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Spatially Enabled Society – Role of the Cadastre

XXIV FIG International Congress 2010

Sydney, 14 Apr. 2010

FIG-Task Force «Spatially Enabled Society»
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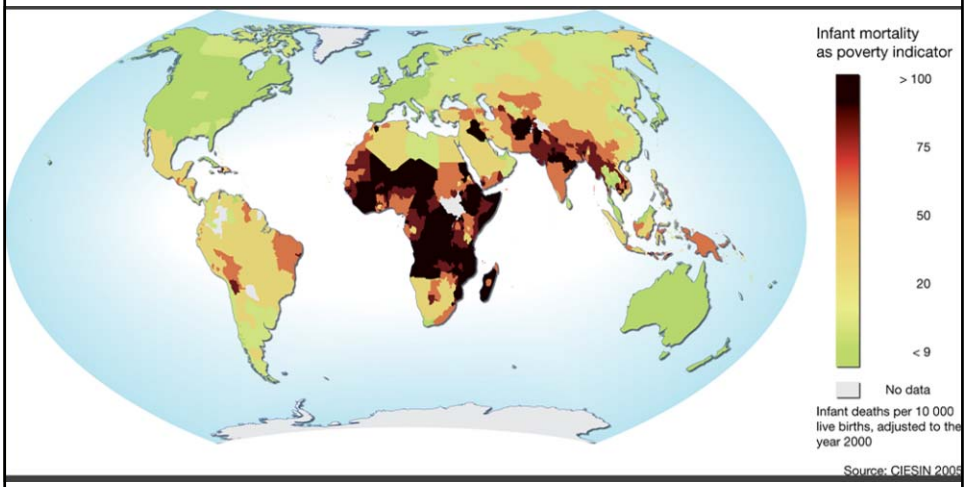
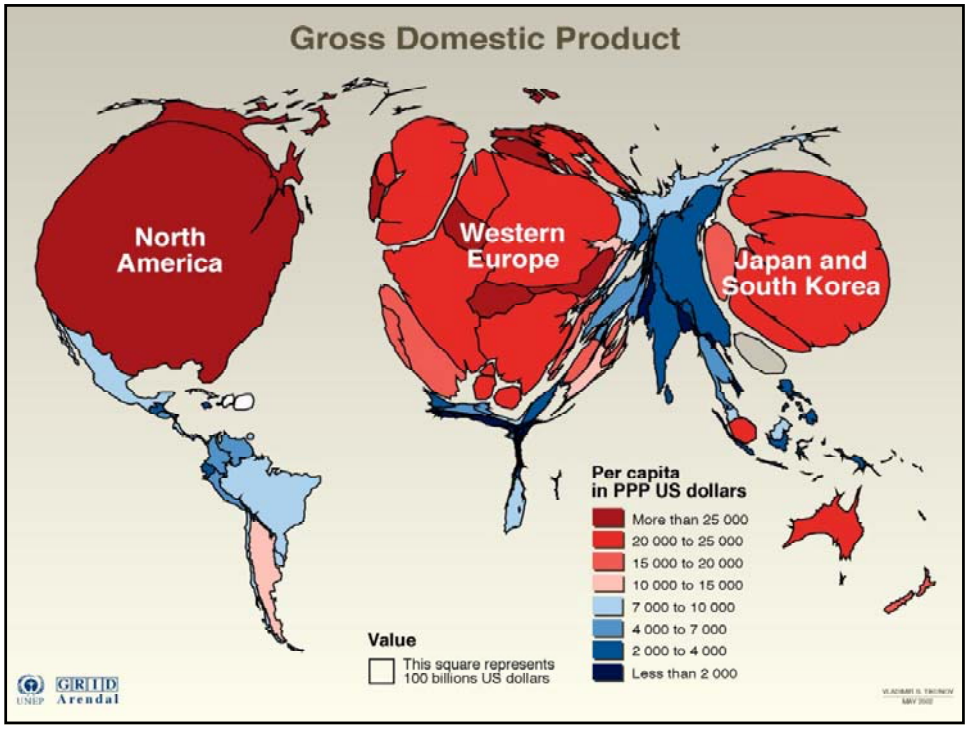
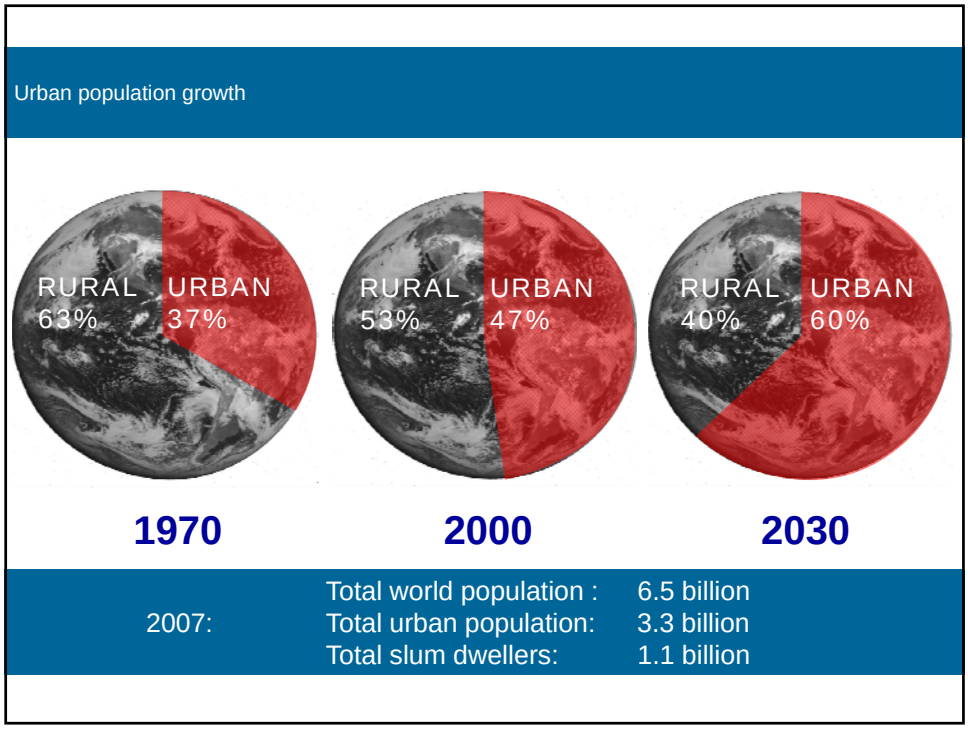
Reversal of perspective

