Developments in the Core Cadastral Domain Model

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FIG

ITC

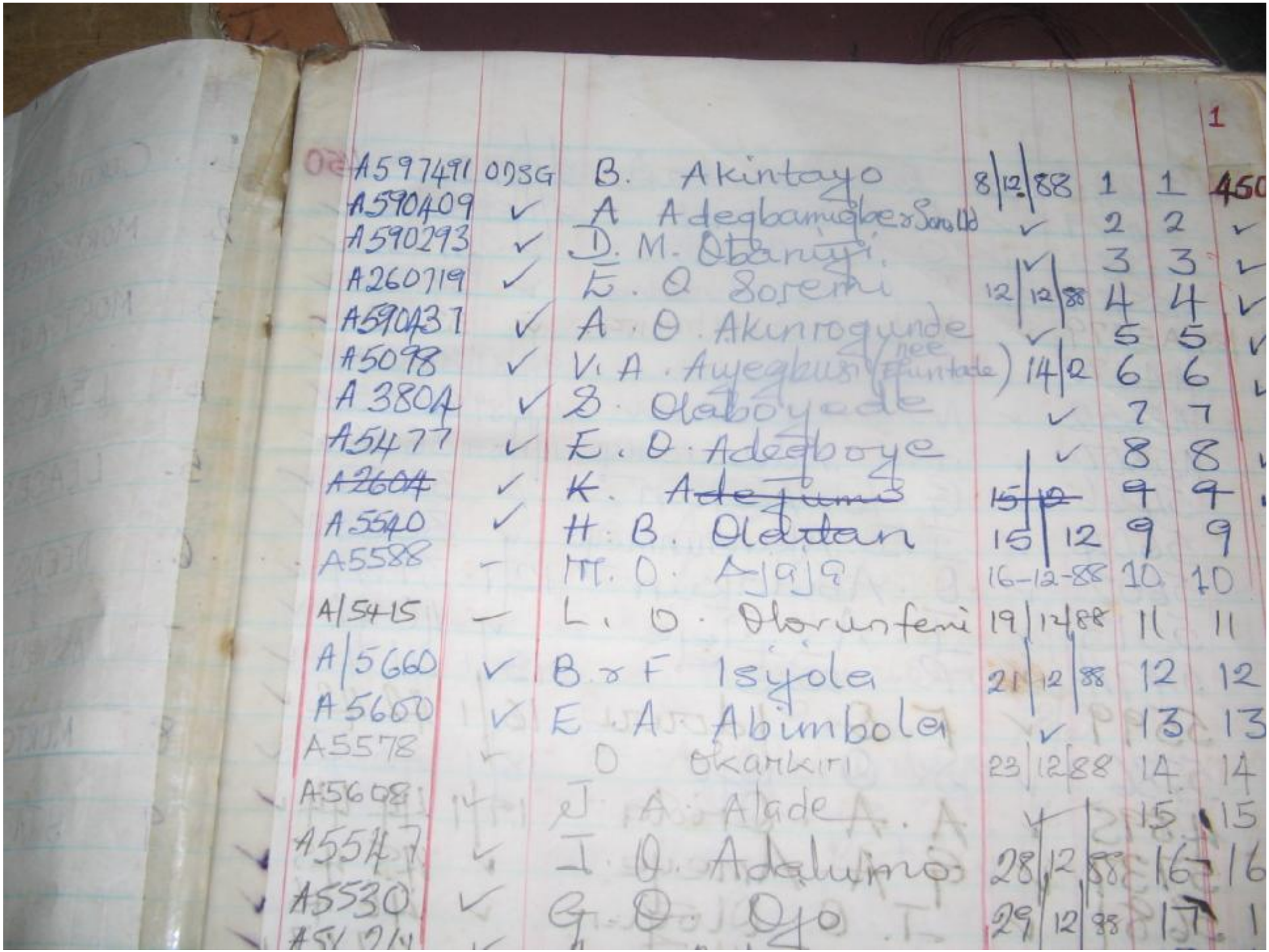
TU Delft

Delft University of Technology

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)



