

ILM_2: Real Property Units and their Location

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Overview

1. The world view of the course
2. Land tenure and real property rights
3. A systematic approach of territorial units
4. Theory supporting use of place names

The world view of the course

Societal Values and Resources
condition
Organisational *interactions* on Development
of cadastral systems comprising of

Owners & Government
Property Rights & Rules
Transactions
Terrain Objects Databases

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Land tenure and property rights

- Land tenure is a legal term that means the right to hold land, rather than the simple fact of holding (being in possession of) land
- Property rights is a set of rights and responsibilities/ restrictions concerning a thing
- Real/ immovable property is property in land, etc.;
- Personal/ movable property is property in other things
- Intellectual property rights is copyrights to works, etc.

Land Registry and Cadastral Systems

- Land Registry: The administrative system used to record real property rights
- Cadastre: The administrative-technical system used to identify and locate units of property rights
- Cadstral System/ Land Administration System: Land Registry and Cadastre combined
- Land Management: + property taxation + land use planning + environmental management + ..

Land tenure systems

- Commonwealth "in theory feudal" [does not apply to the USA]
- Continental European (allodial system, ownership basically independent)
- Socialistic (Public ownership, individual right of use, planning for optimal use of land)
- Islamic (ownership/stewardship defined by religious world view)
- Customary law (community based rights; non-written rules)

Real Property Rights: Dispositions

- Physical dispositions
 - use, possess, gain usufructs
 - construct, fence
- Legal dispositions
 - sell, inherit
 - mortgage, use as collateral
 - lease, rent
 - subdivide, change boundary
 - grant easement

Real Property Rights: The Property Unit

A piece of the surface of the Earth, as defined by court rulings

- horizontal and vertical boundary
- delimitation of fixtures relative to movables

Definitions according to statute laws (Example: Denmark)

- Cadastral law
- Land registry law
- Agricultural law
- Property taxation law
- Condominium law

The unit of real estate according to Danish legal doctrine

What is generally left by the seller to the buyer of the estate, including some movables (keys, ladder), excluding some fixtures owned by 3rd party (utilities).

One or more parcels (contiguous areas) with plants, trees, and buildings, but only 'traditional' minerals (e.g. gravel) in the ground and limited towards sky according to convention.

Defined by legal doctrine and legislation, that is: not a tangible unit (like the property boundary). Restricted by spatial planning, agricultural law, heritage protection

Real Property Rights: Restrictions

- Compulsory purchase / expropriation
- Purchase restrictions, incl. preemption rights
- Spatial planning
- Easements, e.g. right of way
- Adverse possession

Enforcement of Real Property Rights: The infrastructure

- (Police) Protection of privacy
- Solving title and boundary disputes
- Performance of forced sales
- Operating credit market
- Maintenance of cadastral and land registry system
- Protection of boundary marks

Real Property Rights: Summary

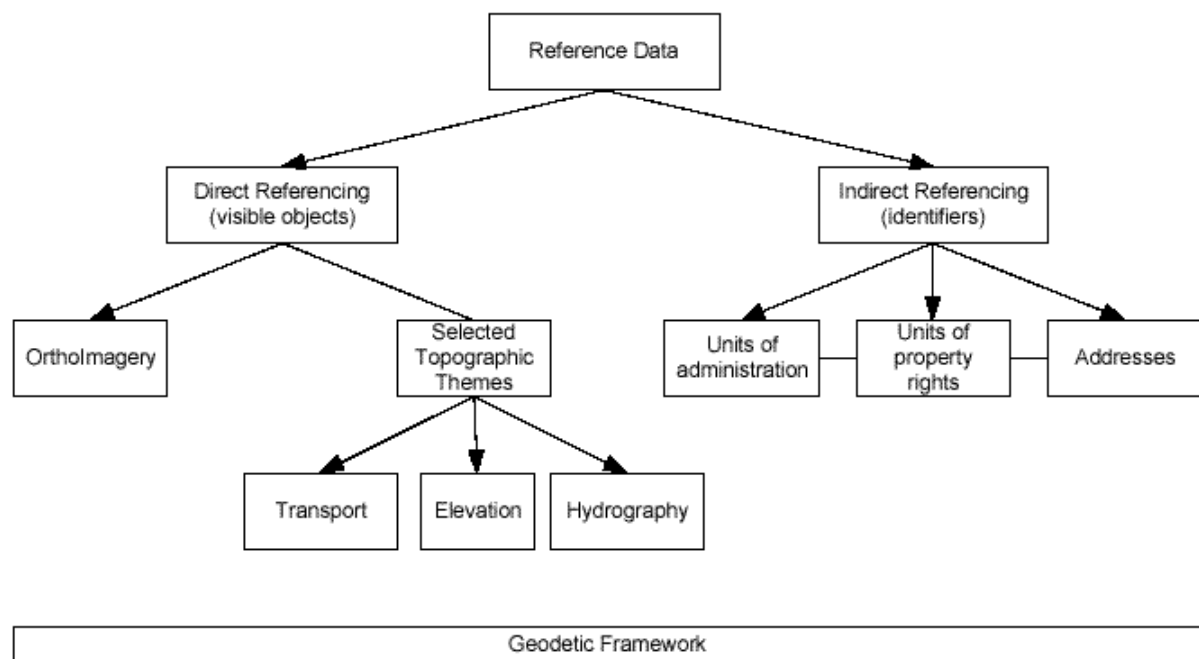
Dispositions: The content of Real Property Rights <ul style="list-style-type: none"> • Use; grow+sell; • mortgage+invest 	The Unit of Real Property: The object of Real Property Rights <ul style="list-style-type: none"> • Definition of the unit • Definition of boundaries and location
The context for dispositions regarding Real Property	
Restrictions of R P R <ul style="list-style-type: none"> • Easements • ... 	Infrastructure of R P R <ul style="list-style-type: none"> • Cadastral systems • ...

