ESRI Cadastre 2014 Data Model

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Agenda

- Data Model Purpose
- Thematic content

Sample Database and Design Documents
See Data Models at
support.esri.com/datamodels

Data Model Purpose

- Develop a data model to support management of cadastral systems of the future
- Basis
  - ideas of Cadastre 2014 initiative of FIG,
  - best practices form around the world,
  - other Cadastral data models,
  - standards
- Provide a solid template for cadastral agencies of the world based on ESRI's multilayer philosophy

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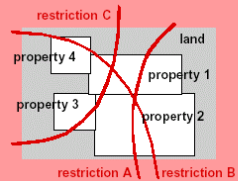
Cadastre 2014 - Review

- FIG Working group 7.1 - tasked to study cadastral reform projects in developed countries.
- Elements considered:
  - the on-going automation of the cadastres
  - increasing importance of the cadastre as part of a larger land information system.
- Result - a vision of:
  - where cadastral systems might be in twenty years,
  - the changes that might take place,
  - the means by which these changes can be achieved,
  - the technology to be used to implement these changes.
- 6 Principles of the Vision.

Legal Situation of Land

Statement 1 on Cadastre 2014

Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions!
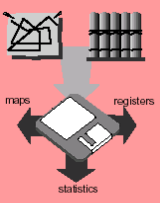
Comment: The population of the world is growing. The consumption of land is increasing. The absolute control of the individual or of legal entities of land is increasingly being restricted by public interest. To provide security of the land tenure, all facts about land must be made obvious by the cadastral system of the future.

Consequences: A new thematic model is necessary. Surveyors must take into consideration public law.

restriction C

land

property 4

property 1

property 3

property 2

restriction A   restriction B

Integration with the Register
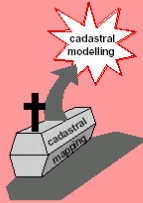
Statement 2 on Cadastre 2014

maps   registers

The separation between 'maps' and 'registers' will be abolished!

Comment: The separation was necessary because the available technology – paper and pencil – did not allow other solutions.

Consequences: The division of responsibilities between surveyor and solicitor in the domain of cadastre will be seriously changed.

statistics

Modeling Over Mapping

Statement 3 on Cadastre 2014

The Cadastral mapping will be dead! Long live modelling!

Comment: Maps have always been models, but the available technology did not allow for the use of these models in a flexible manner. So in mapping flexibility had to be brought in by different scales. Different scales had to be represented by different data models.
Modern technology allows the creation of maps of different scales and registers in different forms from the the same data model.

Consequences: In 2014 there will be no draftmen and cartographers in the domain of cadastre.

True "E-Cadastre"

Statement 4 on Cadastre 2014

'Paper and pencil - cadastre' will have gone!

Comment: Geomatics technology will be the normal tool for cadastral work. Real low-cost solutions are only possible when this technology is used in combination with lean administrative procedures.
Developed, developing, and transitional countries need models of the existing situation to resolve the problems of population, environment and reasonable land use.

Consequences: The modern cadastre has to provide the basic data model. Surveyors all over the world must be able to think in models and to apply modern technology to handle such models.

Private Sector Involvement

Statement 5 on Cadastre 2014

Cadastre 2014 will be highly privatized! Public and private sector are working closely together!

Comment: Public systems tend to be less flexible and customer oriented than those of private organizations.
Free economies demand flexibility in land markets, land planning and land utilization. Flexibility may be provided better by private institutions. For necessary security, however, public involvement is indispensable.

Consequences: The private sector will gain in importance. The public sector will concentrate on supervision and control.

Cost Recovery

Statement 6 on Cadastre 2014

Cadastre 2014 will be cost recovering!

Comment: Cadastral systems need considerable investment. But the land documented and secured by the cadastre represents a multiple of the investment. The investment and operation costs have to be paid back at least partially by those who profit.
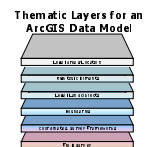
Consequences: Cost-benefit analysis will be a very important aspect of cadastre reform and implementation. Surveyors will have to deal more with economic questions in future.

Theory vs. Practice

- New ideas
- Experienced players
- Best practices
- Leadership
- Data Model efforts

Thematic Content

- Many different layers participating
- Key layers at the initial stage

Land Objects

- Concept of Land Objects -> simple structure
  - different types defined by different laws
  - relation object - rightful claimant differs in content but not in structure
- Very few rules
  - Legal independence
  - Closed polygons

Legal Land Objects from private ownership concepts

- Legally defined rights and interests
- Primary private rights for any cadastre
  - Owner parcel
  - land use parcel
  - encumbrance

Legal Land Objects from public law arrangements

- Imposed by public decisions and enforced by Government Agencies
- Represent public rights
- Managed independently of individual rights

Polygon feature class
RegulatedUse
Polygon feature class Restriction
Polygon feature class TaxParcel
Polygon feature class GeopoliticalArea
Polygon feature class PlanningArea

Rightful Claimants

- Relationship between Legal Objects and people
- US EPA standard – Facility Information Template for States
- Registries

Rightfuls claimant tables

Type of right

Law register tables

Landobject features

Areas easy to handle (thanks to ESRI's multilayer concept

- Vertical Parcels and buildings/structures on land
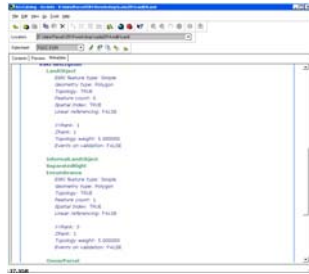
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24

125

More Work Needed

- Elimination of mathematical small elements in polygon overlaying algorithms (ex: bldg/parcels)
- Affiliations
- Survey integration
- Attributes
- Registry

Metadata Documentation

- Metadata is critical
- ArcGIS creates some metadata automatically
- Users need to add / manage additional metadata specific to their implementation

Implications

- Very early stage of design and discussion – still lots of work
- Cadastre 2014 is a good idea
- Good participation of the industry
- It will have implications
  - Workflow
  - Cadastral mapping
  - Integration with registries

Next steps

- Draft model posted on the WEB
  - Try it and share your experiences
- Presentation of practical examples at the FIG Commission 7 meeting – Athens Greece, May 2004

Summary

- More information
  - Data Model Poster
  - Example Geodatabase
  - Data Model Reference Document (TBA)
- At Data Models section of support.esri.com/datamodels