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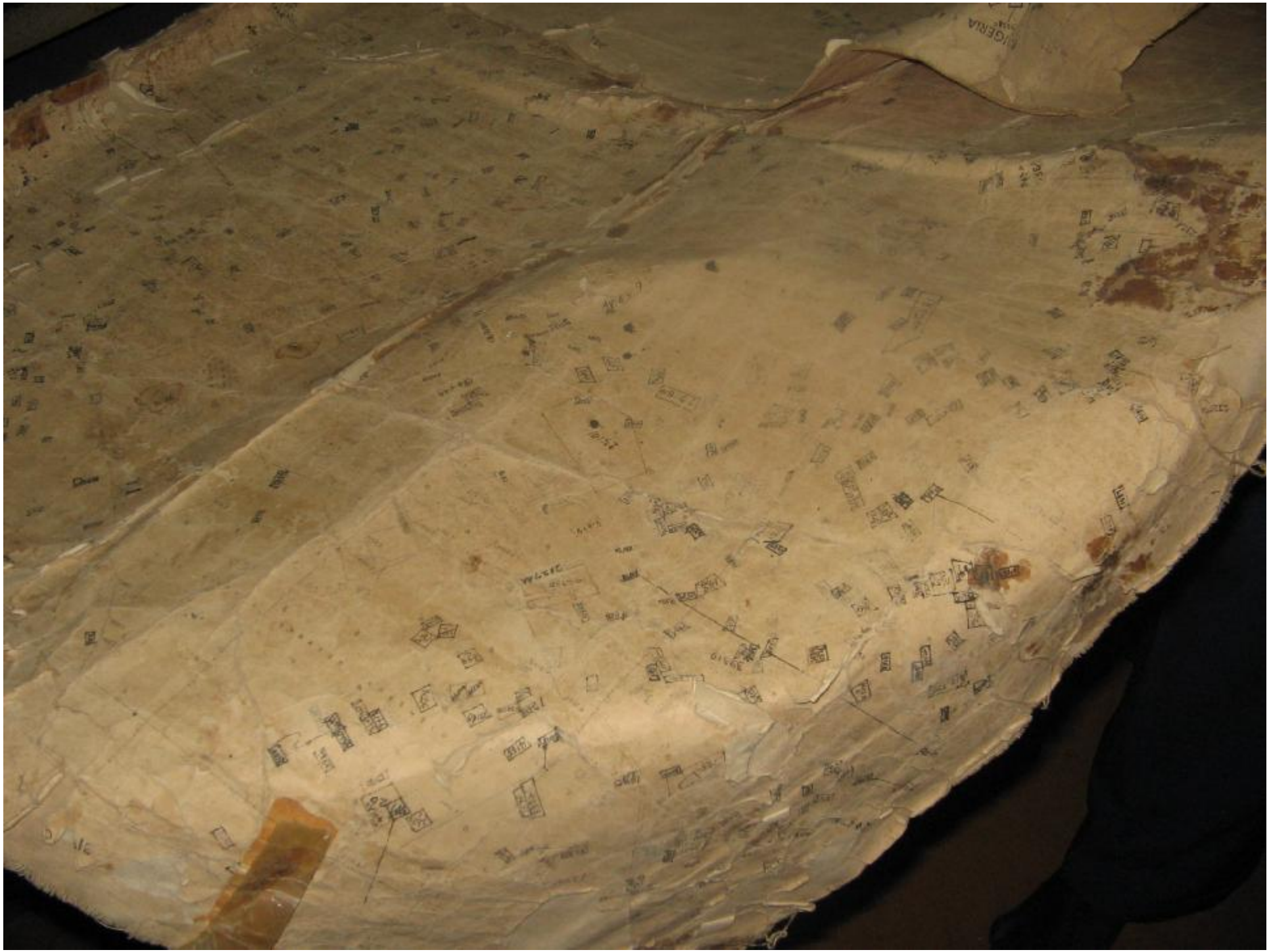


