Social Tenure Domain Model (STDM)

Requirements from the perspective of Pro-Poor Land Management

FIG Regional Conference, Accra, Ghana, March 10th 2006

Clarissa Augustinus, Chief, Land and Tenure Section, UN-HABITAT

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Agenda

- Context (CA)
- UN-HABITAT land mandate (CA)
- The Global Land Tool Network (GLTN) (CA)
- What is core cadastral domain model? (CL)
- UN-HABITAT raises questions on model (CA)
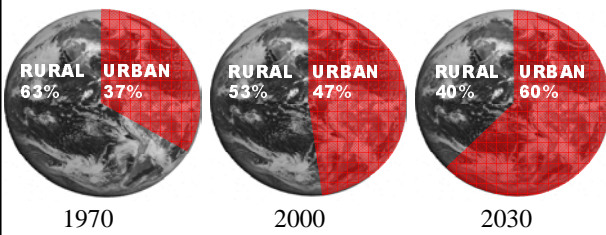- FIG responds (CL)
- Way forward (CL)

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Urban population growth

RURAL 63%   URBAN 37%   1970

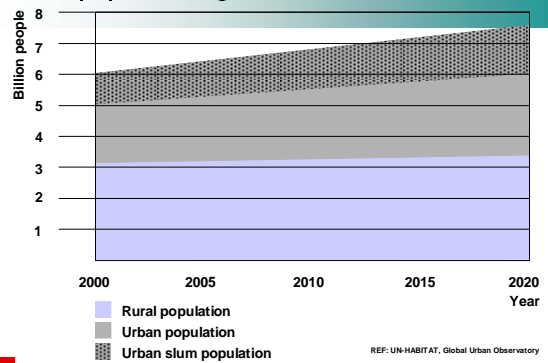RURAL 53%   URBAN 47%   2000

RURAL 40%   URBAN 60%   2030

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Urban population growth

Rural population
Urban population
Urban slum population

REF: UN-HABITAT, Global Urban Observatory

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Size of the slum populations

- 924 million people, 32 % of the world's urban population, live in slums (UN-HABITAT: 2001)
- Slum dwellers increased by 36 % during the 1990s
- Global number of slum dwellers likely to increase to about 2 billion by 2030 if no serious action
- In 2007 more urban than rural people globally

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Slum Dwellers as a percentage of the Urban Population: By Region (2001)

1
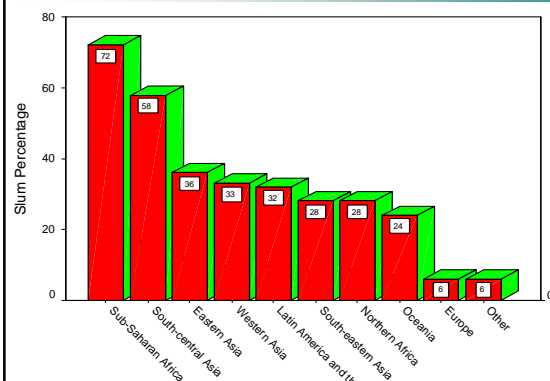
Density of an informal settlement

Tenure security coverage

- Best estimates S.America +/- 30%
- Best estimates N. Africa +/- 15%
- 70% of cities in Africa: slums
- Challenge of security of tenure for majority
- New ways of doing business

Customary, informal and post conflict tenure

- Overlapping rights and claims
- Family and group rights
- Social land tenures/livelihoods

UN-HABITAT land mandate

- 1976 Vancouver action plan
- 1996 HABITAT Agenda
- 1999 Global Campaign for Secure Tenure
- 2000 MDGs (goal 7, target 11)
- 2004 GA resolution on land administration

Global Land Tool Network (GLTN)

