Spatial Objects in the Domain Model of the Public Property Management System

GIS for the Police's Property Management Case study

TS02I - State Land Management, paper No 5807

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Fundamentals

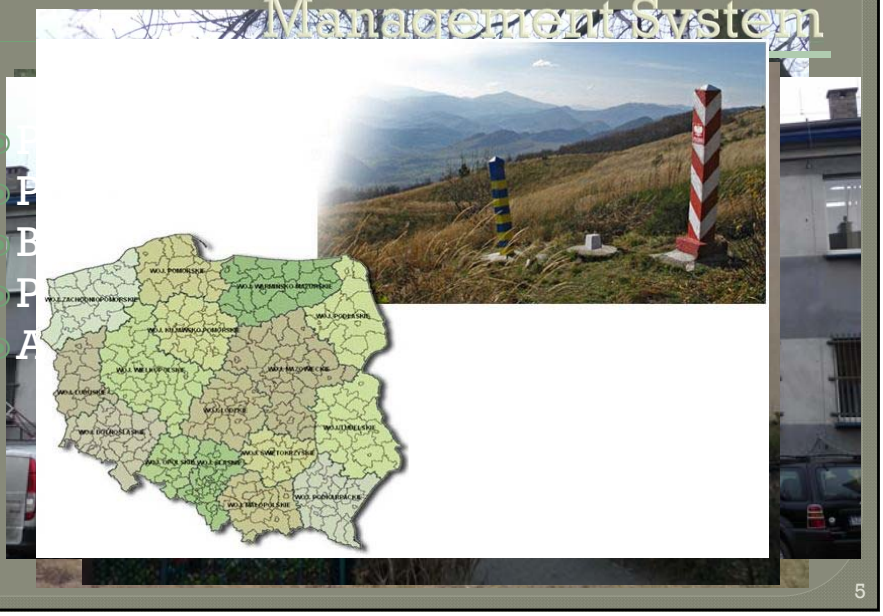
- A **spatial database** is a database that is optimized to store and query data that is related to objects located on the Earth's surface.
- To process spatial data types (points, lines and polygons) additional functionality needs to be added for databases.
- The **ISO 19100 standards** formulate methodology for spatial data modelling, maintenance, exchanging and publishing providing **interoperability.**

Fundamentals

- ISO 19103 – Conceptual schema language
- ISO 19107 – Spatial schema
- ISO 19109 – Rules for application schema
- ISO 19110 – Methodology for feature cataloguing
- ISO 19111 – Spatial referencing by coordinates
- ISO 19125 – Simple Feature Access
- ISO 19152 – Land Administration Domain Model (LADM)
- ……

- Geographic/spatial data - Data with implicit or explicit reference to a location relative to the Earth
- Feature - abstraction of real world phenomena

Spatial Objects in Property Management System



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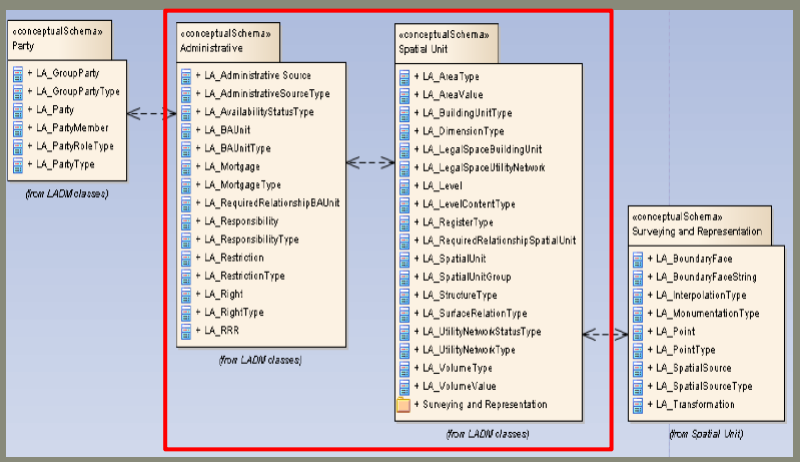
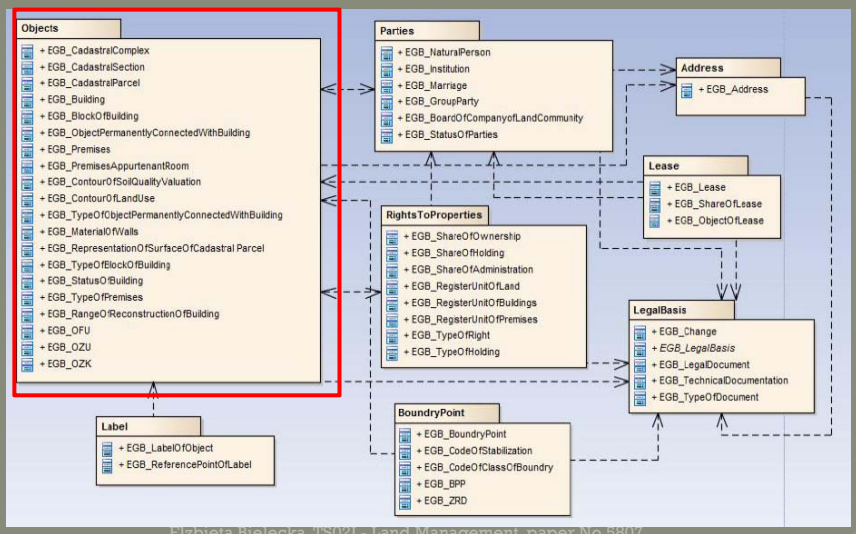
Spatial objects in LADM