منطقة رقم ١٠٨٥
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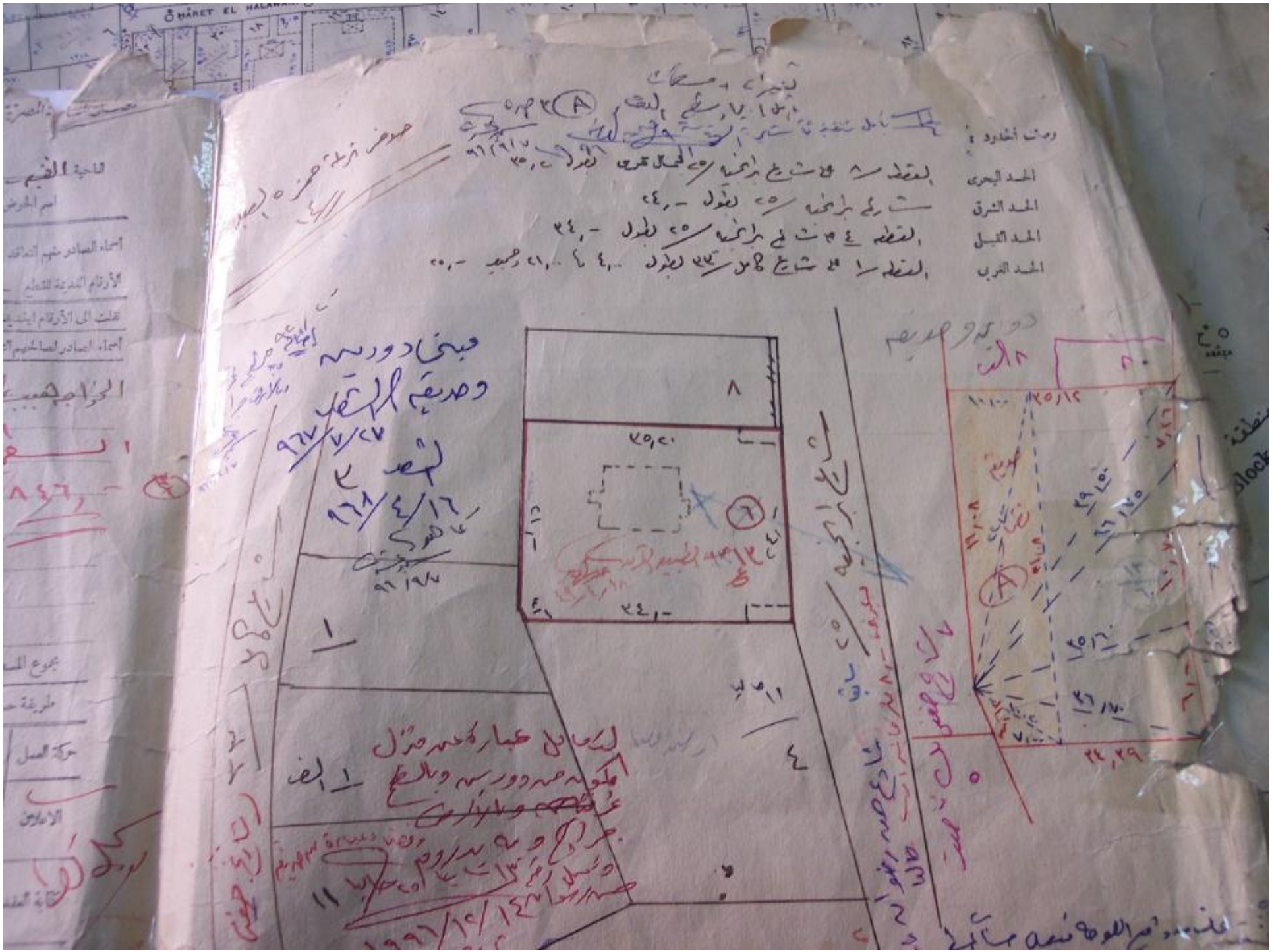
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User Requirements

