

Strategy for Improving Cadastral Spatial Quality toward Effective e-Government based NSDI

Young-ho LEE, Republic of Korea

Key words: e-Government, interoperability, NSDI, Spatial quality

SUMMARY

E-Government is sharply increasing an international issue based on recent Information technologies and is considered as a fundamental element in the new governance infrastructure. Although e-Government should be considered to use the GIS technology for using diverse spatial data and service, it is not integrated with the current e-Government and National Spatial Data Infrastructure (NSDI) in Korea.

Integrating e-Government with spatial information based on the qualified cadastral data has the specific purpose to improve the public services to the government and citizens enabling them to access spatial information through diverse geo-information portals. Also, e-Government having spatial information can provide the efficient land information as well as support the effective decisions to be made for the policy makers.

Therefore, it is important not only to make the good policy for integrating e-Government with NSDI based on good qualified cadastral data but also to establish the proper law/institution relative to this project for preparing infrastructure.

This paper proposes the strategy to introduce the necessity of the qualified cadastral data for integration of e-Government and NSDI. It will create greater synergic effects for the improved citizen services and increased efficiency of governmental administration as well.

Strategy for improving cadastral spatial quality toward effective e-Government based NSDI

Young-ho LEE, Republic of Korea

1. INTRODUCTION

“Government is spatial” implies that administrations affairs are relative to spatial information as well as administration affairs are useful for spatial information. As spatial information of e-Government in abroad has been concentrated on implementation and research, it is an important issue that this is proposed a necessity to apply for spatial information in the e-Government of Korea.

Regardless of necessity of applying spatial information in e-Government of Korea, e-Government projects have not been approached linked with spatial information currently. In many cases of the project for e-Government mostly there are implemented the general citizen services to focus on citizen services based on text data. However, the national spatial data project still has many lack points because this is just focused on official works for the government rather than citizen aspect.

The purpose of the every information project in the public organizations can be essential subject to improve the administration efficiency and citizen services together. In Korea, internet technology and spreading its service are leading over the world. Through this infrastructure, service of government can be possible more broad with economic ways than old times. The e-Government of Korea could be embodied pan-government and pan-citizen of e-Government based spatial data infrastructure if citizen service of e-Government and a national GIS project will be integrated together on this background.

This paper is to analyze e-Government based on NSDI having a concept that integration with e-Government and national GIS project should be drawn the big synergy effect. It is also proposed how to improve the cadastral information for applying to the e-Government based on NSDI.

2. CURRENT E-GOVERNMENT AND NATIONAL GIS PROJECT IN KOREA

2.1 e-Government Project

Korea e-Government project (<http://www.egov.go.kr>) was launched on November 2002 by the master plan of e-Government and there have 11 subjects such as digitalization of customer work processes and G4C to share administration information. The government was implemented primary 10 agendas and 31 initiatives on 4 sub sectors for the e-Government project.

2.2 National Spatial Data Infrastructure (NSDI)

The project of the National Spatial Data Infrastructure has been implemented the purpose of improving efficient administration affair and citizen service using GIS and it has a same goal to establish the digital land environment. However this national GIS project that has a primary goal for the efficiency of the official work has been concentrated on the establishment of the public GIS application such as land management system and underground facility digitalization.

The national GIS project since 1995 is trying to set up distribution and application of diverse GIS service based NSDI as second stage through establishing a national information infrastructure as first stage. However, the current second project of the national GIS has lack points because it is just focused on public GIS business than general life GIS business for citizens. The general life GIS as too closed part for citizen services is lively driven forward to provide the GIS service in the municipality level than the central government level. Few municipalities are providing the general life information to the citizen via Internet but this has limited services such as short road course, tour information, surrounding area analysis etc.

2.3 The Problem of Cadastral Information for Integrating e-Government and NSDI

The current seamless cadastral map that was constructed by map matching method of cadastral map sheets and forestry map sheets is a base map to use the land administration work and land management work in the municipalities as well. The cadastral map that has been completed as a land management information project since 1998 was finished 163 municipalities in 2004 and 250 municipalities in 2005 totally.

The purpose to make the cadastral map in the first stage has been used a reference map merely. But there was a demand for the special purpose to use a data set with the topographic map and other thematic maps according to increase its accuracy. The cadastral database that contains the original problems caused by the paper based map and diverse local coordinates as well as by several scale maps such as 1:500, 1:600, 1:1000, 1:1200, 1:2400, 1:3000, 1:6000 is difficult to acquire and provide a sufficient quality of the continuous cadastral database for the customer.