Spatial objects in Polish Cadastre



Property Management

- Property management typically involves the managing of property that is owned by another party or entity.
- Management of land and buildings and premises include activities such as:
  - keeping buildings in good condition,
  - organizing the renting of property,
  - preserve the value of the property while generating income.

GIS for the Police's Property Mangement

- Aims of the System:
  1. Significant increase in Police's property management.
  2. Analysis /reporting of costs, expenses and form of rights of individual property.
  3. Overall statistics and analysis.
  4. Identification of redundant properties.
  5. Multiuser access to the System.
  6. Data security and protection.
  7. Interoperability with other systems.

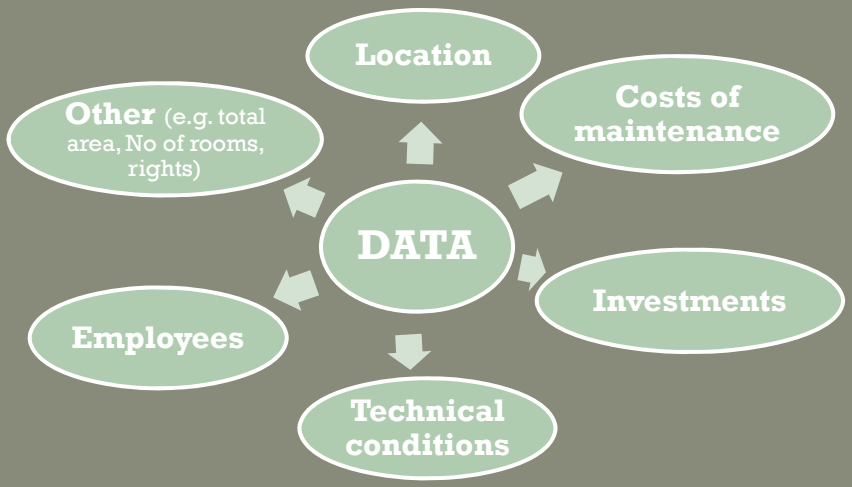
Basic Assunmptios

Modular Structure
- allows adapt to the increasing number of users, and facilitate the expansion of functionality

GIS Module
- Viewing location
- Spatial analysis

Data
- update at every organizational level
- tailored to the needs of the Police

Collected Data



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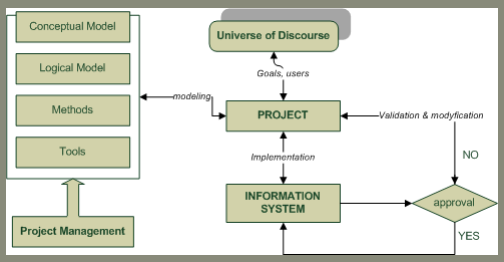
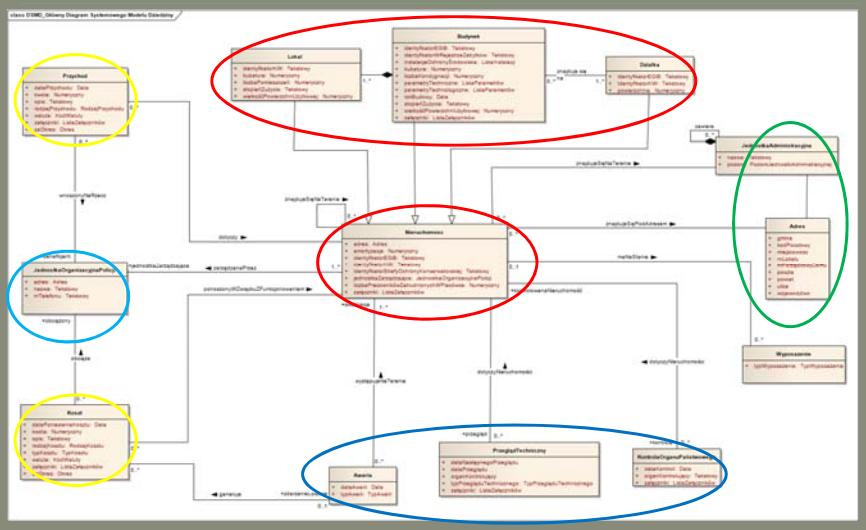
Stages of project implementation

