Strategy for Application of Geospatial One-Stop (GOS) in Korea

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ABSTRACT

According to the facility of effective search and user-friendly access to various spatial data by building GIS, the demand for application of information and social effect has been increased. To meet such domestic demands, it has become necessary to develop local, regional, and global SDI(Spatial Data Infrastructure) which can support discovery, access, and use of spatial information in the decision-making process. Many developed countries are implementing and managing GSDI in accordance with their state and purpose. There are two typical international cases; U.S. Geospatial One-Stop and European Geo-Portal. These systems are observed the international standards so they provide standardization and interoperability of GI. In domestic cases, however, each sector is managing separately geospatial data management systems.

From this point of view, this paper proposed implementation approaches of GOS that can provide interchange of geospatial information between supplier and user. This paper focused on standardization, considered technical and political factors and analyzed two cases of GOS such as U.S. and Europe cases into our spatial information environments. It is possible to search and access geospatial data effectively by introducing GOS. In addition, it is possible to promote popularization of geospatial information and development of GIS industry.

Keywords : GIS, GSDI, Geospatial One-Stop (GOS), Portal

요 약

지리정보시스템(GIS)의 구축으로 보다 효과적인 지형공간정보의 취득 및 관리와 분석이 용이해짐에 따라 정보의 활용과 사회적인 효과에 대한 관심과 요구 또한 증가하였다. 그 결과 공간정보의 접근, 사용 및 의사결정을 지원할 수 있는 지역적, 국가적, 세계적 차원의 공간정보기반(SDI)의 구축이 필요하게 되었다. 선진국들은 각국의 상황과 목적에 따라 세계공간정보기반(GSDI)의 구축·운영하고 있으며, 그 대표적인 사례로 미국의 Geospatial One-Stop과 유럽의 Geo-Portal이 있다. 이들 통합유통체계는 국제

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표준을 준수하여 구축되고 있어 지리정보에 대한 표준화 및 상호호환성을 제공한다. 그러나 국내의 경우 국가지리정보유통망, 해양GIS유통시스템, 위성영상정보 통합관리소 등 각 부서에서 독자적으로 유통체계를 구축하여 관리하고 있는 실정이다.

이러한 관점에서 본 연구는 지형공간정보의 공급자와 수요자간의 유통을 효과적으로 지원할 수 있는 유통체계인 Geospatial One-Stop (GOS)을 국내에 도입하기 위한 전략방안을 제시하였다. 도입방안은 기술과 정책의 두 가지 측면에서 고려되었으며, 표준화에 초점을 두고 국내의 유통체계와 미국, 유럽의 구축 사례를 비교·분석하였다. 본 연구에 기반을 둔 GOS의 구축으로 정보의 용이한 검색 및 접근을 가능하게 할 수 있으며, 이에 따른 지형공간정보의 대중화를 촉진함과 동시에 GIS선진국으로의 발전을 도모할 수 있다.

주요어 : 지리정보시스템, 세계공간정보기반, One-Stop (GOS), Portal

1. Introduction

As the demand for GIS application and social effectiveness through NGIS project and the development of framework datasets are increasing, the need to distribute and share as well as produce and manage geospatial information are discussed. Therefore, it has become necessary to develop GSDI (Global Spatial Data Infrastructure) which can support information discovery, access, and use of the information in the decision-making process at the local, regional, and global levels. As a result, an integrated portal system that can act as a gateway needs to be developed to facilitate access to geospatial information and data.

In this paper, we propose ideas for introducing the GOS into Korea. For this study, we analyzed GOS between domestic and international case such as U.S. and Europe, and then propose implementation approaches that are suitable for application in domestic environments.

2. Definition and Status of GOS

There are two typical international cases of GOS; GOS (U.S. FGDC) and European Geo-Portal (Europe INSPIRE). One of the 24 e-government initiatives for constructing and enhancing NSDI (National Spatial Data Infrastructure) framework, GOS is a web-based portal that will make it easier, faster and less expensive for all levels of governments, academic institutions and public sectors to access geospatial information. This data coupled with geospatial data integration and services can be used to support the government businesses through the enhancement of a decision-making tool.