GLTN key priorities:
- Develop innovative, pro poor and gendered land tools
- Unblock and upscale existing initiatives
- Strengthening existing networks
- Global coordination and integration
- Dissemination of knowledge

www.GLTN.net
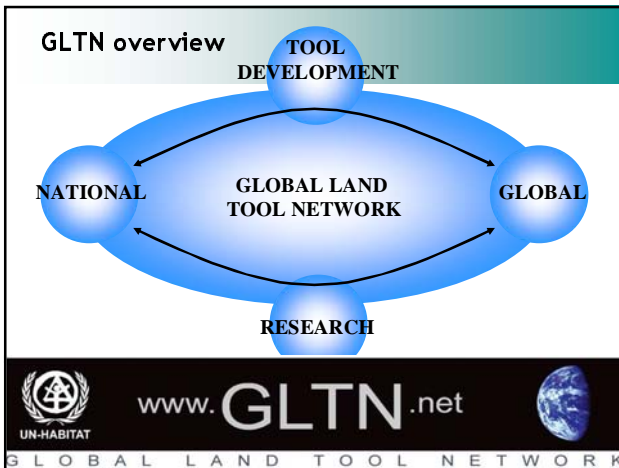
GLOBAL LAND TOOL NETWORK

What would GLTN do?

- Develop innovative land tools
- Research, documentation, dissemination
- Strengthen global comprehensiveness (Paris decl.)
- Improve security of tenure of poor
- MDG goals - indicators/benchmarks

www.GLTN.net

GLOBAL LAND TOOL NETWORK

GLTN overview

TOOL DEVELOPMENT

NATIONAL

GLOBAL LAND TOOL NETWORK

GLOBAL

RESEARCH

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UN-HABITAT
G L O B A L   L A N D   T O O L   N E T W O R K

GLTN key values

- Good governance
- Large scale approach
- Pro poor
- Gender sensitivity
- Paris Declaration (HAC)

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UN-HABITAT
G L O B A L   L A N D   T O O L   N E T W O R K

Potential GLTN partners

- Member states (where tools are developed)
- UN bodies
- Research institutions
- Donors
- NGOs
- Professional bodies

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GLTN work programme

- Six themes on land tool development:
  1. Land rights and records
  2. Land information/planning
  3. Land management/administration
  4. Land law and enforcement
  5. Land tax/valuation
  6. Cross cutting issues

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GLTN work programme

1. Land rights and records

  ✓ a) Enumerations for tenure security
  ✓ b) Continuum of land rights
  ✓ c) Deeds or titles
    d) Gender friendly affordable adjudication
    e) Statutory and customary
  ✓ f) Co-management approaches
  ✓ g) Land records management for transactability
    h) Family and group rights

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GLTN work programme

2. Land information/planning

  ✓ a) Spatial units
  ✓ b) City wide slum upgrading
    c) City wide spatial planning
    d) Regional land use planning
    e) Land readjustment (slum upgrading and/or post crisis)

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GLTN work programme

3. Land management/administration

✔ a) Post conflict land administration
✔ b) Land administration and governance tools
✔ c) Technical/legal policy e.g. user fees
   d) Management of state land
   e) Geodetic for Africa
   f) Cost benefit analysis
   g) Pro poor GPS

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GLTN work programme

4. Land law and enforcement

✔ a) Regulatory framework for private sector
   b) Estates administration (HIV/AIDS areas)
   c) Expropriation and compensation

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GLTN work programme

5. Land tax/valuation

a) Land tax for financial and land management

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GLTN work programme

6. Cross cutting issues

   a) Modernization of land agencies budgeting approach
✔ b) Measuring tenure security for the MDGs
✔ c) Capacity building for sustainability
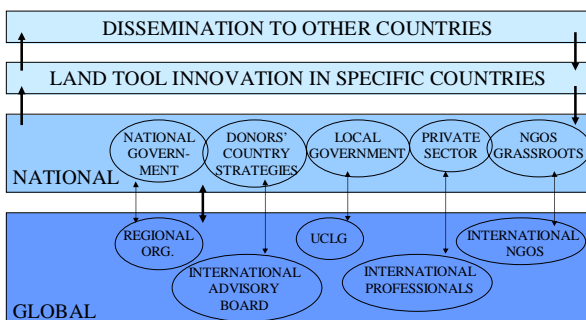   d) Land access/land reform
✔ e) Key characteristics of a gendered tool

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GLTN partner dialogue

DISSEMINATION TO OTHER COUNTRIES

LAND TOOL INNOVATION IN SPECIFIC COUNTRIES

NATIONAL
- NATIONAL GOVERN-MENT
- DONORS' COUNTRY STRATEGIES
- LOCAL GOVERNMENT
- PRIVATE SECTOR
- NGOS GRASSROOTS

GLOBAL
- REGIONAL ORG.
- UCLG
- INTERNATIONAL NGOS
- INTERNATIONAL ADVISORY BOARD
- INTERNATIONAL PROFESSIONALS

GLTN work programme

- 10-12 November 2004, Nairobi: EGM on Secure Land Tenure: "New legal frameworks and tools"
- 25-27 October 2005, Moscow: EGM, Innovative land tools and urban cadastre
- 17-18 November 2005, Geneva: EGM, Post Conflict
- 24-25 November 2005, Stockholm, GLTN meeting
- 8-9 December 2005, Bangkok: EGM on Secure Tenure: New legal frameworks and tools
- 15-18 December, 2005, Cairo: Islamic Land Tools

