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A Theoretical Basis for Cadastral Development
Part 2 of 3

Lectured 1.-3. December 2009 in the context of
The Master's Programme in Land Management,
Unit for Real Estate Planning and Land Law,
The Royal Institute of Technology, Stockholm, Sweden

Summary and outlook

1. Dec.	2. Dec.	3. Dec.
1. The cadastral system 2. Analysis of society 3. Inequality and 'convergence' 4. Society, state and ownership	1. Components of Spatial Data Infrastructures 2. Public information services 3. Organisation and institution.	1. Development strategies 2. De Soto (2000) 3. Understanding institutions 4. Institutional transactions 5. Why did Denmark develope?

Overview: GeoSpatial objects, information flow, and organisations

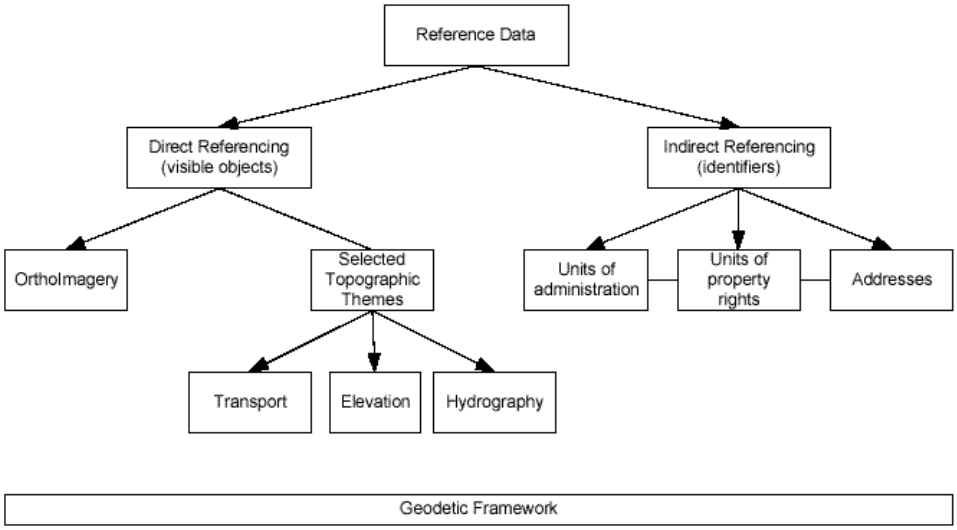
1. Components of Spatial Data Infrastructures, SDIs
   - Spatial data categories; socio-economic units
   - Territorial units of a country; jurisdictions
   - Post addresses as a spatial reference frame. Theory on spatial reference frames
2. Public information services - flow of information
   - L4-transactions on rights in land: subdivision, sale, building permit. De Soto on efficiency.
3. Organisation and institution. (Change of Inst. comes tomorrow)
   - Organisations: Structure, types,
   - Research on organisations. Rational vs. satisfying decisions.
   - Sociology of organisations: Byond the formal rules

Data categories as 'reference' for more specialized data

Visible objects (direct referencing)	**Socio-economic units and identifiers**
OrtoImagery ('Landscape') Selected topographic themes: • Transport • Elevation • Hydrography	• Units of administration • Units of property rights • Addresses (place names, postcodes)
Geodetic framework	

Source: ETeMII Reference Data White paper, Version 1.0, 31. July 2001, p 9 (Format modified)

Categories of geo-spatial data



EU ETeMII White Paper, 2001.