- UML diagrams
  - Business model
  - Domain model
- ERD diagrams
  - 96 classes
  - 25 packages



- Standarised methodology proposed by ISO
- Case Tools

System Domain Model



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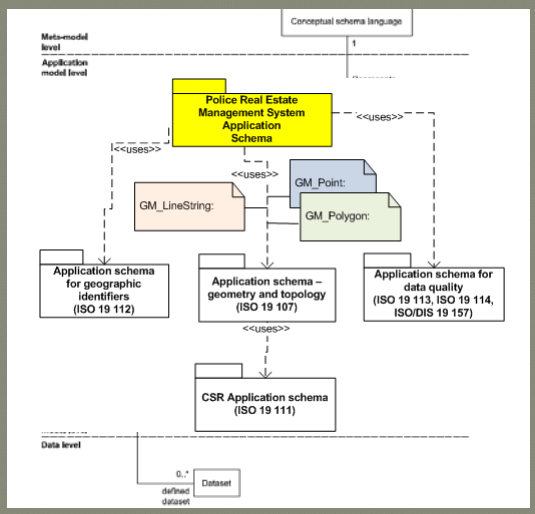
Integrating standarised schema



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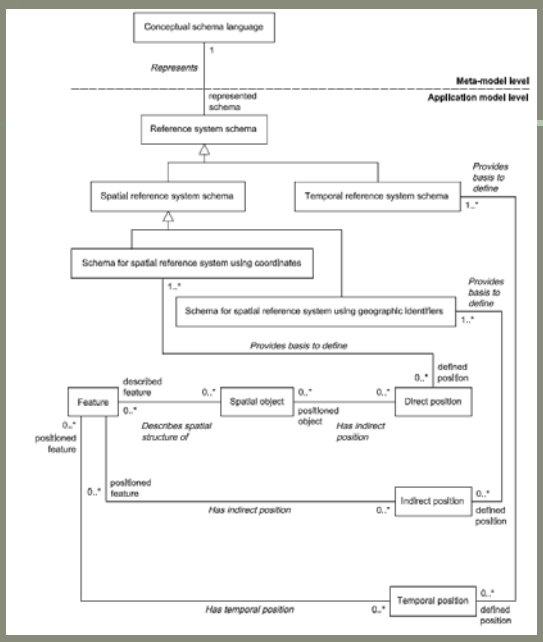
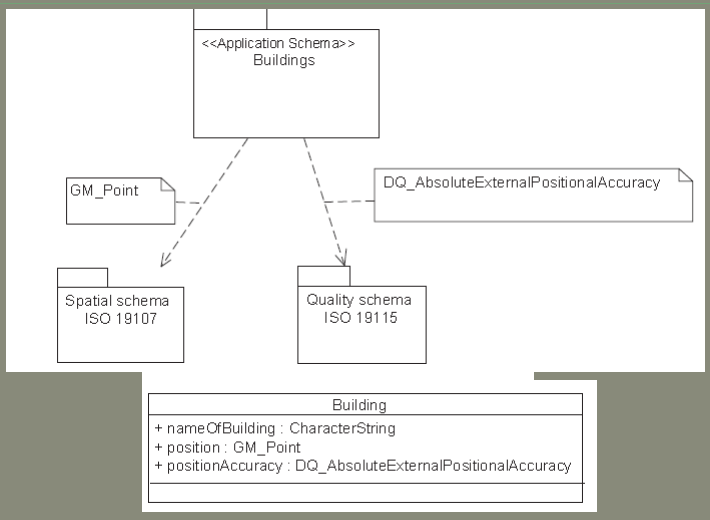