- What does society need? What are its requirements?
- Problems that humankind, respective we as a global community are facing:
  - pollution, climate change, global warming, sea level rising, disaster management, shortage of natural and energy resources, land grabbing, mobility, traffic, global financial crisis, overpopulation, increasing urbanization, poverty
- UN - Millennium Development Goals by 2015:
  - eradication of extreme poverty and hunger, ensure environmental sustainability, develop global partnership for development

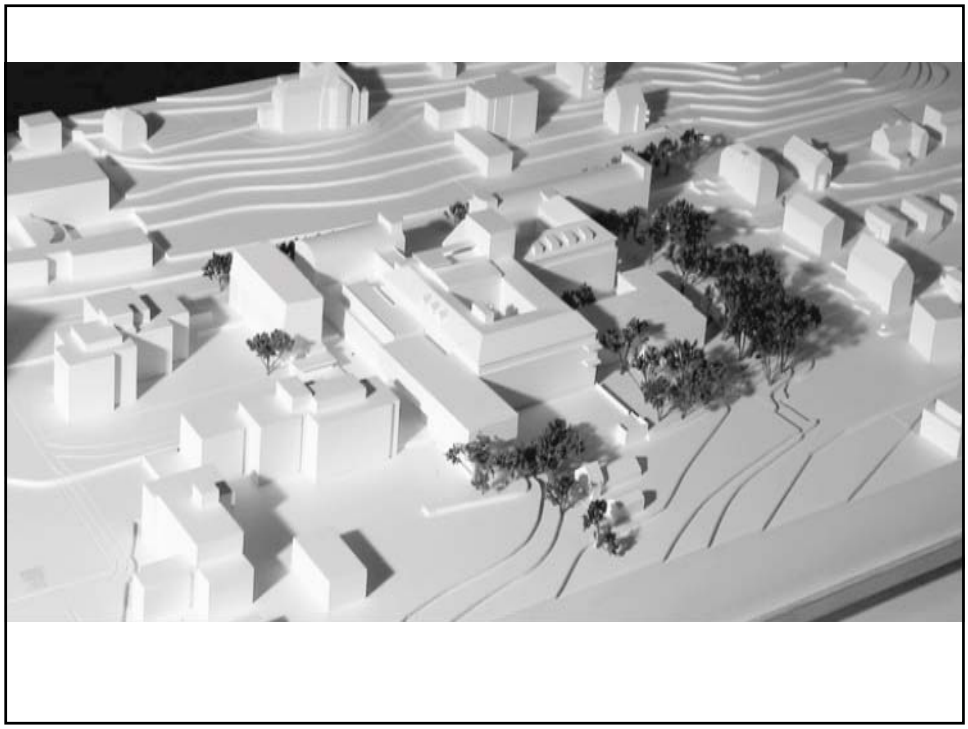
World status of poverty




Gross Domestic Product
North America
Western Europe
Japan and South Korea
Per capita in PPP US dollars
More than 25 000
20 000 to 25 000
15 000 to 20 000
10 000 to 15 000
7 000 to 10 000
4 000 to 7 000
2 000 to 4 000
Less than 2 000
Value
This square represents 100 billions US dollars
UNEP GRID Arendal


Urban population growth
RURAL 63%
URBAN 37%
RURAL 53%
URBAN 47%
RURAL 40%
URBAN 60%
1970
2000
2030
2007:
Total world population : 6.5 billion
Total urban population: 3.3 billion
Total slum dwellers: 1.1 billion


Kibera, Nairobi, 250 ha, 1 mill+ people



How to approach such challenges?

- as any other problems, global problems have a spatial dimension (*"everything happens somewhere"*);
- in order to overcome such problems, to monitor them and to do the proper planning, data and information is required;
- this information has to represent reality as close as possible;
- data modelling is needed in order to organize the information involved;
- these data models have to:
  - represent the actual situation,
  - provide the basis for planning and monitoring the projects,
  - be able to do simulations of alternatives of the planned solutions,
  - provide the correct location → spatial enablement.

Three ingredients for spatial enablement of society's needs

- **positioning infrastructure**
- **content**
- **land ownership information**

Role of landownership

- everything happens somewhere;
- always on somebody's property;
- for planning, monitoring and sustainable development, landownership data is required;
- even when property is state owned, society needs to know;

➢ **society needs a documentation system for landowner-ship as a basis for informed decision-making.**

Documentation of landownership in history

- Domesday Book (William the Conqueror) 1086
- Maria Theresia Cadastre (Austro-Hungarian Monarchy) 1792
- Cadastre by Napoleon 1807

3 dimensions of the cadastre for sustainability

Economic dimension

- Fiscal income for government
- Transparent land market
- Administration of public-rights restrictions provides a more transparent land market

Social dimension

- Legal security of ownership provides social security

Environmental dimension

- Resource planning and management
- Land-use planning, management of zoning

Land management and landownership

- land consolidation is an essential tool for good land management;
- this tool is suited for agricultural areas;
- but also for urban areas;
- and for larger zoning projects such as for example for "industrial zoning consolidation" across municipalities;

➢ land consolidation always needs landownership information.