Information i ETeMII White Paper, Annex C:

Geodata groups and their relative economic weight	
Visible objects: 33%	**Socio-economic Units: 29%**
Selected topographical themes: • Transport: 5 • Elevation: 7 • Hydrography: 5 • Other environmental: 16	• Units of administration: 2 • Units of property rights: 27 • Addresses: ?
Geodetic framework: 4; Utilities 19; Maritime navigation: 15;	

Source: ANZLIC Benefit Study, 1995, as quoted by ETeMII, 2001, Annex C

Available information suggests priority of property data

Danish socio-economic, territorial units (1990s)

Number of units	Name of unit *Jurisdictions* *Districts*	Map scale
10^2	Diocese (7), County (14)	1:100.000
	Municipality (276)	
10^3	Parish (~1200) (Settlement)	1:25.000
10^4	Township (~12.000) (Municipal planning districts) 1 square kilometre (44.000)	
10^5	Address codes in population NIS (~120.000)	1:15.000
10^6	Real property units (Estate units, dwellings, etc. ~2 mio)	1:4.000 1:2.000

Information communities and categories of territorial units

Information community	Territorial categories	Example
Princes, rulers, owners	Jurisdiction	Nation Unit of real property
Inhabitants	Place	Square, town, recidence
Geographer, scientist	Region	Unit for scientific analysis
Planner (logistics; municipality)	District (zone)	Solving adm. tasks

Stubkjær (2001) Spatial, Socio-economic Units and Societal Needs - Danish Experiences ... Pp 265-279.
In: Frank, A U; Raper, J; Cheylan, JP (Eds): Life and Motion of Socio-Economic Units. GISDATA Series, no. 8, London.

Geogr. units of the Danish Building and Dwelling Info. Sys.

- Estate unit: Data on water, sewers, heating; ownership
- Building unit: Data on walls, roof, floors, area (sq. meters)
- Dwelling (flat, rented unit): Data on kitchen, wc, bath, area (sq. meters)

Identification scheme (planned):

- Estate unit: Number within municipality (property tax number)
- Building: Number within estate unit + *post address for ALL street doors*
- Dwelling (flat, rented unit): Label with numbers on entrance door, numbering system decided by owner (Cadastral identifiers are plated in Copenhagen)

Identification scheme: The solution:

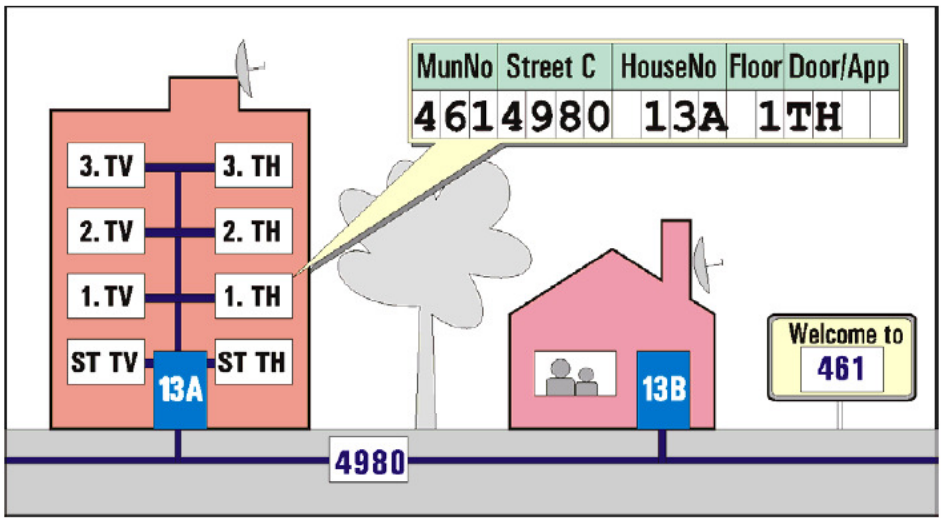


Figure 1-2: The "architecture" of the Danish address format

Co-ordinates were not in focus; Location by ordinal, not metric system.

Morten Lind (2001) http://www.adresseprojekt.dk/files/Develop_PublicAddress_urisa2001e.pdf

The identification of dwellings by means of post address

Danish identification scheme:

- Municipal number (815)
- Street code (8216, coding street name within municipality)
- Plated number on street door (post address, managed by municipality)
- Floor: Basement, ground floor, 1st, 2nd, ...*Standardization needed*
- Dwelling identification ('left', 'centerleft', 'centre', .. or number)
- "Orient yourself by standing on the last step before the landing"

Identification of geographical units without maps! but how ?

