Applying ISO 19100 Standards for Geographic Information Standardization in China

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1. Brief Overview of Implementing Geographic Information Standards in China
2. Action for Introducing ISO/TC 211 19100 standards to China
3. Creating Some National Standards Referencing ISO/TC 211 CDs
(1) Brief Overview of Implementing Geographic Information Standards in China
Geographic information standardization has been recognized as a very important component at the beginning of GIS developing in China early 80’s. As one of key projects, it has been placed on the national research plan and national standard working-out plan.
Before participating activities of ISO/TC 211 in 1995, China was stand alone for working-out national geographic information standards, except cooperation research with a few countries, such as USA.
Some national standards had been worked out, such as:

- Geographic Grid
- Classification and Codes for National Fundamental Geographic Information
- Classification and Codes for Forest Resources
- Coding System for River Names of China
- ...
Research on more standards related to:

- Data quality control and estimation
- Digital photogrammetry and digital cadastral
- Symbol system for digital mapping
- Data dictionary
- Technical linkage between topographic data base and geographic names data base.
- Data transfer format
- ...

Problems:

• The national standards are not structured
• The scope of national standards is rather narrow
• There is a gap between China and the international for geographic information standardization
(2) Action for Introducing ISO/TC 211 19100 standards to China
1. Organizations for Geographic Information Standardization

The National Technical Committee of Geographic Information Standardization (CSBTS/TC 230) was found in 1997.
CSBTS/TC 230 is in charge of creating national standards, including planning, research, working-out and testing all new national standards and revising existing standards in China.
One of the commissions of the Chinese Association for GIS, the Commission of Standardization and Quality Control was found in December 1994.
2. There are more than 40 organizations take part in the activities related to ISO/TC 211 in China. **Expert Groups** relevant to the 5 working groups of ISO/TC211 have been formed. The responsibility of these groups is reviewing and discussing ISO/TC 211 draft documents and make comments.
3. Introduce ISO TC 211 standards and their implications to the Chinese geographic information community, to facilitate the development and implementation both national standards and product standards or product specifications.
Documents of ISO 19100 standards will be translated into Chinese partly, to let more people understanding them, such as officers, researchers, students and geographic information industry.
4. Some drafts of ISO/TC 211 standards have been used for special projects, such as:

- the 19113 and 19114 CDs were used for data quality control of the 1:250,000 database of the NFGIS
Index of 1:250,000 Database of the NFGIS
• the 19115 CD was used for the national key project “Sharing of Sustainable Development Information in China”, the NFGIS databases, databases of land and resources, etc.
Sharing of Sustainable Development Information in China
(Web site of its sub-node for standardization)
(3) Creating Some National Standards Referencing ISO/TC 211 CDs
1. Using ISO 19110 for revising the national standard “Classification and Codes for National Fundamental Geographic Information”

- feature type
- feature attribute
- feature relationship
- feature operations
Classification and Codes for National Fundamental Geographic Information

(GB/T 13923-1992)

Based on feature type and partly on attributes
Based on feature type, attributes, relationship and operation
2. The national standard “Data Quality Control” is being developed with relation to the ISO 19113 and 19114 standards.

quality elements
data quality evaluating
data quality reporting
Data Quality Control

1. Data Completeness, including:
   - Coverage Completeness
   - Data layer Completeness
   - Attribute Completeness
   - Feature Completeness

2. Logical consistency, including:
   - Attribute consistency
   - Format consistency
   - Layer consistency
   - Topological consistency
   - Feature relationship consistency
3. **Positional accuracy**, including:
   - Absolute accuracy of points, lines and polygons
   - Relative accuracy of points, lines and polygons
   - Generalized polygon shape comparability

4. **Attribute accuracy**, including:
   - Classification correctness
   - Qualitative attribute correctness
   - Quantitative attribute accuracy

5. **Edge matching**, including:
   - Edge positional matching
   - Edge attribute matching
6. Temporal accuracy, including:
   - Temporal consistency
   - Temporal currency
   - Data capture time

7. Linage and document completeness, including:
   - Metadata
   - Linage
   - Design document
   - Other documents
Content of data quality control is company with the relevant ISO/TC 211 standards

Data quality control methodology:

- Drawn up
- Tools
- Interactively

Data quality control report
3. ISO 19115 is the basis for working-out the national standard “Geographic Information Metadata”.  
   core metadata  
   full metadata  
   codelists and enumerations  
   metadata extension rules
An example of Metadata level one (a part)

METADATA (LEVEL ONE)
----FOR THE 1:1M-SCALE TOPOGRAPHIC DATABASE OF THE NATIONAL FUNDAMENTAL GEOGRAPHIC INFORMATION SYSTEM OF CHINA