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GLTN work programme

- 23-24 March 2006, Oslo, GLTN meeting
- Mid year 2006, Somaliland: EGM, Post Conflict Land Policy Formulation
- 19-23 June 2006, Vancouver: World Urban Forum, GLTN launch
- September 2006, Nairobi: EGM, Transparency and Land
- September 2006, EGM, IFAD, Innovative Land Tools

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GLTN web site

- New version to be uploaded May 2006
- Interned debate/discussion 1-15 June 2006

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Social Tenure Domain Model

- Core Cadastral Domain Model
- Re-usability
- 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 computerize their land administration
- Land administration *modelling* is complex. Especially in a distributed environment
- Lack of a shared set of concepts and terminology in the Tenure Domain

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Basic data model

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

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

Qualilty labels

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

Overlap

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

Biometric identification

5

Example: K.o. Klokočevac, Croatia

Situation in the field

Situation on Cadastral map

Parcels with unsolved ownership

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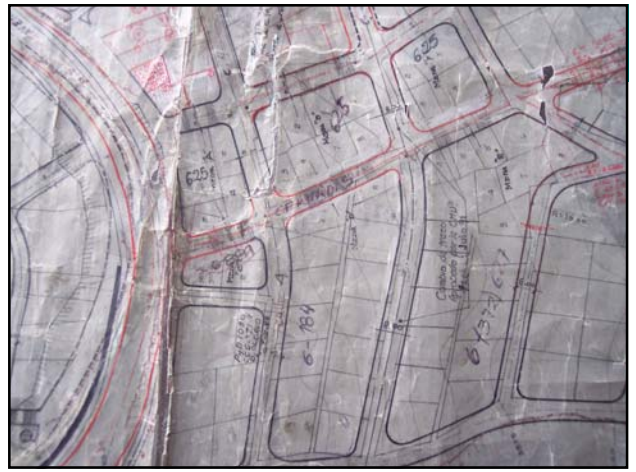

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Cadastral Data

- 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
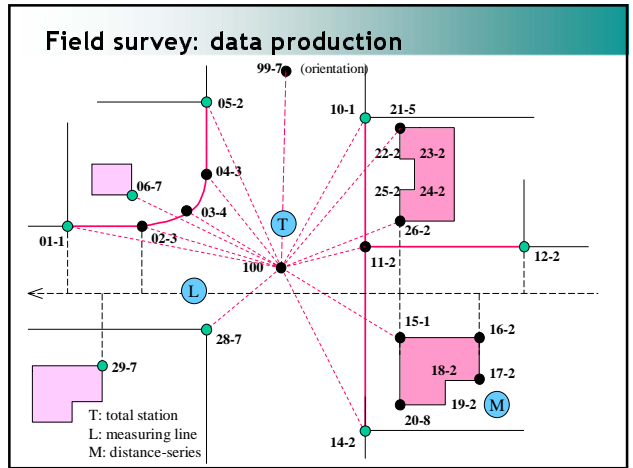
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Cadastral Update Process Data

- 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 errors
- Production norm
- Time registration
- Objection, complaint
- Salary scale
- Team
- Team members
- Responsible manager
- Status code
- Out of tolerance
- Line code
- Point code
- Transformation parameters
- Historical data used
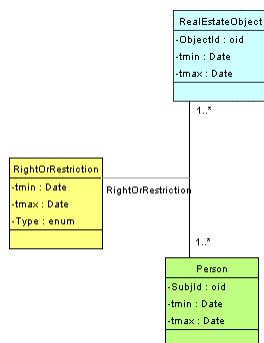- Cluster identifier
- IT Support

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Field survey: data production

T: total station
L: measuring line
M: distance-series

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 → 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