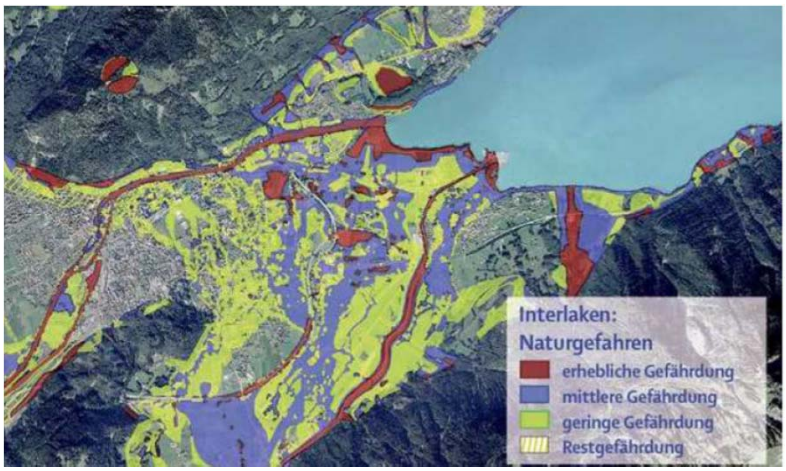
Land administration in a larger context

Tasks	Land related activities	Tools / Methods
Strategy • visions and objectives	**Land policy**	•political activities
Management • measures and projects for the implementation of the policy	**Land management** 	•land-use planning •land consolidation •land reallocation •melioration •landscape development •land recycling
Administration / Documentation • handling of spatial information, data analysis, data visualization • cadastral operations, data modelling, data acquisition, data maintenance, data distribution	**Land administration and cadastre** 	•monitoring •navigation •geoinformation •land registration •cartography •surveying •geodesy

Lack of landownership information in disaster management

- Thailand after Tsunami: lack of proper landownership information allowed financial investors to take over land, while local fisherman have been ousted from their properties
  → a well documented landownership information would have protected minorities with lesser economic power against exploitation.
- Aceh: the lack of a land registry and cadastre caused huge problems for reconstruction, planning, and social stability.
- Haiti: clear landownership information would support a much quicker recovery (Kappeler, 2010).
- **Disaster management starts before the disaster; landownership information is crucial.**

Inventory of natural hazards in combination with landownership information



Private landownership supporting environmental sustainability

Azerbaijan after transition in 1990's:

- private landownership was introduced initially for land within the village only;
- land outside the villages remained common property respective state property;
- village society was not sufficiently organized;
- sheep secure the income of the rural population;
- sheep stock became approx. 5 times as big as the actual capacity of the land would have been;
- serious erosion and degradation problems;

➢ **basic problem was the lack of responsibility and accountability.**

Landownership plays a central role

- landownership data is required for planning, monitoring and sustainable development;
- disaster management starts before the disaster; landownership information is crucial;
- accountability: only stakeholders with ownership rights – i.e. landowners – take responsibility;
- tools for land management need reliable landownership information.

→ **Private landownership is crucial; it needs to be secured by an appropriate land policy driven by sustainable development principles and documented with an efficient and reliable land administration system.**

Positioning infrastructure

- "everything happens somewhere"
- many business applications are in need of position data
- CORS provide high accuracy
- business cases show a high potential (Higgins, 2009)
- accuracy not really a problem anymore nowadays

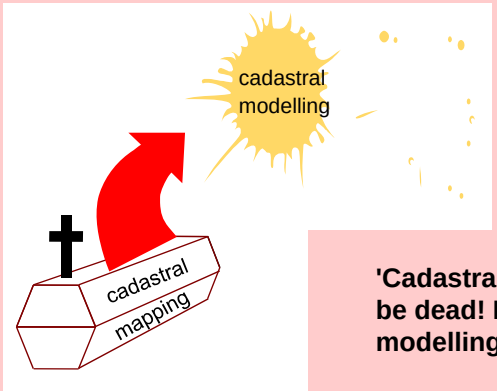
→ **A positioning infrastructure provides the spatial enablement of content.**

Modelling of content

- based on the positioning infrastructure, content is added to locations;
- content needs to be organized, i.e. modelled in order to be helpful for monitoring, planning, and managing change;
- the data model behind has to represent reality as close as possible;
- data modelling would have to be done according to accepted standards in order to share the data and allow ease of use;

→ **Data modelling is the enabling technology to organize the content of data. Data modelling standards are crucial for the sharing of data.**

Statement 3 on Cadastre 2014



'Cadastral mapping' will be dead! Long live modelling!