Theory on Spatial Reference Frames

a. Stevens' scales of measurement

Scale	Characteristics	Examples
Nominal	Discern: A != B, A = A Classification	Names, basic colors
Ordinal	Order: A > B, B > C Boolean operations	Number sequences
Metric (Interval and Ratio)	Units: meter, Joule, Arithmetrical operations	Co-ordinates Angels (directional differences)

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

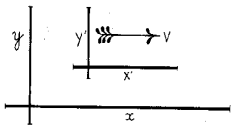
b. Einstein and bodies in motion, 1905

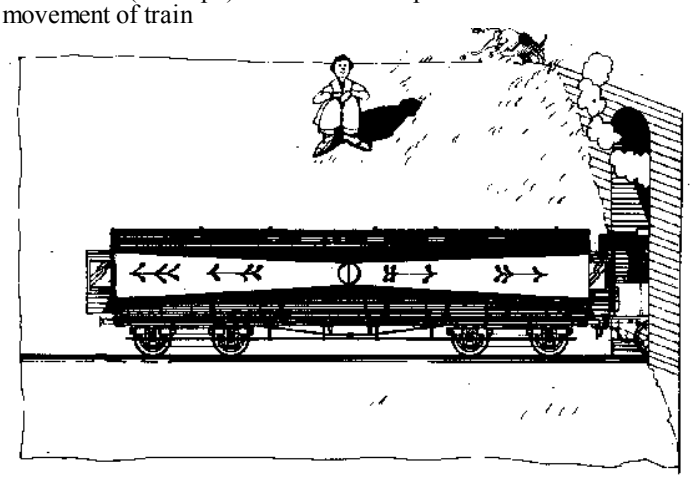
Two observers, one (1) in a moving train, other (2) on a nearby slope.
Light impulses emitted from centre of wan to open doors at both ends Observer 1 (in train) sees doors open simultaneously
Observer 2 (on slope) sees rear door open first because of movement of train

Thought experiment:

Important point:

Concept of spatial reference frames used outside geodesy





Turtle geometry: The reference frame moves with the body

Geodetic surveyors use Cartesian co-ordinate system, higher math.

An alternative is *turtle geometry* (Abelson & di Sessa, 1980):

Go forward 100 steps, turn right 90^{o}, etc.
No abstract co-ordinate system. Route directions (to cheap tomatos or advising tourists) are given in the same way.

Abelson H & diSessa A: Turtle geometry - the computer as a medium for exploring mathematics. Cambridge, Mass., 1986.

Spatial reference frames

- The geodesist's reference frames (co-ordinate systems)
- Einstein's generalisation
- Turtle geometry's and robots' 'moving' reference frame
- Gersmehl: Objects referenced by their enclosures
  e.g. 'KTH lies within Stockholm'

leads to: A *spatial reference frame* consists of

a mathematical construct related to a physical body

Stubkjær (1992) The development of national.. info. systems *CEUS* 16(3)
Ph J Gersmehl (1996) The language of maps

2. Public information services - flow of information Interoperability

The aspects of interoperability identified as being in need of consideration by the European Interoperability Framework v.1.0 (EIF) are: Organisational, Semantic and Technical interoperability (EIF, section 2.1.2).

ORGANISATIONAL INTEROPERABILITY
..defining business goals, modelling business processes and bringing about the collaboration ... Moreover, .. aims at addressing the requirements of the user community

SEMANTIC INTEROPERABILITY
..ensuring that .. meaning of exchanged information is understandable ... enables systems to combine .. information ...and process it in a meaningful manner.

TECHNICAL INTEROPERABILITY
..the technical issues of linking computer systems and services. .. open interfaces, middleware, data presentation and exchange,.. and security services.