Model basis: Object-Right-Subject

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
- Group of Groups of persons
- Surveyor, conveyor and money provider are included, specialisations of the Persons class
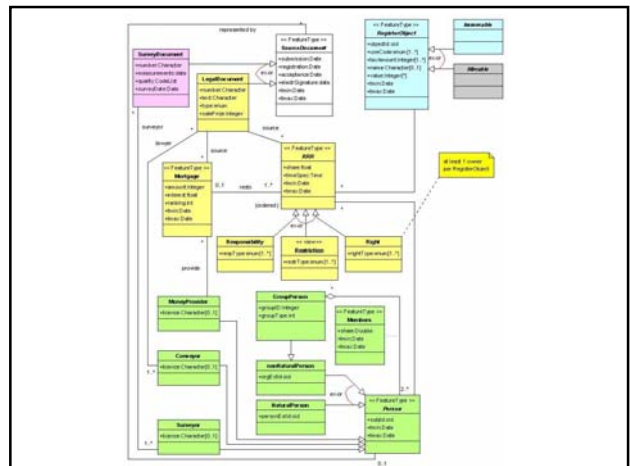- A RRR can be temporal

8

Spatio-temporal 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

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
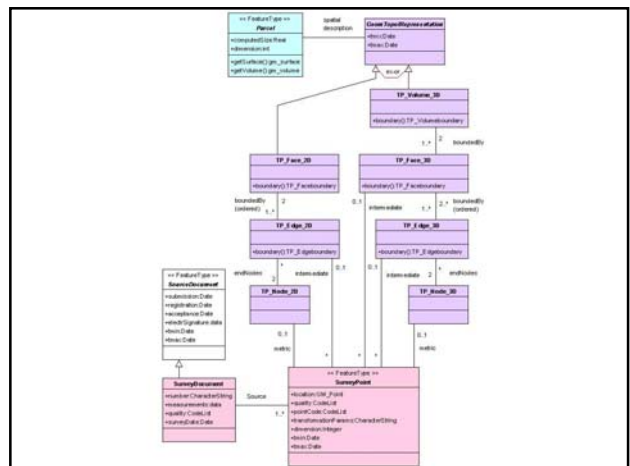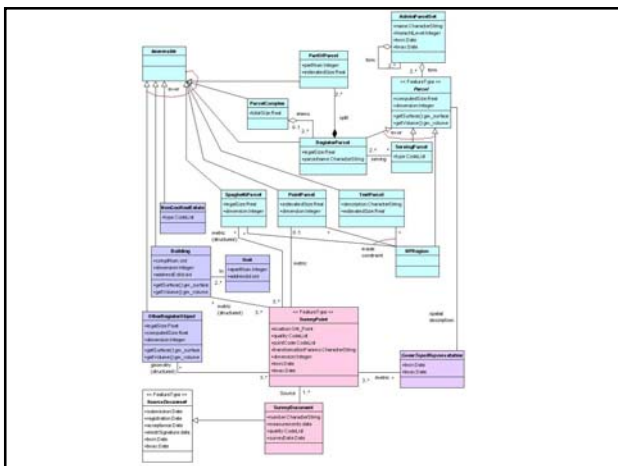- Link to OGC standards (Nodes, Edges and Faces)

Parcels...

- 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)

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
- Monumentation

Input of users (CA)

- EGM, UN ECA, Addis Ababa, Ethiopia, November 1998 on Integrated Geo-Information
- EGM, UN-HABITAT, Nairobi, Kenya, November 2004 on Secure Land Tenure: FIG, 2005
- EGM, UN, Bangkok, Thailand, December 2005 on Secure Land Tenure: FIG, 2006
- Research by team, + developing countries students

Can formal and informal tenure systems be merged in one environment?

- Laws and regulations introduced by a colonial administration to serve the interests of the colonial power
- Separate cadastres have often developed, operating as informal systems in parallel
- System should include information that covers the whole spectrum of formal, informal and customary
- Customary and statutory rights (e.g. Ghana)

Can reversibility from database to a paper based system be guaranteed?

- Computer based technology is faced with human resource constraints
- Same is valid for modern survey technology
- Another restriction is related to costs
- Emergency to reconstruction
- Role of paperbased systems

Could spatial information in a STDM be represented in both existing geodetic networks and in new spatial frameworks?