- 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

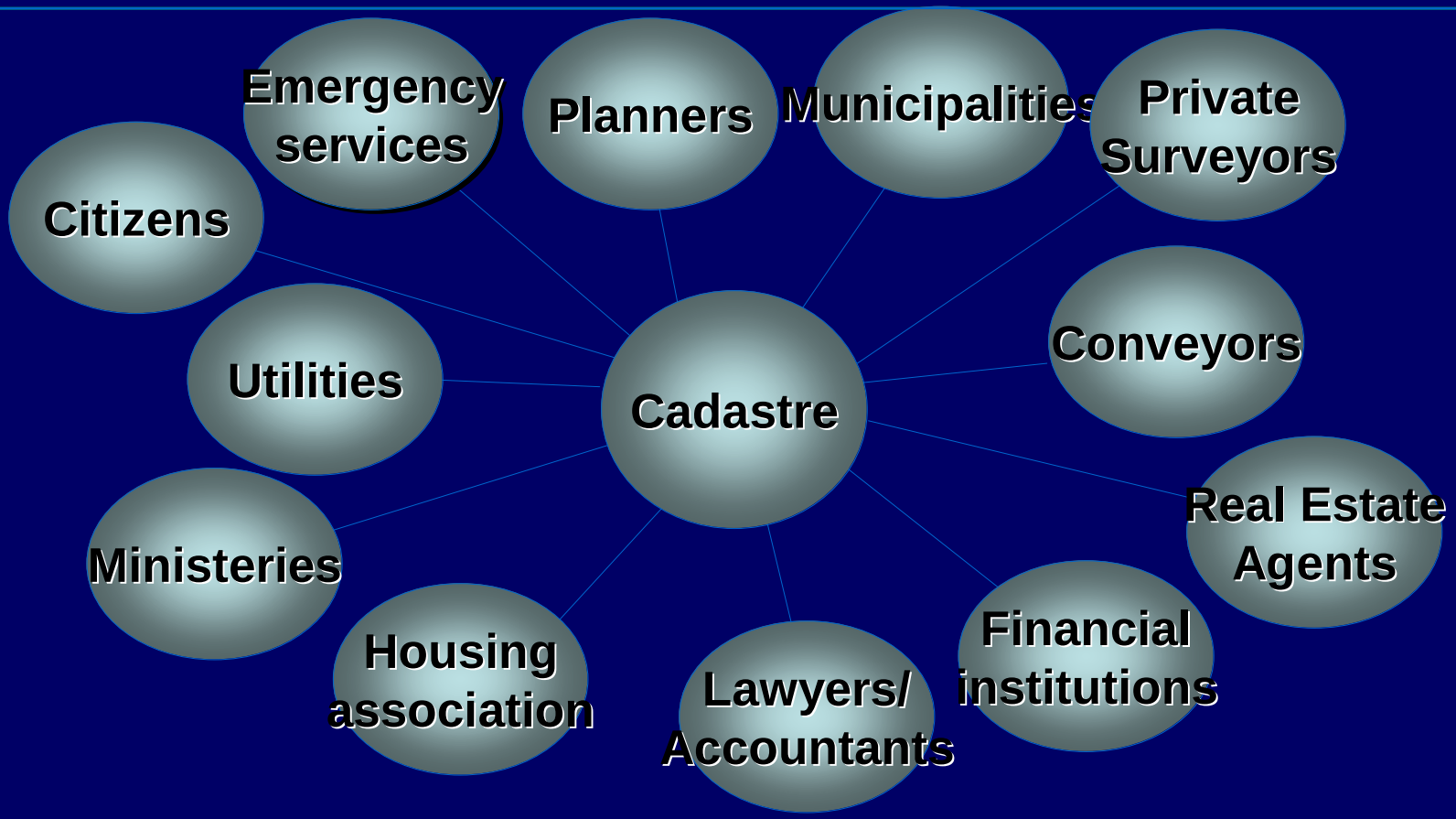
Standards

- Many countries want to computerise their cadastral data sets: modelling is complex
- There are problems in data dissemination in a distributed enviroment which is a condition in case data are maintained by (many) different and distrubted 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



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Basic datamo

1. Parcel
2. Apartment
3. Building
4. Spatial Unit

One Point
Lines
Polygon (low accuracy)
Polygon (high accuracy)