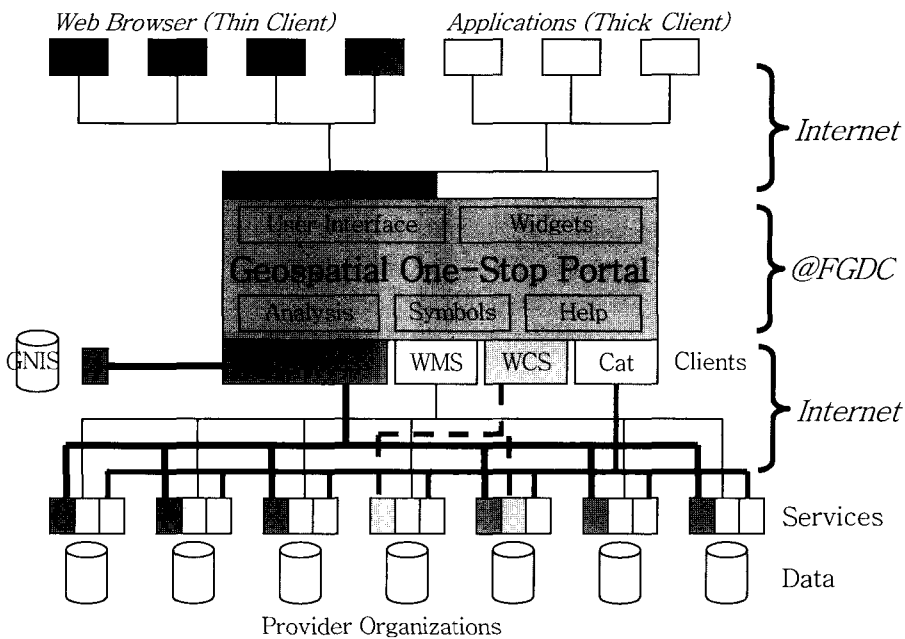Web Browser (Thin Client)   Applications (Thick Client)

Figure 1. GOS Portal Concepts(Geospatial One Stop Project Design, 2002, FGDC)

The European Geo-Portal is European internet access point to a collection of spatial data under the Infrastructure for Spatial Information in Europe (INSPIRE) initiative. The Geo-Portal does not store or maintain the data. These are distributed in many national and thematic servers across Europe. Each server is maintained by the organization responsible for the data. The Geo-Portal shall provide facilities that for selected thematic policies and link to functionalities such as: publish and provide access to metadata and data, delivery, viewing and analysis of GI etc.

In the case of Korea, there are 2 representative examples; MGIS (Marine Geographic Information System) and NGIC (National Geographic Information Clearinghouse). MGIS is an integrated system that constructs marine geographic information based standardization and connects GIS with business system to promote infrastructure for the integration of land and marine data. General users can search metadata of marine GIS through NGIC. Marine experts can search through marine clearinghouse. Acquisitive marine geographic information using the access and search services is offered to users in the form of familiar and easy information.

NGIC is a system that easily offers already constructed national geographic information through the internet. Users can directly conduct search and write geospatial metadata through this system, and verify the image of geographic information before downloading.

3. Implementation approaches of GOS

3.1 Standardization of data

3.1.1 Organizational Approach: Framework data

Framework data is a collaborative effort to create a common source of basic geographic data. It provides the most common data themes that geographic data users need, as well as the environment to support the development and use of these data. The framework's key aspects are specific layers of digital geographic data with content specifications, procedures, technology, and guidelines that provide for integration, sharing, and use of these data, and institutional relationships and business practices that encourage the maintenance and use of data. The framework represents a foundation on which organizations can build by adding their own detail and compiling other data sets.