- Spatially referenced framework should be developed which can be understood and used by a wider range of stakeholders and decision makers
- A range of techniques and technologies, GPS (centimeter, sub-meter, uncorrected -hand held), conventional terrestrial approaches - measuring tape, plane table to theodolite), remotely sensed images (satellite and photographic)
- Accommodate graphical (pictorial) data, geometric (measurement based) data and topological (connectivity not absolute position) data

Is it possible to link a STDM containing spatial data to other systems containing spatial data?

- In a phased design, *linking mechanisms* should be possible to set up so that a Social Tenure Domain Model can be coordinated with other systems
- Linking systems to other systems has proved to be very problematic in practice
- Can we integrate non cadastral spatial information into this common reference system?
- Will it always be seperate?

What are the conditions for implementation of a STDM in a distributed and de-centralized environment?

- Vertical coordination
- Limit fragmentation of information
- Economies of scale
- Facilitate local land management and information currency
- Local level: many people know the parcel and its owner/occupant
- Information provision by people with fewer skills using lower grade and cheaper technology
- It should not be necessary for the capital city to hold all the cadastral and land registration records
- Lengthy technical processes will be short circuited
- (Step by step) centralization/concentration

How can a STDM be applicable in an environment with different source data with different accuracies?

- High standards of accuracy linked to legal accountability issues often make cadastral systems cumbersome and inflexible
- Varying accuracies should be accepted
- Global Navigation Satellite Systems
- Will GPS surveys allow the community to participate

What are the requirements for the user interface at local level?

- For land registration and/or land records to work in Africa the system itself should become more accessible, both in terms of location, cost and user friendliness
- The land office should be at the local level and be user-friendly to poor, often uneducated people

How should a participatory approach be optimally supported?

- Participatory land use decision making, so that land rights and land use rights are adjudicated and negotiated at the same time
- This should facilitate information flows
- Information collected and made available at the local level should be passed on to the national level and vice versa, in an appropriate way
- There should be female and local participation

How could a STDM support full and equal access to land?

- A land administration or land management system should ensure that men and women have full and equal access to the economic resources of the country
- Security of tenure is a condition for all and sustainable human settlements development in an urbanizing world

Which types of parcel/spatial unit identifiers should be supported?

- Data bases should accommodate a range of identifiers, geo-referenced parcels, un-referenced parcels, lines and points
- A range of identifiers should be used, not just accurately surveyed parcels
- (Pictorial) reference framework
- Points, geo-codes (sometimes known as dots on plots), lines and polygons
- Polygons with fuzzy boundaries
- Text, including lists of names and unique numbers
- Parcels -poorly surveyed, non geo-referenced and geo-referenced
- Sketch maps and photographs, in the absence of any better identifier
- Approximate boundaries of the informal settlement and the customary areas
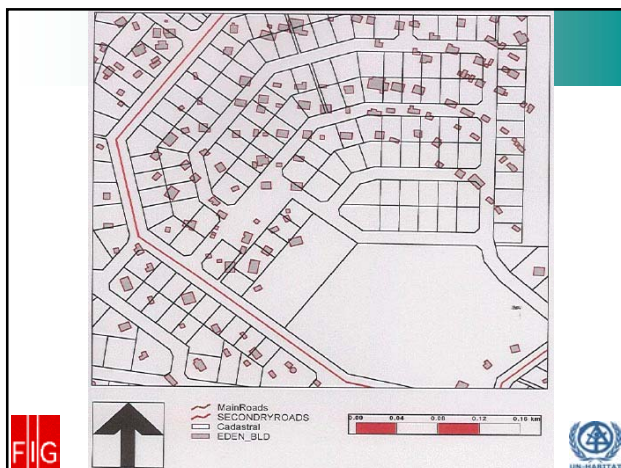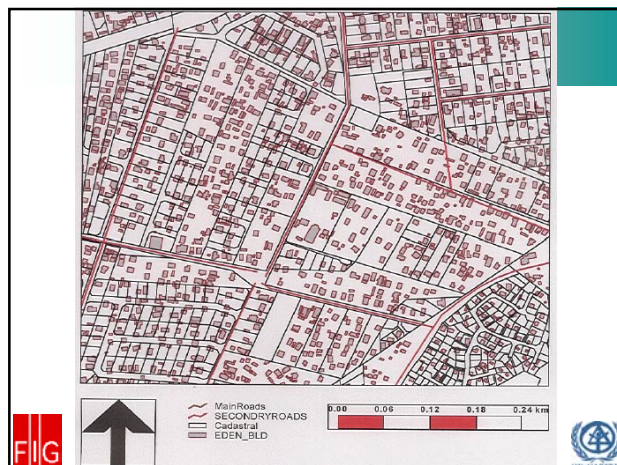- Geo-code or point identifier

Slide 1

Can the STDM accommodate an overlap between different tenures on the same parcel of land?

