An Experiment on Spatial Data Exchange

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SAIJO, Yuuki
(Geographical Survey Institute Japan)

E-Mail: saijo@gsi.go.jp
Verification works for ISO 19100 drafts in Japan

ISO/TC211 Domestic Committee

ISO/TC211

JSGI Committee with 5 WGs

JSGI : Japanese Standards for Geographic Information

- Development of Japanese National Standards for Geographic Information (JSGI) conformed to ISO 19100 drafts
  (Mainly focused on the exchange of spatial data, in current)
- Methodologies to apply JSGI to practical operations
- Experiments on Spatial Data Developments / Exchanges
History of Spatial Data Exchange Experiments

- **FY 1999**
  - **Spatial Data Exchange Experiment I**
    - Convert existing spatial data to standard specification data sets
    - Load standardized data set into existing GIS

- **FY 2000**
  - **Spatial Data Exchange Experiment II**
    - Merge multiple standardized data sets in existing GIS
    - Exchange update information
    - XML documentation for Application Schema

- **FY 2001**
  - **Spatial Data Exchange Experiment III**
    - Dynamic recognition of the content of Application Schema
    - Implementation of Portrayal Catalog / Portrayal Specification
Results of

Spatial Data Exchange Experiment II
Exchanging Spatial Information including Update Data

Conformed to 19107, 19108, 19109 and 19118

(Experiment II)

An Experiment on Spatial Data Exchange in Japan
Defining “Application Schema Description File”

Instances of any UML class diagrams can be encoded with XML.

Application Schema by UML

Instantiation of MetaClasses by XML

= Definition of Application Schema by XML

Instances of any UML class diagrams can be encoded with XML.

Application Schema Description File
Results of

Spatial Data Exchange Experiment III
Image of Experimental System

Base Map got from market

![Base Map](digital map 25000)

Application Schema for Base Map

Thematic spatial data got from some site

![Thematic Spatial Data](Application Schema for Thematic data)

![Application Schema for Base Map](Portrayal Catalogue)

Overlay Thematic data on Base Map to utilize information

Information about the structure of Thematic data

Emphasize Thematic data by a specified portrayal rules

Assumption of Thematic spatial data

Plot big energy users on base maps, i.e. factories, hospitals, hotels or high buildings
Class names and attributes are defined in the application schema.
Highlights

Base Map + Thematic data (Point data) overlay

Dynamic recognition of Application Schema

Application Schema of thematic data may be changed.
Their definitions are read and recognized dynamically so that corresponded thematic data can be loaded with proper understandings.

Implementation of Portrayal Catalogues
Functional Overview

Conformed to 19107, 19108, 19109 and 19118

Base Map (XML)

Application Schema of Thematic Data (XML)

Thematic Spatial Data (XML)

Portrayal Catalogs and Portrayal Specifications (XML)

GIS (6 different systems)

1. Load Standardized format file of Base Map data. Application Schema of Base Map is statically defined in GIS-A.

2. Load Application Schema Description File of thematic data, and recognize new classes and their attributes dynamically.

3. According to the recognition of Application Schema, load Thematic Data and overlay them on Base Map.

4. Load Portrayal Catalogs / Portrayal Specifications, and change the way to draw each features.

Based on 19117
Dynamic recognition of application schema

Exhibit III

Application schema of Thematic data were dynamically recognized before reading its data set and overlaid features with base map.
Changing the application schema

Definition of class “Factory” changed by adding attribute “telephone”. Attribute values also were changed.
Portrayal Catalogue for Thematic spatial data

( Experiment III )

Example of catalogue contents:

( Actual portrayal catalogue is written on XML.)

- If feature class is “Factory”, energy type is “Electric Power” and energy usage is more than 2000kW
  Then draw a large (300 units) red dot symbol:

- If feature class is “Hospital”, bed amount is more than 200, energy type is “Electric Power” and energy usage is less than 500kW
  Then draw a small (100 units) green square symbol:
Applying Portrayal Catalogue

(Experiment III)

Thematic data are drawn with same manner in each system.
Accomplishments

- **Exchanging the application schema information**
  Using the specification of “Application Schema Descriptor File”, we could describe all information of application schema and exchange it with spatial data.

- **Dynamic and automatic recognition of application schema, and loading spatial data corresponded to it**

- **Implementing the mechanism of Portrayal Catalogue**
  Each GIS could draw symbols using same manner specified by portrayal catalogue.
Considerations

- File size problem for spatial dataset with XML encoding. Spatial schema should be more simple for common use. (Required to define simpler specification as a profile)

- Automatic recognition of application schema is difficult because of its complexity and flexibility. (Required to be a profile, too)

- DIS 19117 portrayal has only limited ability to define portrayal specifications.
Thank you

This report and data of the Experiment on Spatial Data Exchange will be available to download in June. Please visit:

http://www.gsi.go.jp/ENGLISH/

and select "Research and Development", then "GIS".