CATALOGUING METADATA INFORMATION

Title (Chinese): 国家基础地理信息系统全国1：100万地形数据库
Title (shortened form, Chinese): 1：100万地形数据库
Title(English): 1:1M-Scale Topographic DataBase of the National Fundamental Geographic Information System of China
Title (shortened form, English): 1:1M DB（NFGIS, PRC）
Edition: 1.0
Series name: National Fundamental Geographic Information System
Issue identification: The first step
Issue date: 199408
Initiative identification information:
Initiative name: National Fundamental Geographic Information System Networking
Initiative type: Ministry key project

Responsible party information:
Responsible party organization name: State Bureau of Surveying and Mapping
Responsible party individual name: 
Responsible party role: Management
Country: People Republic of China
Administrative area: Beijing City
City: Beijing
Postal address: No. 9 Shanlihe Road
Postal code: 100830
Electronic mail address: 
Web-site: http://www.sbsm.gov.cn
Telephone: 
Fax:
Dataset extent:

Geographic extent coordinates:
- West bounding coordinate: 72° E
- East bounding coordinate: 135° E
- North bounding coordinate: 54° N
- South bounding coordinate: 3° N

Geographic extent name: People Republic of China

Temporal extent date/time:
- Temporal extent type: 1
- Temporal 1: 19901231
- Temporal 2:

Scale: 1:1,000,000

Resolution:

Language of dataset: Chinese, English
Dataset content information:

Abstract:
Covering entire China. Data contain administrative boundary, reservation, hydrography, railway, road, hypsography, vegetation, etc. The data source is the topographic map at the scale of 1:1,000,000 published in 1980s, with totally 77 map sheets. Data are divided into 17 layers.

Purpose:
As a common platform for locating all kinds of thematic data for governments, organizations, institutions, agencies and so on; for compiling small scale maps in digital or simulative form.

Progress code: Complete

Theme name: Surveying and Mapping

Keyword (s): Surveying and mapping    Fundamental information
              Geography spatial data   Database    GIS    NFGIS
A part of metadata of the 1:250,000 database
Implementation of Metadata
The Web site is:

http://nfgis.nsdi.gov.cn
4. The concept of ISO 19101 will be used for developing the guidelines of standards or general list.

- Example: Ministry of Land and Resources
- It means the reference model will optimize the guidelines of standards or general list in China.
5. **Spatial referencing by coordinates:** Here are the referencing systems and datum which will be put in the codelist.

**Horizontal coordinate systems:**
- the Beijing 1954 Coordinate System
- the Xi’an 1980 Coordinate System

**Vertical datum:**
- the Yellow Sea Height Datum 1956
- the National Height Datum 1985
# Codelist of referencing systems of China

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<tr>
<th>No.</th>
<th>Name</th>
<th>Code</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beijing 1954 Coordinate System</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Xi'an 1980 Coordinate System</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Local Coordinate System</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
6. **Data Identifier Codes**, such as:

- Codes for the administrative Divisions for the P. R. China
- **Coding System of River Names of China**
- **Coding System of Mountain and Peak Names of China**
- **Name and Number of National Trunk Highway Route**

In fact these are of spatial referencing by geographic identifiers.
Codes for the administrative Divisions for the P. R. China (GB 2260 - 1998)

XX XX XX
----- ----- -----
| | | county sub-code
| | district sub-code
| provincial sub-code
Coding System for River Names of China
(To be approved)

Code for drainage area at the first level, one letter

Code for drainage area at the second level, one letter

Code for river at the first level, two digits

Code for river at the other levels, one digit

Code for river level, one digit
Code for Highway Classification

(GB 917.1 - 1989)

G * * * *

Code for national road

**

Code for province

Number of the road
7. ISO 19104 and 19105 will be basis for related national standards.

19104 will be referenced.

19105 will be adapted.

More ISO 19100 standards will be applied in China
8. Issues faced:

• People are always feel standards are not enough
• Different point of view among experts and among organizations have to be hardly coordinated
• It is a long way to go through all steps for working out a standard and spent much money
**Issues faced (Cont.):**

- Language obstacle. It is difficult to understand the implications of ISO 19100 standards sometimes. And some new terms are hardly to translate into Chinese, such as *profile, coverage, portrayal, operation*, and so on, even *geomatics* itself.
• General speaking, ISO 19100 standards are useful and valuable. They are very important international standards.
• We will make more efforts to enable the acceleration of China’s geographic information standards to comply with ISO 19100 standards.
Thanks for your attention!