The development of this framework data was recommended by GSDI. The relevant international standards are ISO TC 211 and ISO 19136. ISO TC 211 includes ISO 19109 - Rules for application schema, and 19110 - Feature cataloguing methodology. And ISO 19136 GML (Geography Makeup Language) is a specific encoding method. In order for the international stewardship and sharing of domestic framework data, these data need to be converted in accordance with the above-mentioned standards.

3.1.2 Distributing Approach: Metadata

Metadata is a term used to describe the summary information or characteristics of dataset, or "data about data". These concepts have been in use for as long as information collected has been organized, playing a role of library catalogues. We can search and use geospatial resources more easily through the standardization of geospatial metadata and format. In various countries, the various types of metadata model have been developed. The recommendations of GSDI as follows;

- Adopt or build a national profile of the ISO 19139 Technical Specification based on the abstract ISO 19115 metadata standard.
- Begin by documenting those data sets that have current or anticipated future use, and then prioritize your data.
- Develop a coordinated spatial data product identifier system for use globally.
- Research into a common thematic classification system for geospatial data.

Whereas ISO 19115 standards are applied to the Korean standard, ISO 19139 is still reserved. Also, we need to conduct researches on the third and forth recommendation.

3.2 Systems integration

3.2.1 Implementation approach of portal system
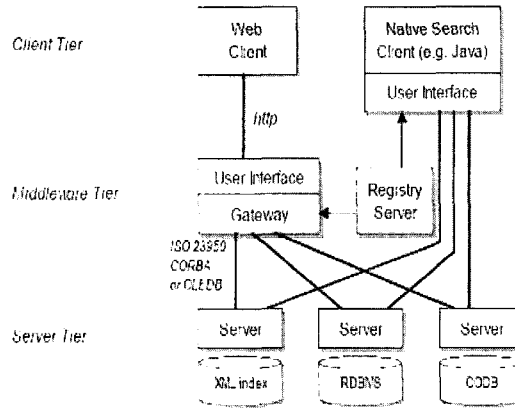
The model of the portal system is decided

Figure 2. Implementation view of distributed catalog services
(GSDI Cookbook Version 2.0, 2004, pp. 52)

according to the role of the element in organizing the system. It can be divided into 3 types in accordance with the management method of information.

First is the center concentrated model. This is a kind of management and integration of spatial data and metadata obtained from the central server. Second is the local distributed model. In this model, spatial data clearinghouse, which acts as a gateway, is at the center while the other servers that manage spatial data and metadata are distributed and constructed in local. Lastly, we have the hybrid model which is an integrated form of the center concentrated model and local distributed model. This model manages data by considering the security grade of information. In general, the distributed or hybrid model is preferred due to the increase of the main group in portal system and because it offers various spatial

data and functions. Therefore, in this study, we need to offer distributed catalog model as shown in Figure 2.

To build network nodes, we need to implement portal that can unify each geographic information managed by all of sectors including the government, municipality, public and private sectors; reconstruct the technical factors of each portal system; and offer improved functions as shown in Figure 3. Also, it needs to consider the connection with GSDI.