Information systems are updated through data flows

Public services for **citizens**:
1 [Property/ land] taxes: Sales abstract for statistical purposes
6 Application for building permission: Data collected from adm. process
11 Announcement of moving (change of address): Dissemination of info

Public services for **companies**:
5 Submission of data to statistical offices
7 Environment-related permits (including reporting): As 6. above

Land Registries (and Cadastre): Data flows (='business processes') needed

Property formation in the Nordic countries - Denmark
http://www.kms.dk/NR/rdonlyres/631D6233-F747-4E1F-98DA-FED3EDAD963E/0/PropertyformationintheNordiccountries.pdf

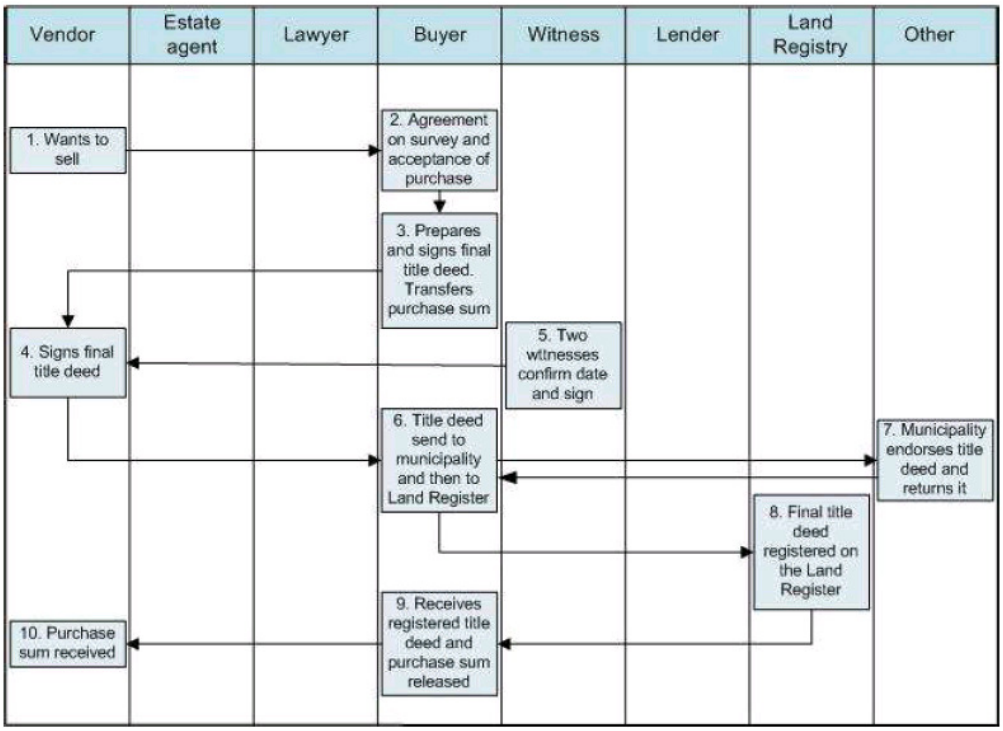
Summary, regarding GIS / SDI

Public services for **citizens**:
1 [Property/ land] taxes: declaration, notification of assessment
6 Application for building permission
11 Announcement of moving (change of address)

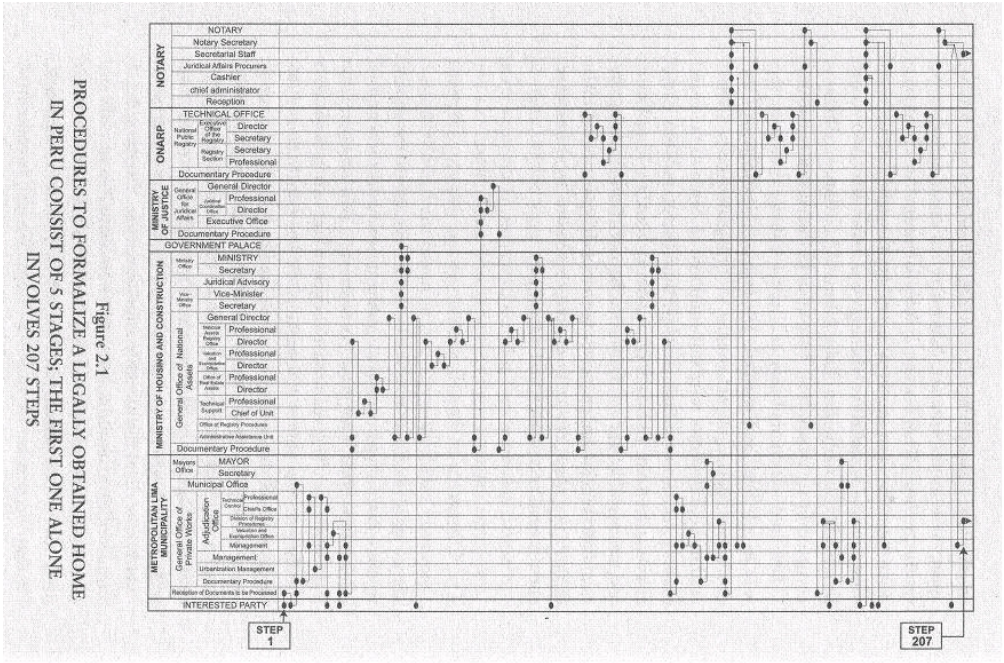
Public services for **companies**:
5 Submission of data to statistical offices
7 Environment-related permits (including reporting)