3. ANALYSIS OF INTEGRATION BETWEEN E-GOVERNMENT AND NSDI

The core components about the concept and the introduction of portal service relative to e-Government in the URISA Workshop 2003 are defined data, organization, regulation/institution, and standard/technology

- Data: All data (attribute, spatial data) relative to e-Government is acquired and it can be maintained and managed by using meta-data. User can permit necessary data through e-Government.
- Organization: this part is to make a partner relationship for e-Government project and to choose initiative businesses and subjects in the future.

- Regulation/Institution: this part is to deal with law or institution for e-Government. This is also contained improving regulation of e-Government, Licensing and privacy such as private information protection.
- Standard: this part is to mention standard principle for data, process and technologies of e-Government.
- Technology: this part is to support 4 components as information, organization, institution / policy, and standard. Delivery Mechanism, Enterprise technology support and application are included in this part. GIS is to define the core element to support ERP, CRM, DataWare, and Web Service with Enterprise technology.

<Table 1> Analyzing elements for integrating e-Government and NSDI

Information	Common use of information
Organization	Integration with partnership /organization
Law/Institution	Law/Institution for implementation
	Support finance/specialist
	Information open/protection
Technology	Delivery Service
	Enterprise technology
	Enterprise architecture
Standard	Data·Tecnology·Process standard
Service	Participating and improving service of citizens

It can be able to define 6 parts such as “Information”, “Organization”, “Law/Institution”, “Technology”, “Standard”, and “Service” for Integrating with e-Government and NSDI. In the information part, the domestic GIS is using well in the data acquire and management but collaboration and share of those spatial data have still many lack points. The present Geographic Information Clearinghouse (<http://www.ngic.go.kr>) is working and providing to the user. However there have lack points to use public and private sectors directly. In the organization part, the central government and local governments are launched differently of similar projects and there are not collaborative each other. Also law, finance/ specialist support, protection and standard have many lack points for integrating together.

Although GIS has been used Application, Enterprise technologies including visualization tool, a part of delivery service for accessing data is necessary to develop many things. Portal service for geo-data is still not providing although national clearing house is operation now in the service part. The service providing from each municipality is the supplier rather than the customer based service. As GIS situation according to e-Government components until now are analyzed, the present national GIS project has been implemented spatial data acquire, maintain/management and Enterprise technology based spatial information. However the constructed administration information is not enough to providing portal service to the citizen as well as collaborative governments, GIS service based on citizens.

4. STRATEGY FOR INTEGRATING E-GOVERNMENT AND NSDI

4.1 The Model for Integrating e-Government and NSDI

4.1.1 Driving Model of e-Government

For integration each other, the first step is to start the isolated systems, the second step is to integrate partially in the same community, the third step is to integrated totally in the same organization, the forth step is to make value network between organizations. The information technologies; 1 step is Local computing, 2 step is Web computing, 3 step is Analytical computing, 4 step is Ubiquitous computing; are used for implementing this project. In case of participating citizens, there are arranged a matured model as 1 step is offline, 2step is Web board(N:1), 3step is Service/Transaction(1:1), 4 step is Multi-transaction(1:N).