Key standardization efforts for accessing catalogues can be found in the ISO 23950 Search and Retrieve Protocol, the OpenGIS Consortium Catalogue Services Specification Version 1.0, and relevant standards or "recommendations" of GSDI known as ANSI Z39.50. For all levels of government and the public to access geospatial information, these standards need to be complied with in order
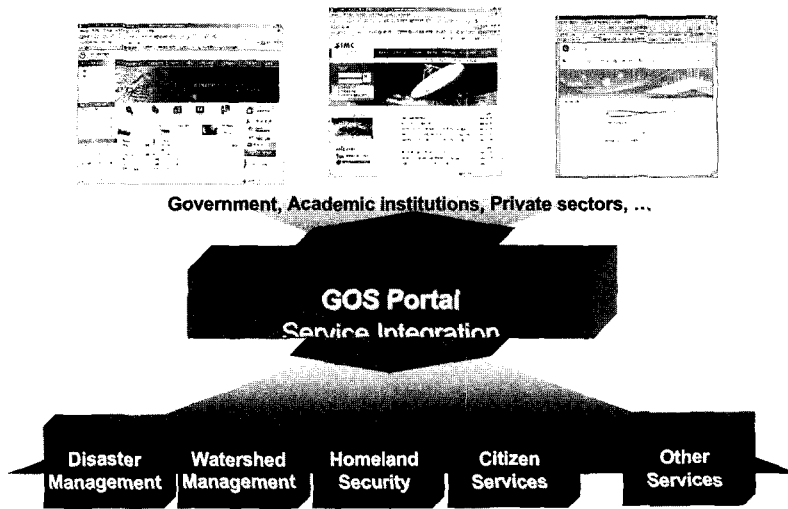
Figure 3. System context for future GOS portal in Korea

to implement the portal system.

3.2.2 Ontology

In the context of knowledge sharing, an ontology is a specification of a conceptualization in a specific domain. It can be defined as a collection of the standard terms used in a specific field. In addition, this ontology formally defines the relations among the terms for expressing knowledge effectively. That is, ontology represents the standard for applying a
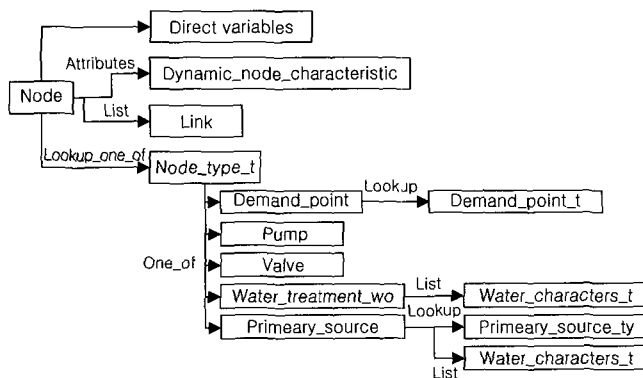

Figure 4. An example of an ontology for underground water resources(Hadzilacos et al. 1999)

wide scope to express, share and reuse knowledge provided in a web document.

Ontology is similar to metadata in both form and property, but it can additionally represent reasoning function, express, extract, share and reuse knowledge. Based on the foregoing, in this study, we propose applying the concept of ontology for implementing catalog module in searching for spatial data and related services through GOS.

4. Conclusion

As the GIS projects are driven by both the government or municipality and the private sector, it is becoming more and more important to develop a system of common use distributed geospatial information..

In this study, we propose ideas on how GOS, a web-based portal, can be introduced into Korea so as to promote efficiency and activate production, management, and sharing of geospatial information. The technical aspects take into consideration 2 factors; the standardization of data and systems integration. We emphasized the importance of and need to standardize geospatial data, and discussed about the implementation approaches of portal

system and catalog for searching and sharing.

In that respect, the future works will need to involve conducting researches on the detailed technical approaches such as catalog service module and user interface, along with considering the legal and institutional issues that follow.

5. References

Garie, Hank, 2003, Geospatial One Stop - Building blocks for implementing the national spatial data infrastructure, Internal paper(not published).

GSDI, 2004. Developing Spatial Data Infrastructures: The SDI Cookbook Version 2.0.

Nolan, James J., 2001, Developing an ontology and ACL in an Agent-based GIS.

KRIHS(Korea Research Institute for Human Settlements), 1999, A study on development of Korean model for the flow geographic information.

KRIHS(Korea Research Institute for Human Settlements), 2004b, A study on involvement strategy of GSDI.

Smits, P.C., 2002, INSPIRE Architecture and Standards Position Paper.

Dollison, Robert, 2003a, GIS for e-Government - Geospatial One Stop.

Laurini, Robert , 2001, Information systems for urban planning, Taylor&Francis, pp. 161-165.