Qualilty 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

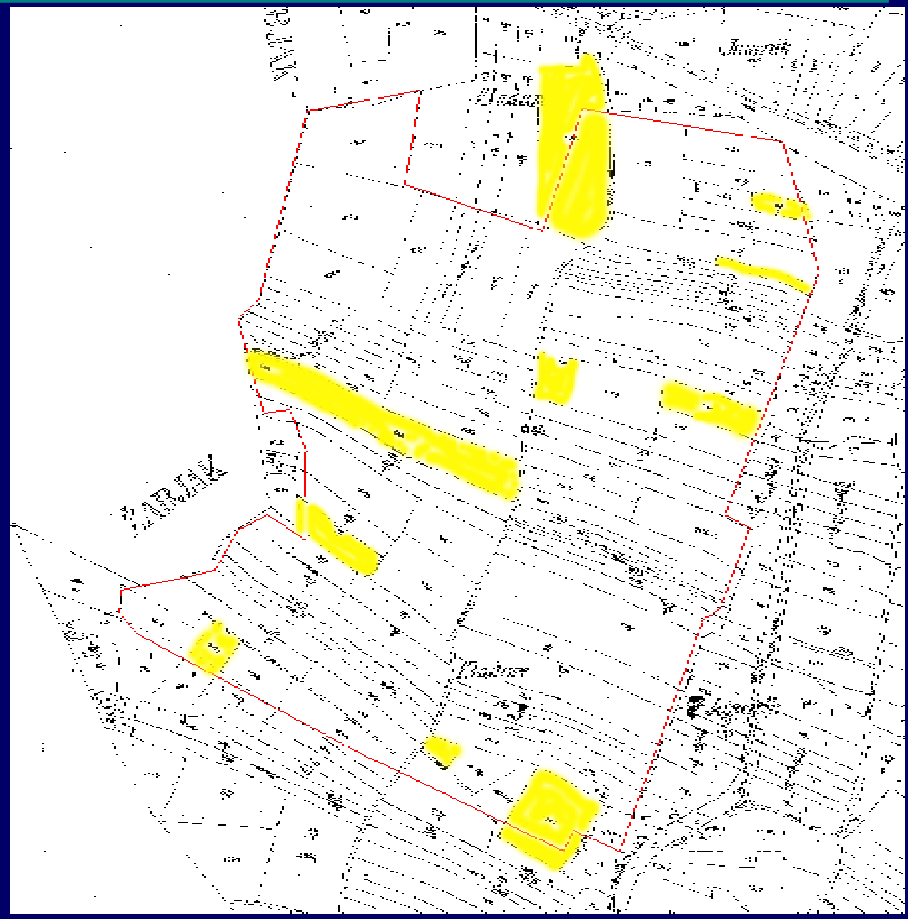
1. Natural Person
2. Company
3. Municipality
4. Co-operation
5. Group
6. Ministry