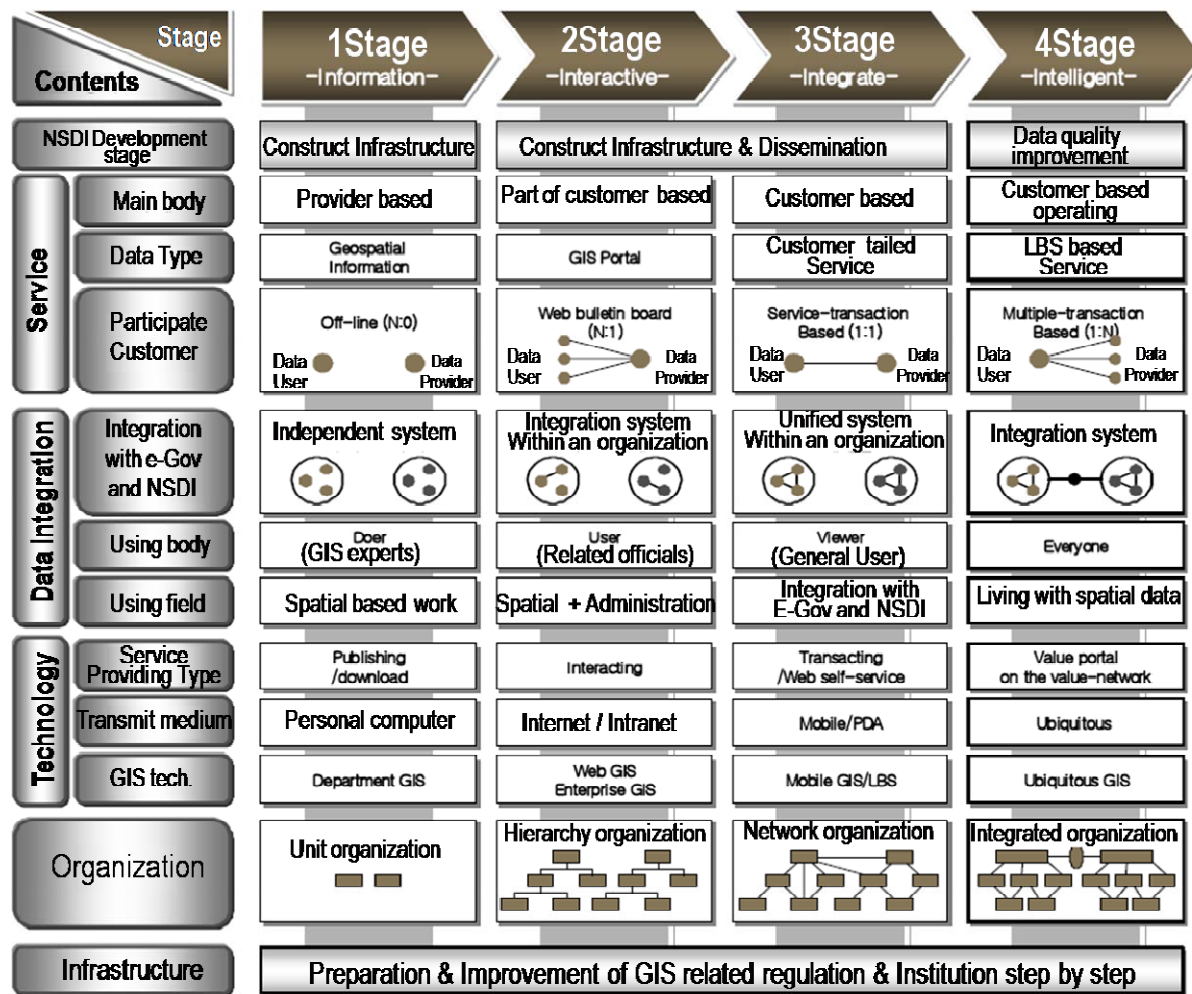
4.1.2 Driving Model of NSDI

There are considered that integration with e-Government and NSDI for improving administration efficiency and increasing satisfaction of the citizen service. Crain and MacDonald(1984) who researched GIS growth, is to define 3 steps of GIS growth as Inventory Application, Analysis Application, Management Application and this can be reanalyzed such as developing infrastructure, dissemination, high performance level.

The construction stage of the imitative GIS development can be analyzed the working efficiency and the stage of jumping and expansion of it can be embodied the improving effect of citizen service. Otherwise high performance level can be provided a plenty of decision making of GIS with efficiency and effectiveness.

4.1.3 The Model and Composition with e-Government and NSDI

The integration model of NSDI in the e-Government is to propose as figure 1 to consider GIS development stages that 5 elements is derived from “infrastructure construction” to merge with “Service”, “data collaboration”, “Technology”, “Organization”, “Standard”, and “Law / Institution” for integrating e-Government and NSDI like prior mention. Figure 2 is to show a driving model for integrating e-Government and NSDI. It can be divided a vertical model and a horizon model. The horizontal model is composed of 4 stages as step by step for e-Government and NSDI.



<Figure 1> Driving model of integration with e-Government and NSDI

4.2 Strategy and initiatives for e-Government and NSDI

4.2.1 Strategy for integrating e-Government and NSDI

The strategy for integrating NSDI with e-Government is prepared and adapted by current e-Government master plan based on prior step by step. Recent e-Government road map that considers IT such as GIS, Ubiquitous is sharply increased the GIS importance to implement the real e-Government. Table is to show the arranged matters to go ahead a plan of integrating with NSDI and e-Government.