Schema integration



Feature Catalogue

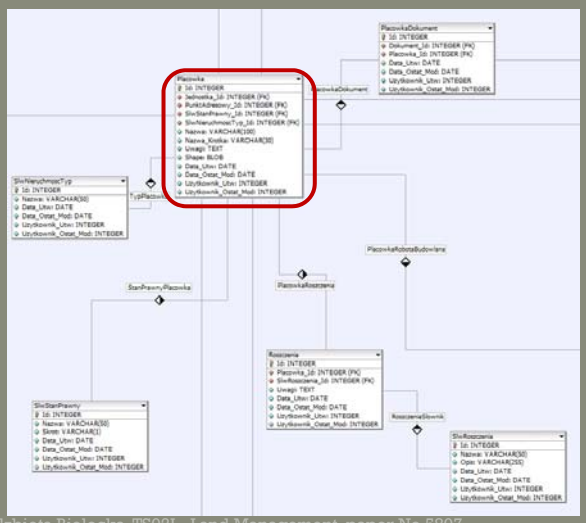
List of packages containing spatial objects

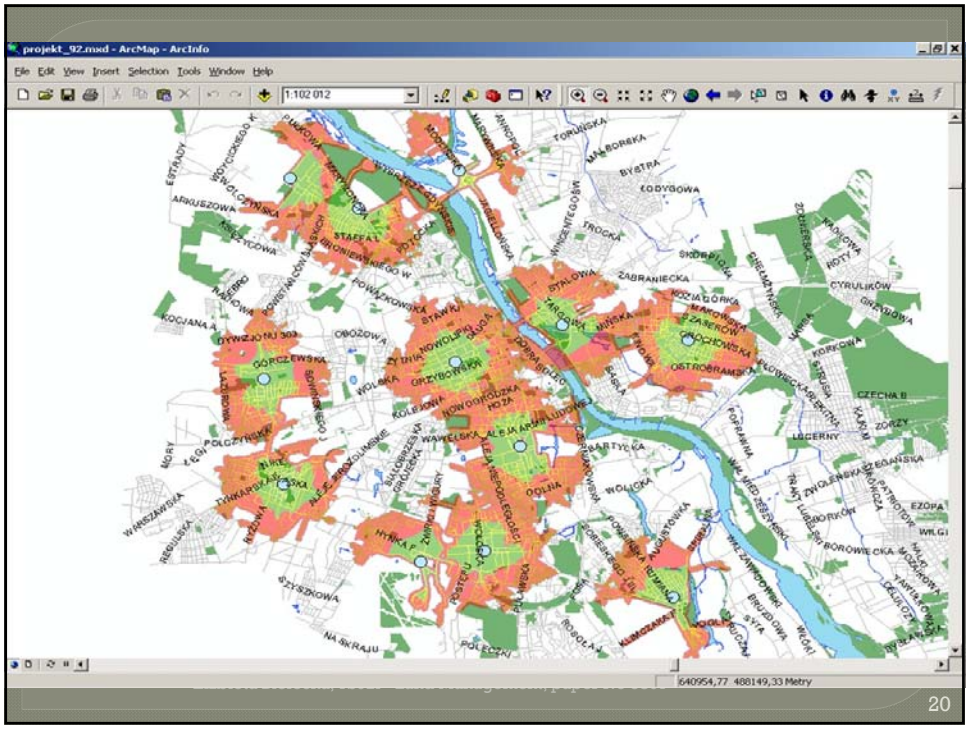
Package name	Object class	Spatial representation
AdministrativeDivision	Voivodship (wojewodztwo)	polygon
	County (powiat)	polygon
	Commune (gmina)	polygon
	Town	polygon
	Street	linestring
RealEstateAndLand	Parcel	polygon
	Building	surface
RestorationZone	RestorationZone	polygon
PoliceBusinessObject	PoliceBusinessObject	point
PoliceInstitution	PoliceInstitution	surface

Feature catalogue

PoliceBusinessObject	
Attribute:	**name**
Type:	Character string
Definition:	Name of the Police business object
Description:	
Municipality:	0…*
Attribute:	**Id_inventory**
Type:	Character string
Definition:	Inventory number
Description:	
Municipality:	1
Attribute:	**Geometry**
Type:	GM_Object
Definition:	Geometry of the Police Business Object
Description:	As much as possible, the geometry should be a single point
Municipality:	1
Attribute:	**beginLifespan**
Type:	Data time
Definition:	Date and time at which this version of the spatial object was inserted or changed in the spatial data set.
Municipality:	1
Attribute:	**endLifespan**
Type:	Data time
Definition:	Date and time at which this version of the spatial object was superseded or retired in the spatial data set.
Municipality:	1

Logical model ERD diagram





Conclusions

1. The ISO 19100 methodology provides a set of standardized application schema that should be implemented in user's application schema to ensure interoperability.
2. An application schema should be platform independent.
3. Spatial object are visualized in the map.
4. A number of spatial analyses could be done.

Thank you for attention

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