Biometric identification

K.o. Klokočevac, Croatia

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

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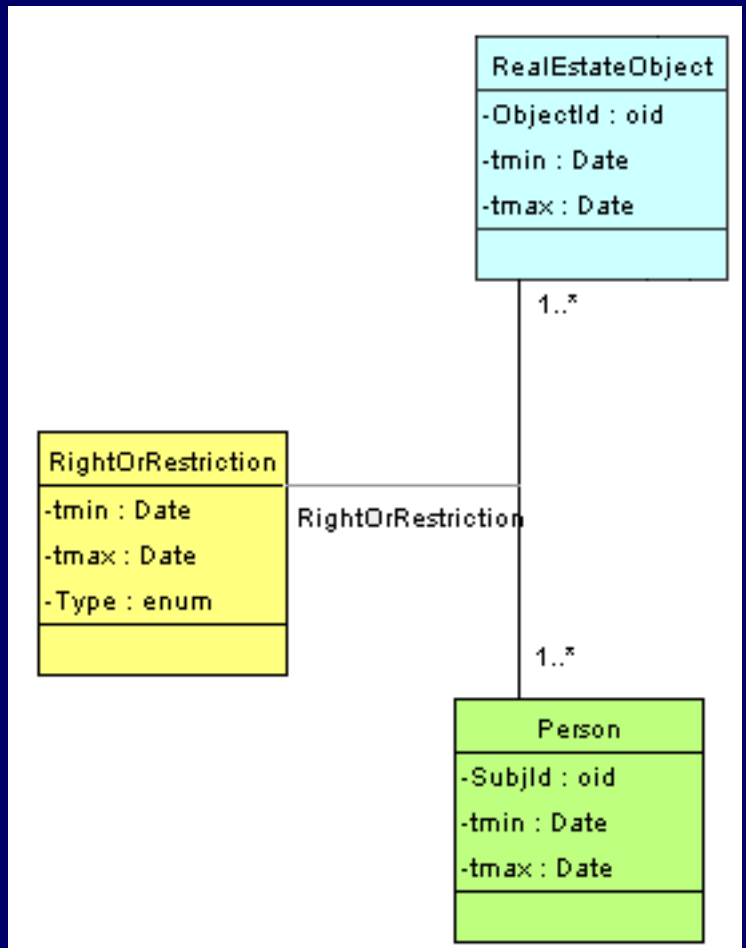
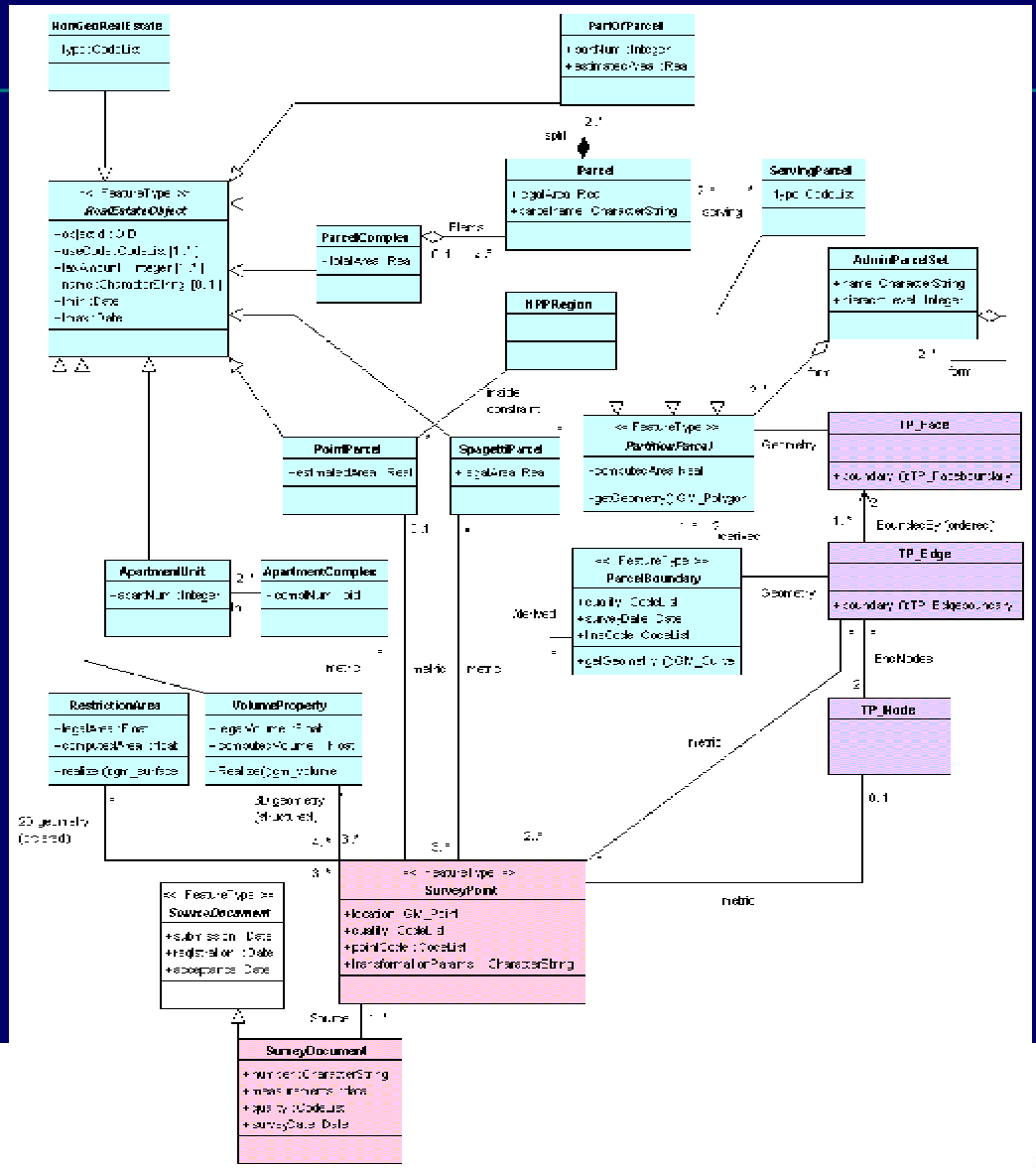
Model basis: Object-Right-Subject