The development of land administration

Development of land administration includes, probably in parallel:

- Policy preparation and development
- Drafting and adoption of new legislation
- Implementation, based on Land Information Systems/GISs of national scope (NIS)
- Education of staff, involvement of professionals

Territorial units and the development of land administration



Territorial units of NIS need to be analysed, to catch specific opportunities. Source: ETeMII, 2001

Territorial units: Jurisdictions and districts

Number of units	Name of unit		Map scale
	Jurisdictions	Districts	
10 ²	Diocese (7), County (14), Court district (87)		1:100.000
	Municipality (271)		
10 ³	Parish (~1200) Unit for population statistics (Settlement)		1:25.000
10 ⁴	Township (~12.000) (Municipal planning districts) 1 square kilometer (44.000)		
10 ⁵	Address codes in population register (~120.000)		1:15.000
10 ⁶	Real Property units, and dwellings, etc. ~2 mio)		1:4.000 1:2.000

Theory: Four+ categories of territorial units

- Jurisdictions (formally established by ruler)
- Places (informally agreed by community)
- Regions (defined ad hoc by scientist)
- Districts (defined by logistics staff, available data)
- perhaps also: Areas (mathematical, abstract concept)

Geographical units (districts) for planning purposes

- Nordic Conference of Statistical Agencies ('Nordiske Statistiske Chefmøde') in 1960 adopted a common definition of the spatial unit of a 'locality', 'settlement', or urban district (Danish: 'bymæssig bebyggelse') to be used for population census.
- Independent of references to the administrative structures mentioned above, as it refers to number of persons (200), and distances between buildings (200 m).
- By 1970 the definition was further supported by the UN Economic Commission for Europe

Stubkjær, Erik (2001) Spatial, Socio-economic Units and Societal Needs

Theory on localising: Einstein, 1905

Thought experiment on the electro-dynamics of bodies in motion:

Two observers, one in a moving train, other (2) on a nearby slope.

Light impulses emitted from centre of train to open doors at both ends

Observer 1 (in train) sees doors open simultaneously

Observer 2 (on slope) sees rear door open first because of movement of train

Important point: Concept of spatial reference frames used outside geodesy

Before that: Only the geodesists' co-ordinate systems

After that (Britting, K R (1971) Inertial navigation systems) 9 nine!

Theory on localising: Turtle geometry, 1980s

Through education we (=geodesists) are familiar with analytical geometry, use Cartesian co-ordinate system, use mathematical functions, etc.

An alternative is *turtle geometry*: Carrying the reference frame with you (Abelson & di Sessa, 1980):

Go forward 100 steps, turn right 90°, back 30 steps, etc.

Easier for children to learn (no abstract co-ordinate system).

Route directions (to cheap tomatoes or advising tourists) are given in the same way.

The wise men of Mols, using their boat as a reference frame

Spatial reference frames: A summary

- The geodesist's reference frames (co-ordinate systems)
- Einstein's generalisation
- Turtle geometry's and robotic's 'moving' reference frame
- Gersmehl: Objects referenced by their enclosures

leads to: A *spatial reference frame* is

a mathematical construct related to a physical body

Stubkjær (1992) The development of NISs
Ph J Gersmehl (1996) The language of maps

Theory: Spatial Reference Frames

Domain: Human		Domain: Planetary
Fixed	Moving	Moving
Instrument (Total station, etc) Terrain elements: <ul style="list-style-type: none"> ● road ● landmark ● town, etc. 	Human body Vehicle	Earth Sun (inertial) system

Physical bodies which may provide the basis for a spatial reference frame.

Theory: Stevens' scales of measurement

Scale	Characteristics	Examples
Nominal	Discern: $A \neq B$, $A = A$	Names
Ordinal	Order: $A > B$, $B > C$ Boolean operations	Number sequences
Metric (Interval and Ratio)	Units: meter, Joule, Arithmetical operations	Co-ordinates Angles (directional differences)

Stevens (1946) Scales of Measurement *Science* Vol. 103, pp. 677-680 -
Supplement by Chrismann N (1997) Exploring geographic information system.