ESt: Strangely, Land Registries were not mentioned (judicial, not adm.)
-> A need for **a national address coding and information system**

Purchase (simplified) of a property unit in Denmark:



Hernando de Soto on 'business processes'



3. Organisation and institution

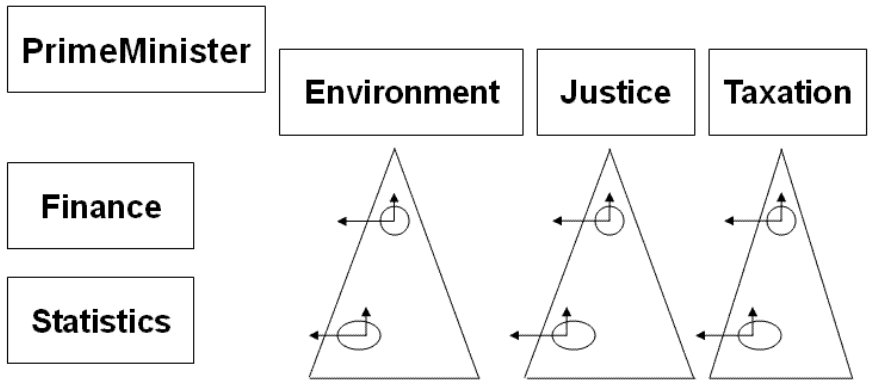
An organisation is

- a named entity, made up of
- a group of individuals, who
  - perform work in specialized units [thereby increasing productivity]
  - coordinated by rather permanent relations and procedures
  - as stated in written articles,
- to achieve the goal of the organisation

North: Organisation: by contrast, are those groups of people and the governance arrangements they create to coordinate their team action

against other teams performing also as organizations. [From Part 1: Emphasizes organisational interaction]

Formal structure: Hierarchy and Matrix-Organisation



The structure of an organisation may be defined by articles, ordinances, job descriptions, ..

Other forms (3/3): Committees, Project organisations

Committee
: a group of peers who decide as a group, perhaps by voting. The difference between a jury and a committee is that the members of the committee are usually assigned to perform or lead actions which leads up to or extends from the decision.

Project organisation
: a 'local' hierarchy set up to solve a specific task, e.g to build a construction

Functionalist views on organisation:

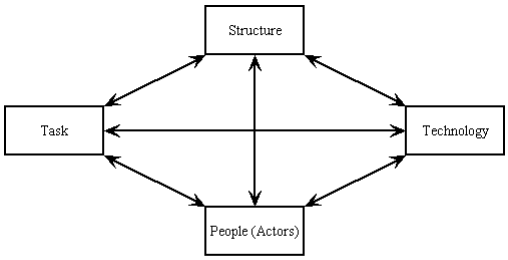
Mechanistic:

- Taylor, 1911: Scientific management (cf Chaplin: Modern Times)
- Simon, 1947: Rational man, administrative man

Human relations:

