Ontology for reference geographical data facing the challenge of applications diversity

Plan

- Context
- Goals
- Achieved tasks
- Conclusions and prospects
Stakes of geographical information

- **Geographical Information**
  - Strategic aspect
  - Customers/users diversity

- **Approach of reconciliation**
  - Technical agreements
  - Organizational agreements

- **Technological advances**
  - Norms
  - Formalisms
  - Models

Geographical information in Morocco!

- New needs
- Accompaniment framework
- Technical and legal aspects
### Extant and Needs Diagnostic

#### Producers / Users

- **Governmental institutions**
  - ANCFCC
  - CRTS
  - Statistic direction (HCP)
  - Hydraulic direction, ONEP, ...
  - Regions
  - Provinces and prefectures districts
- **Territorial communities**
- **None Governmental Institutions**
- **Schools, Formation and training centers** ...

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#### Available Geographical Data

- **Handling difficulties of available numerical data**
  - Data Structure (product object)
  - Geographical data / cartographic representation
  - Information redundancy
  - Lack of pre-definite conceptual data models (CDM)
- **Coordination Lack**
  - DB Independency (management)
  - Heterogeneity (structure and semantic inconsistencies)
  - Multitude of actors
- **Integration**
  - Reflection!
How to bring closer the doers?

• Legal aspect
  - Dialogue remains essential to initiate agreements

• Technical aspect
  - responsibilities clearness
  - information adaptability to user's needs
  - maintain of a common and coherent language
  - optimization of information use

Modeling of Reference data in Morocco

Specific Objects

- Establishment of **ontology for reference data**
  - responsibilities clearness of various doers
- Features **Cataloguing**
  - adaptability to user's needs
- Setting up of **data dictionaries**
  - Maintain of a common language
- Setting up of a **global model** adapted to applications using reference data.
  - Optimization of information use
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  - Concretization elements
    - Features cataloguing
    - Conceptual modeling
    - Reference model implementation
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Ontology for reference data

Establishment frame of the ontology

Existent:
- Reference data identification

Object:
- Reference model

Approach:
- Definition of reference objects types
- Establishment of an ontology for reference data
Ontology for reference data

Establishment frame of the ontology

- Reference model
- Models of reference object types
- Features cataloguing (reference objects)
- Producers / users needs
- Reference data identification

Approach of reference objects types definition

Ontology for reference data

Principles of the established ontology

- Context
- Goals
- Ontology
  - Approach
  - Principles
  - Cataloguing
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- Independence and the complementarity of objects types
  - 11 objects types (1st classification)
  - Consistency checks at a general level (Independency)
  - Multiple inheritance according to the level of detail

- Adaptability of objects types to specific domains
  - Definition is independent from context
  - Exploitation in a particular application must be functional

- Hierarchy
  - Relations of specialization (SOT / ROT)
  - Generic features classes / sub-classes
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Concretization elements

Features cataloguing

- To clear up the knowledge of the geographical field described
  - Definition of eleven reference objects types
  - Features cataloguing
  - Definition of concepts ensuring the adaptability of the definite structure

Normalisation
Concretization elements

Data dictionary

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- Textual definitions
  - Feature classes
  - Attributes
  - Associations
  - Domain values

- Setting up data dictionary

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Conceptual modeling

- Establishment of a reference data conceptual model
  - 11 Specific CDM
  - Global Model (Hierarchy)
  - Modeling of topological relations (CONGOO within Web2GIS AGL)

- Constitution of data bases resulting from the same CDM

Integration

- Conceptual modeling
- Structure of data bases
- Features spatial modeling
- Objects semantic

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Concretization elements

- Exploitation and adaptation of reference model to user intention
- Confrontation of this research developments to genuine datasets
- Lacks in terms of data documentation
- Topology control / Problem of data quality
  - Cadastre / Cartography
  - Geographical data / Cartographic representations
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Conclusions

Establishment of an ontology for reference data

- To moderate problems associated to data use, the approach was guided by:
  - Purposes of data producers and users
  - Available data configurations
  - Anterior application domains

- To establish principles
  - Independence / Complementarity
  - Adaptability
  - Hierarchy
Prospects

Ontology for reference data

- To go deeper into an ontology aspect concerning relations and spatial attributes of reference data to assure their adaptation to various applications
- To illustrate the reference notion through the extension of the reference model (ontology of reference / domain)

Prospects

Reference model exploitation

- To implement developed models
- To illustrate various detail levels to concretize possibilities of multiple inheritance of some feature classes illustrating transition mechanisms
  - Feature classes
  - Spatial modeling