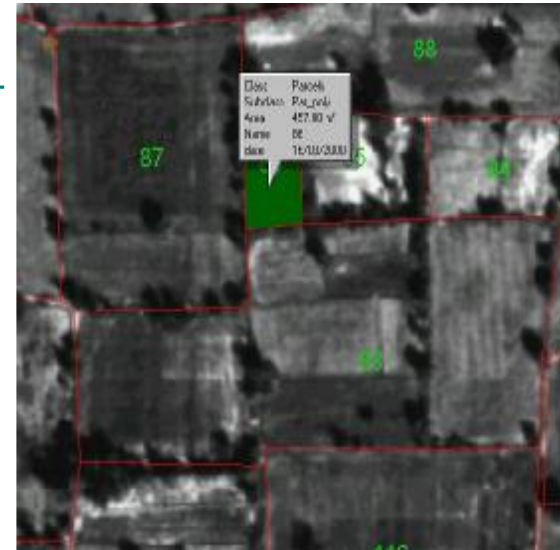
Aspects not yet covered

- **Processes: how to maintain consistency between two related distributed systems in case of updates: the cadastral production process depends on availability and quality of data at remote servers (e.g. Persons in population database)**
- **Catalogues with 'types of right' (per country?)**
- **Further modelling of cadastral survey**
- **Inclusion of a range of spatial units**
- **Generation of a full XML/GML schema**
- **Test with real data, in EULIS context**
- **Harmonise with other domain models, e.g. Topography, Water, Utility Networks**

Process: Data Acquisition

- ❑ 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
- ❑ Source documents
- ❑ WGS/UTM
- ❑ No monumentation

Kadaster



၁။ မြေပုံဆွဲချက်ပုံစံ
 ၂။ မြေပုံဆွဲချက်ပုံစံ
 ၃။ မြေပုံဆွဲချက်ပုံစံ

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 မြေပုံဆွဲချက်ပုံစံ



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Conclusion

- **Current proposal is under development, workshops, reviews, etc**
- **There is communication with GIS providers, OGC, ISO**
- **More attention to process side (in addition to data side)**
- **Not only the model itself is important, but the fact that there is consensus (also important role of industry)**

Thank you

- www.fig.net
- www.oicrf.org
- www.gdmc.nl