- Large scale informal settlement development often occurs contiguously over a range of legal land tenure types

Slide 2

MainRoads
SECONDRYROADS
Cadastral
EDEN_BLD

0.00   0.06   0.12   0.18   0.24 km

Slide 3

MainRoads
SECONDRYROADS
Cadastral
EDEN_BLD

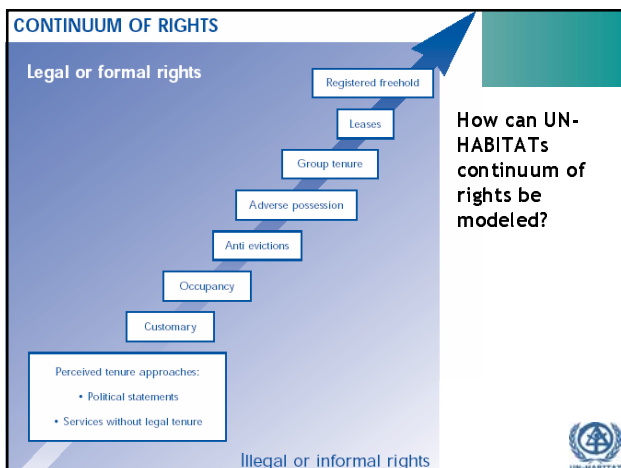0.00   0.04   0.08   0.12   0.16 km

Slide 4

How can optimal flexibility in linking all types of attributes and identifiers be supported?

- Decision makers have to deal with conflicting uses when making decisions
- Decision makers also need the information in a combined form
- Finally, decision makers require information over time
- A unique identifier (the Land Parcel Key) is associated with all information relating to the parcel or spatial unit thus enabling the Deeds, Survey, Financial, Planning and Engineering systems to communicate with each other.

Slide 5

CONTINUUM OF RIGHTS

Legal or formal rights

Registered freehold
Leases
Group tenure
Adverse possession
Anti evictions
Occupancy
Customary

Perceived tenure approaches:
- Political statements
- Services without legal tenure

Illegal or informal rights

How can UN-HABITATs continuum of rights be modeled?

Slide 6

What spatial information and land record requirements in conflict situations?

- Sustainable Relief and Reconstruction
- Guidelines on housing, land and property in post crisis situations
- Soft systems thinking
- Characteristics
  - lack of land policy at the national level
  - land management and land administration system that is largely dysfunctional
  - breakdown in the land management/administration
  - land planning system that has not been updated
  - breakdown in law and order
  - invasion of land
  - overlapping rights and claims

Comments to the questions (CL)

Can formal and informal tenure systems be merged in one environment?

- It seems that the whole spectrum of formal, informal and customary can be covered by re-using functionality
- There could be some (temporal) topological problems

Can reversibility from database to a paper based system be guaranteed?

- Complete paper based systems are not cheap
- Reconstruction of data in the case of disasters
- Source documents are relevant
- A class: 'SocioTenureRelationship' combined with '(Group)Person' and 'ImmovableObject'
- Appropriate ICT investments and capacity building are necessary conditions for sustainable development, alignment and implementation of the institutional, organizational and technical tools of land management
- The CCDM is designed for a digital environment, reversibility to paper environment seems complex and expensive but must be analyzed
- The need for both a paper based and computerized version of a Social Tenure Domain Model has to be further investigated; including efficient data acquisition methods.

Benny, Indonesia

Could spatial information in a STDM be represented in both existing geodetic networks and in new spatial frameworks?

- Standardization of the spatial reference frame work is a Domain in itself
- AFREF
- Existing co-ordinates in existing frameworks are expected to be transformed to new 'versions' of these co-ordinates in the future
- In case any spatial reference is missing those documents can only be accessed using the object identifier

Is it possible to link a STDM containing spatial data to other systems containing spatial data?