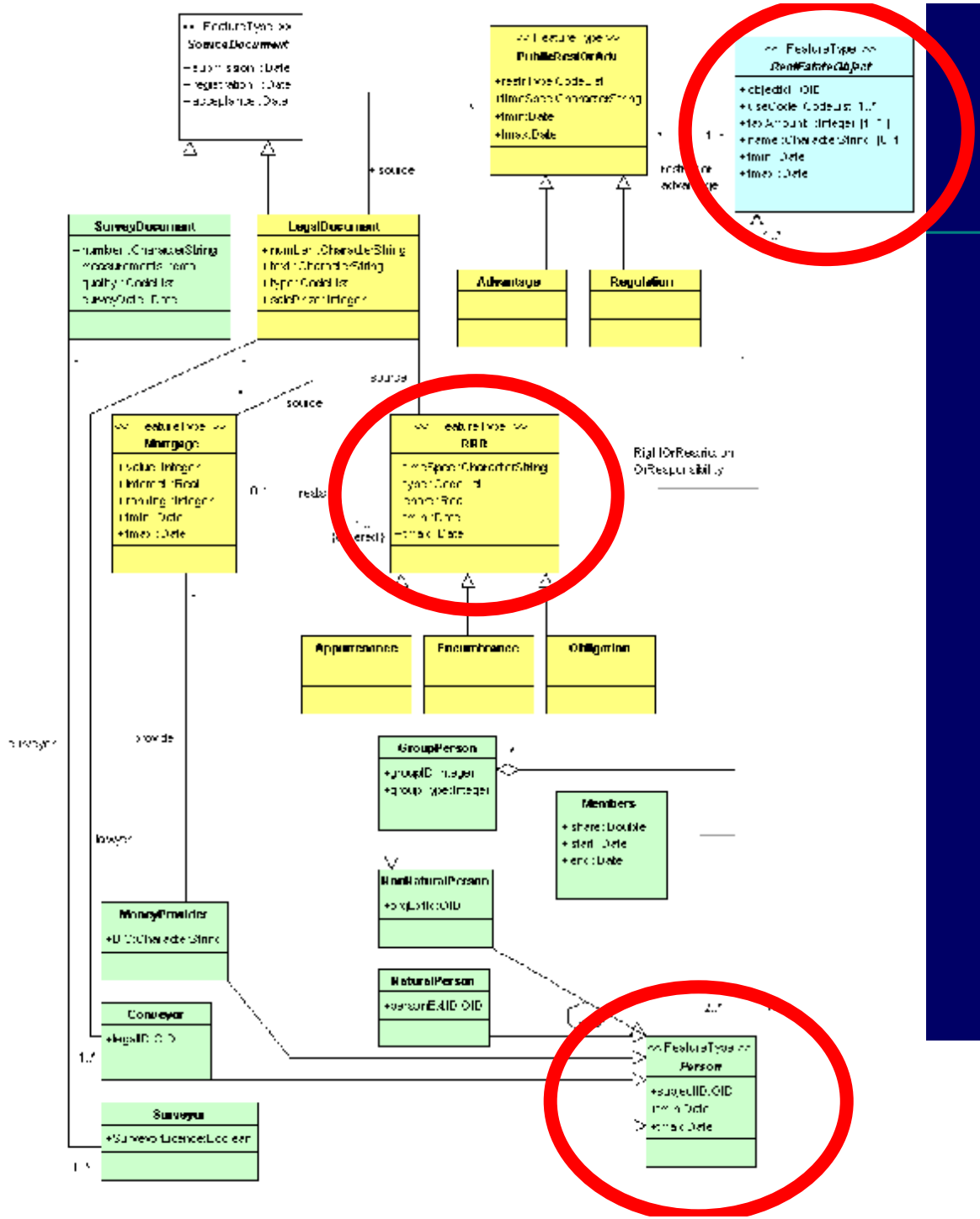
Core Cadastral Domain Model: Geometry

- 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)


NonGeoRealEstate
PartOfParcel
Parcel
ServingParcel
ParcelComplex
AdminParcelSet
HPPRegion
PointParcel
SpagettiParcel
PartitionParcel
TP_Face
TP_Edge
TP_Node
ApartmentUnit
ApartmentComplex
ParcelBoundary
RestrictionAreas
VolumeProperty
SurveyPoint
SourceDocument
SurveyDocument

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


SurveyDocument
LegalDocument
Advantage
Regulation
Mortgage
RRR
Appurtenance
Encumbrance
Obligation
GroupParty
Members
NaturalPerson
Party
Person
Surveyor
Conveyancer