- Mayo, 1933: Hawthorne experiments
- McGregor, 1960: Theory X and theory Y

The Leavitt-Whisler model: Components and change



Kilde: Leavitt, 1965. Fig 1, side 1145

Sociology of organisations

	Strong (formal) regulation	Weak (formal) regulation
Strong social integration	Hierarchical: Exchange according to authorized rules	Egalitarian culture: cf. Human relations approach
Weak social integration	Culture of indifference, fatalistic: No initiative is a rational position	Individualistic: Quid pro quo for each transaction

Social regulation: Degree of individual freedom towards authority
Social integration: Degree of partnership in groups or networks

Omran; van Etten (2007) Spatial-Data Sharing.. IJGIS

Max Weber (1924) on bureaucracy

"..the exercise of control on the basis of knowledge"
in church, government, and enterprise (read: in hierarchy)

- Decisions by subsumption of cases to rules, in writing
- 'Bureau' (office: authority) with specific competence
- Officials act impersonal, duty /service, *have no ownership of means*
- Promotion based on technical skills, by superiors

Recently quoted in

Roberts and Hite (2000) From modernization to globalization - Perspectives on development and social change. Blackwell, UK.

Decision processes: Rational

Steps in rational problem solving:

- define problem
- establish criteria of solution
- develop alternatives
- rate alternatives
- select solution, and implement it
- restructure problem conception

.. and not so rational , and legal decision processes

1. General administrative approach: Refrain from developing alternatives, that is: be *satisfied* with a sensible solution (Simon, 1947: Rational man, administrative man)
2. Legal and bureaucratic approach: Subsumption of data of an application to given legal rules

Comments on Hierarchy

- (Well functioning) organisations are based on hierarchy
- Potential of hierarchy is division of tasks (specialization), leading to better productivity
- Because of order of hierarchy, it can achieve a lot, but it may suppress creativity and individual initiative

Alternatives to hierarchy: Market and (actor) network

Bureaucracy and patrimonialism

Democratic transition has been successful in only a few countries in sub-Saharan Africa. In most countries a mixed system prevails, which has prevented the beginnings of a *rational and legal* administration asserting themselves against continuing *patrimonial* power structures. Decisions are taken not on the basis of institutionalised rules, but in favour of personal relationships and to personal advantage. ... the assertion of rational-legal administration and legal systems [is] the most important precondition for Africa's development.

http://www.inwent.org/E+Z/1997-2002/de102-4.htm

Patrimony
The sum total of all personal and real entitlements, including movable and immovable property, belonging to a person.

Patrimonialism in Russia

Calling Russia "patrimonial" I find much more useful, since it captures the essence of what I believe Russia is and not what it might become. By patrimonial, I mean those regimes, where political authority and property ownership are fused.
In patrimonial regimes the elites -- be it the czar, the oligarchs, the bureaucracy, or Putin -- view themselves and are seen by their subjects as *both ruler of the realm and its owner*.
In particular, in patrimonial states the legal and practical distinction between political power and private property either does not exist or is blurred. This blurring of power and property is much different from the situation in the United States or Western Europe, where the law draws a strong distinction between the two.

The Washington Times, April 1, 2004 http://www.washtimes.com

Categories of rules (for next week's course)

- Rules of behavior: In situation S the behavior B by addressee A is illegal/ mandatory
- Rules of procedure: In context X, to arrive at decision D, the steps $S_1..S_n$ have to be performed
- Rules of competency: By code C, NN is - on conditions $D_{1..n}$ - entitled to grant applicant A the permission/ benefit P,
- Definitions: In the present law, by term T is understood ..(definition)..
  Implies that certain documents (certificats,..) grants the holder certain rights

Acts and ordinances, etc. are made up of these rule categories

Summary and outlook

1.	2.	3.
1. The cadastral system 2. Analysis of society 3. Inequality and 'convergence' 4. Society, state and ownership	1. Components of Spatial Data Infrastructures 2. Public information services 3. Organisation and institution.	1. Development strategies 2. De Soto (2000) 3. Understanding institutions 4. Institutional transactions 5. Why did Denmark develope?