- Linking *mechanisms* are possible using unique object identifiers or by geo-referencing
- The implementation of linking mecahnisms requires standardisation and agreements between institutions on the use of those standards
- 'New wave' in geo-information standardization: after the domain independent basic geo-information standards (current series of ISO and OGC standards), the new standards based on specific domains will now be developed

What are the conditions for implementation of a STDM in a distributed and de-centralized environment?

- The Social Tenure Domain Model will most likely be implemented as a distributed set of (geo-) information systems, each supporting the data acquisition and data maintenance activities and the information supply of parts of the dataset represented in this model (diagram), thereby using other parts of the model
- Different organizations can have their own responsibilities in data maintenance and supply and communicate on the basis of standardized processes in so called value adding production chains, including upgrading of accuracy where required and the 'level' of the people-land relationship
- (Step by step) centralization/concentration

How can a STDM be applicable in an environment with different source data with different accuracies?

- Accuracy attributes, data collection modes (photogrammetry, satellite images, method of field survey (measuring tape, total station, plane table, etc)), source codes (data producer), date of survey (including name of surveyor or observer), date of creation, etc to polygons, lines and/or points
- The accuracy discussion is not only relevant for geometry

What are the requirements for the user interface at local level?

- The user friendly-ness requirement is probably not explicit within the scope of a Social Tenure Domain Model
- A standardized system contributes in itself to user friendly-ness and the avoidance of bureaucracy via a transparent approach
- Point of attention in standardization is in the number of attributes to be collected.

How should a participatory approach be optimally supported?

- It has to be investigated as to whether the inclusion of a class 'local committee' (with decision making power) and a class 'regional committee' is sufficient to support the participatory approach

How could a Social Tenure Domain Model support in full and equal access to land?

- Shared rights (relationships) are supported

Which types of parcel/spatial unit identifiers should be supported?

- A range of immovable objects is already supported. This concerns topological well structured area's with planar topology. Non planar partitions are supported with fuzzy boundaries, text labels, overlapping polygons.
- A person can be member of a group, a group can be member of a group of groups. A person (natural, non natural), a group of persons or a group of groups can have a one or more rights or socio-tenure-relationships associated, where each right concerns one or more polygons; polygons can overlap or can be identified with a label. A right or socio-tenure relationship is always in between persons and land. A right can be undocumented, in that case the source document is 'no document'

Can the STDM accommodate an overlap between different tenures on the same parcel of land?

- This has to be further investigated, it could be of a complex nature from the perspective of re-using functionality of the CCDM if topology comes in. Further it has to be investigated if overlap in non-planar-regions are possible

How can optimal flexibility in linking all types of attributes and identifiers be supported?

- A Social Tenure Domain Model should support the use of all kind of data types (dates, co-ordinates, photographs, digital fingerprints, a matrix of attributes
- Geo-coding approaches have to be further investigated in practice; re-constructability in case of use of co-ordinates for this purpose is a point of attention here
- Unit identifiers can be hierachical or other
- Geo-coding approaches have to be further investigated in practice; re-constructability is essential

How can UN-HABTAT's 'Continuum of rights' be modelled?

- Rights related to families or groups may be difficult to maintain if all individual persons have to be registered; from CCDM perspective this is not an issue
- The Social Tenure Domain Model has to provide functionality that supports inclusion of the Continuum of Rights
- This is a main research challenge; land tax and land use may require further attention is this research

What are the spatial information and land record requirements in conflict situations?

- What is needed is an information system that shows all the *claimants and rights holders*
- Different types of claims and rights, accuracy and legal evidence
- Overlapping rights

Conclusion

- A first analyses of functionality for a Social Tenure Domain Model is presented in this paper.
- It can be expected that substantial part of the FIG Core Cadastral Domain Model can be re-used or specialized into a Socio Tenure Domain Model
- CCDM functionality is re-usable but has to be further reviewed and assessed by experts in Social Tenure

User requirements

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

Way forward

- FIG partner of GLTN
- A partnership between FIG and UN HABITAT within the frame work of the Global Network of Pro-Poor Land Developers could be the basis for a further analyses and development of the Social Tenure Domain Model. This Network is being facilitated by UN-HABITAT together with partners such as FIG, the World Bank, ITC, the Lincoln Institute, Swedish and Norwegian aid, to be able to identify and solve some of the key blockages to the delivery of security of tenure for the poor. An appropriate pro poor Social Land Tenure Domain Model is considered one of the priority tools. 7

Thank you for your attention!

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

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