Applied theory: Stevens' scales of measurement

Example	Dimension	Scale of measurement
Street naming	N/A	Nominal
House numbering	1	Ordinal
Road centerline	2	Metric
"Metes and bounds"	2	Metric
Property map	2	Ordinal, Metric

Implication for cadastre:**Apply nominal and ordinal spatial reference frames**

Math. construct (scale)	Nominal	Ordinal	Metric
Physical body	Human body Vehicle Enclosures	Terrain objects (road, landmark, town,)	Earth Sun (inertial) system
Application	Jurisdictions	Post addresses	Geodetic co-ordinates

Identification and localising of geographical units

Means of identification of geographical units (means of separating/discerning one unit from another)

- Place names, including street names (name of towns, squares, streets, etc. remembered by people)
- Sign plates (on streets, on rooms, etc.)
- Index maps (e.g. the cadastral map, or maps of condominium units)
- Centroid or geocode coordinates as identifier, and
- Combinations of the above mentioned.

The road system as a spatial reference frame

- Road names are shown on plates in towns AND countryside
- House numbering scheme (plated!) defines orientation, e.g. smaller house numbers closer to city center than larger numbers
- In multi-storey buildings, the floors are named consistently (basement or ground floor 0 or 1)
- In multi-storey buildings, the apartments are identified according to formalised practise

Identification of geographical units

Boundary marks may define (the boundary of) a property unit, but the marks do not identify the unit.

Experience from the development of the Danish Building and Dwelling Register:

Coordinate systems are not the only means of expressing spatial relations. Analytical geometry has to be supplemented by topology ('neighbour-geometry').

Formalisation of Place Names

Tentative overview:

- Burrough / municipal assignment of cadastral numbers in towns (1700->)
- Plating of street names and house numbers in towns (1800s)
- Military mapping services record place names on topographic maps (1800->)
- Linguists study distribution of place names, indicating age of settlement (1900->)
- Road legislation entitles municipalities to assign road names (-> 1950 ->)
- National Committees for place names, balancing cultural, administrative (post, municipalities), and other concerns
- Coding of jurisdictions, post districts, and road names (1960->)
- Denmark: NIS of Building and Premises presupposes complete naming and coding of inhabited roads (1976)

Place naming is a cultural/ political affair

Names for same street in Prague(?) during 1900s:

- Vinograd Avenue
- Foch Avenue
- Hitler Avenue
- Stalin Avenue
- Vinograd Avenue

cf. Ho Chi Minh City (former Saigon)

The name of "Pusher street" (Christiania, DK) was not invented by authorities!

Influencing and neutral referents for place names.

Influencing referents	Neutral referents
Historical events Person names	Location names Terrain features Names of flora and fauna

The Relevance of formalisation of Post Addresses

Makes sense to ordinary people, post, transportation, and administrative purposes:

- collection of utility fees (electricity, water, etc.)
- combining fee collection with collection of property taxes
- small area statistics, that is (geo-spatial) data for planning purposes
- cross reference key for NISs, managed by different ministries
- place names may become an issue in local (municipal) politics

Experiences made in several European countries: DK, N, UK, F, Portugal, .. using the post address system for GIS analyses by cross-referencing with digital maps (geocoding)

Formalisation and administration of place names

Place names -> formalisation -> uniform location designator system

Ed Young, eddon@ozemail.com.au, 2002

Streamline ("re-interpret" K. Deininger) the following:

- the place name practises, as expressed by village inhabitants
- potential carriers (poles?) of street signs, and their functional and artistic design; present practises
- possible body responsible for approving names within the local jurisdiction
- local information system for recording the place names (to be used by local committee, avoid duplicates, etc.), with linkage to nLIS
- governmental consultative committee, and
- ordinance for adopting and managing place names, house numbers, etc.

Summary: Territorial Objects and Place Names

- The geodetic, national coordinate system is not the only spatial reference frame
- The cadastral identifier is not the only territorial identifier
- In a country, Territorial Objects ought to be studied systematically
- A policy aiming at versatile use of formalised practise regarding Territorial Objects may support land administration generally

Summary: Land tenure and property rights

- Land tenure is culture specific, and hence difficult to change
- NIS may possibly be designed and implemented, but institutions like property rights can not be rationally designed and implemented
- Institutional change is a research issue. Task for LM projects is to "re-interpret" (~= change, catch the opportunity)

General summary

- Monday: Listed course resources: Land Tenure terminology, OICRF, etc. Identified course tasks
- Today: Territorial Objects is a field that can (and should) be investigated
- The human body and the street network provides for spatial reference frames that everyone uses and understands
- Property rights are described in basic terms
- Institutional change is an issue to explore

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