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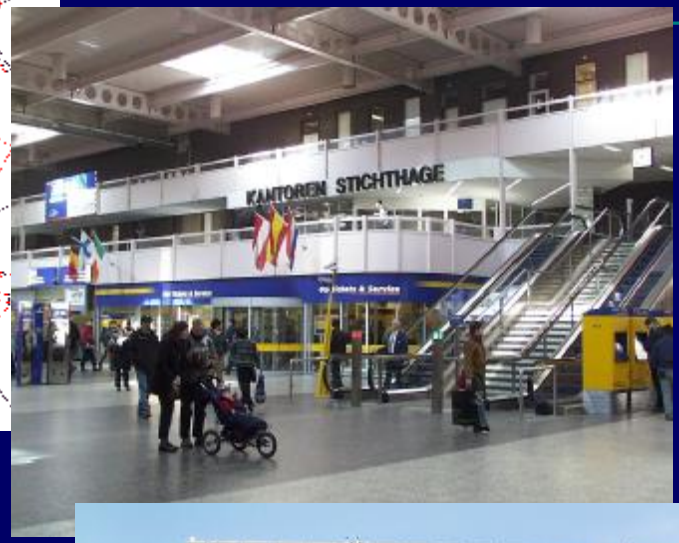
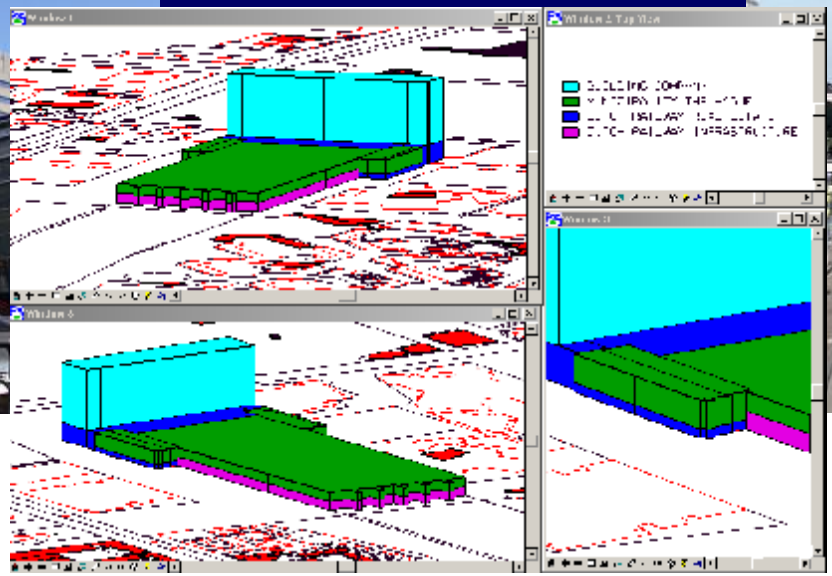
3D factual situation (NL)





FIG

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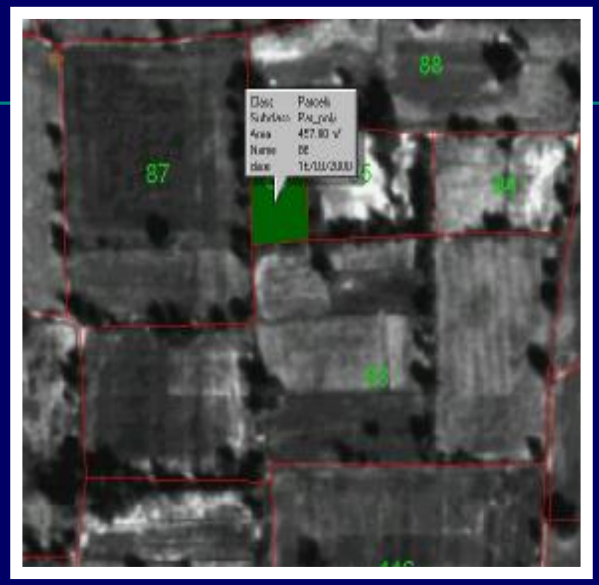
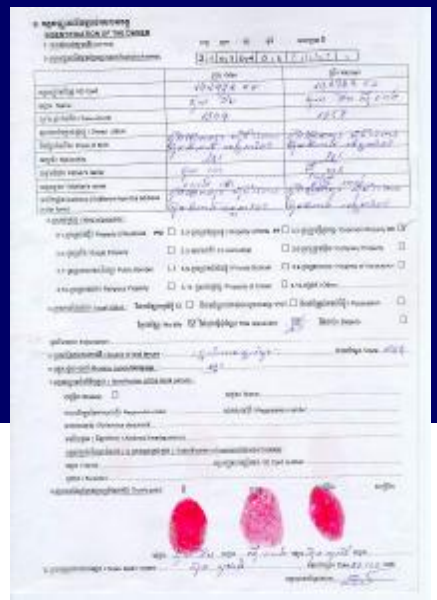
Aspects not yet covered

- 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





FIG

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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