Structure for land information system

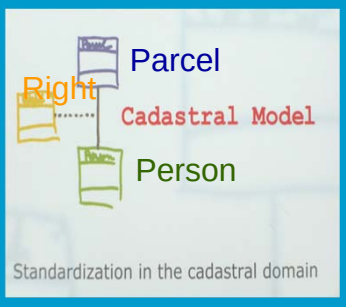
Legal topic	spatial data	textual data	Stakeholders (data owners)
Water protection			Local government
Noise protection			Local government
Environmental protection			Environmental department
Land use planning			Planning department
Indigenous land rights			Tribe, clan
Collective land rights			Corporations
Land ownership, cadastre			National government State government Local government

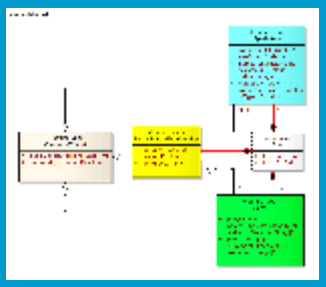
only connection between layers is geographic location !!!

Two preconditions: ..... *common geodetic reference framework*
⟷ *common data modelling concept*

The Social Tenure Domain Model

Party ⟷ Social Tenure Relationship ⟷ Spatial Unit





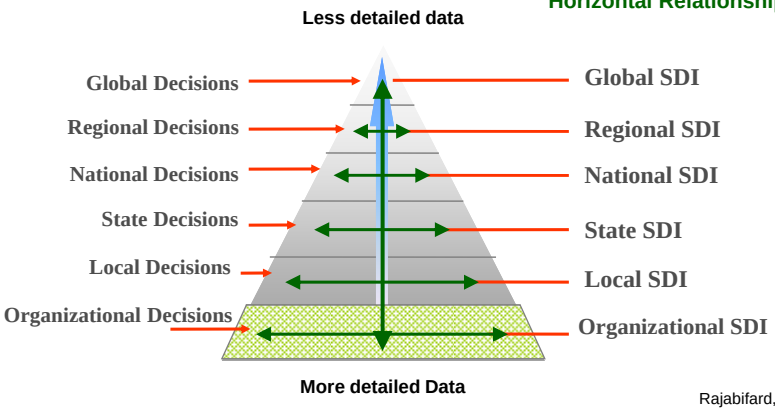
(Lemmen, 2009)

Network infrastructure

Spatial Data Infrastructure

Vertical Relationship

Horizontal Relationship

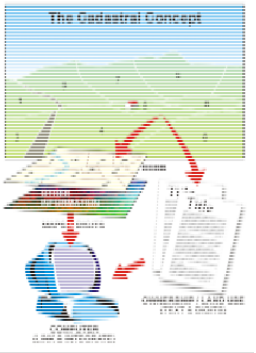


Rajabifard, 2007

→ **Network infrastructure for sharing spatial data.**

Data and information

We are living in the information age, where patchwork information is not good enough.



→ **Data needs to be:**

- **comprehensive**
- **complete**
- **updated**
- **reliable**

Public sector information (PSI)

- spatial data, above all, cadastral information tends to be managed by government and is often not readily available;
- value of data lies in its use;
- fee policies vs. cost recovery policy or the balance between accessibility and cost recovery;
- PSI needs to be accessible in an efficient way.

→ PSI initiative in Europe

→ GILF initiative in Australia (GILF = Government Information Licensing Framework, gilf.gov.au)

→ Public sector information needs to be accessible in defined and easy ways in order to facilitate its multiple use.

Six vision statements for a SES

A society is spatially enabled, when:

1. A positioning infrastructure is in place.
2. Content is added with data modelling standards in place that allow to model reality as close as possible.
3. Private landownership is established, well documented, and its information readily available.
4. A network infrastructure for spatial data is in place in order to provide access to data and information.
5. Data and information is comprehensive, complete, updated, and reliable.
6. Access to relevant public sector information is organized and efficient.

Changing role of (cadastral) surveyors

- from measurement to management
- global land management perspective
- land administration systems provide the infrastructure for implementing land policy and land management strategies in support of sustainable development
- no development will take place without a spatial component

➢ **we are not talking of maps any longer, we are in the information business !!!**