<Table 1> Strategy for integrating e-Government and NSDI in Korea

Contents		Considering matters	Strategy	Direction	
Service	Improving citizen service	Need customer based service using GIS technology Development of the continuous cadastral data nationwide	Develop GIS service for citizens	Improving citizen service	
		Need GIS portal that acquire and use data from user	Develop geo-portal service		
Information	Applying common use	Acquire diverse spatial data through request analysis Demand for unified maintain system that is not distinct spatial data/text data within Enterprise perspective Need sharing geo-data from constructed national GIS projects Strengthen re-use of constructed geo-data	Increasing synergy effect through integration with geo-data and administration data	Effective of administration business	
Technology	Develop delivery service	Develop GIS technology data accessing channel(TV, radio, telephone, fax, etc) excluding Internet service	Develop diverse service development for citizens	Expansive the infrastructure of e-Government	
	Support enterprise technology	Spatial data that manage different organizations is managed by enterprise GIS Improve business process Expand visualization tool in administration working area Develop application to easy link and use spatial data	Develop technology for GIS integration		
	Enterprise architecture	Need national GIS technology system based Enterprise e-Government architecture			
Organization	Integration with partnership /organizations	Organic cooperation and increasing relationship of vertical (between central and local governments) and horizontal (between central departments)	Strengthen collaboration between public organizations	Efficiency of administration affairs	
Infrastructure	Law/Institution	Prepare law/institution	Prepare legal basis for integrating e-Government and NSDI	Improving GIS integration with e-Government	Infrastructure of e-Government
		Finance Specialist	Improve institution such as finance / specialist for integration business Cut down budget through unified business execution rather than each individual budget execution		
		Information open / protection	Consider GIS protection of private information Need progressive information open through improving institution		

Contents		Considering matters	Strategy	Direction
Standard	Standard	Standard of spatial data and technology are developing but e-Government is not implemented until now Need a dividing section of implementing standards between e-Government and NSDI	Set up standard system for integration	Infrastructure of e-Government

4.2.2 Improving Quality of Cadastral Spatial Data for Implementing the Effective e-Government Realization

The government is driving 4 programs based on the necessity of method, institution and plan for improving accuracy of the seamless cadastral database.

Figure 2. Basic direction of improving accuracy of the continuous cadastral DB

Method	Need cadastral	Use cadastral Survey result ②	Cadastral resurvey ③
	Use reference	Repair disparity ① nonexistence	Repair origin system ④ existence

existence and nonexistence of institution and plan

The first program: improving accuracy of disparity parcel by using reference data in case of not necessary improvement of institution and planning. The second program: it is reflected the survey results to the seamless cadastral DB in case of not necessary improvement of institution and planning followed the cadastral survey. The third program: it is necessary improvement of institution and planning to repair the origin system using reference data or algorithms. The fourth program: this is to implement the cadastral resurvey nationwide as big bang followed improvement of institution and planning for solving fundamental problem of the cadastral map

(1) The short term method for institution arrangement

For improving accuracy of the cadastral data, the first step is to increase accuracy of the continuous cadastral data to maintain auto reflection on the KLIS so that cadastral survey result and cadastral data can be upgraded on the same time. The second step is to increase accuracy of the continuous cadastral data using inspection data of cadastral survey result with related data together

(2) The long term method for institution arrangement

There is a necessity to repair the institution relative to unification of survey control network for improving cadastral data in the long term perspective. As diverse local coordinates and national coordinates are used for the cadastral survey currently, each cadastral map leads to disparity in different local coordinates. Through the research of transformation coordinate system to the world geodetic coordinates and verification of the control network for unifying one national survey control network, the survey control network could be prepared as an institutional infrastructure.

4.2.3 The Initiatives for Integrating e-Government and NSDI

The 2~4 development stages for implementing the driving model of e-Government are totally summarized each sector as the initiatives of the driving model. The second stage is a starting point to begin integration of e-Government that considers GIS perspective. The third stage is concentrated on development of related integration technologies and makes an integration infrastructure of “Interactive” level before “Integrate”.

Thus there are demanded for improving related regulations and institution for integration in the early e-Government but also prepared a standard policy, protection, finance and specialist. If a fundamental institution and framework for integration couldn't build up now, it is not easy to implement it although there have the good technologies and service. In addition there are prepared for a framework for collaboration within governments in the organization. The initiatives for a NSDI integration related those infrastructure structure and organization are to need the sustainable drive with 3 stages and 4 stages as well as 2 stages. The mentioned subjects as 2 stages of NSDI initiatives can be integration technologies for using service and information integration mostly.

The technology development of delivery service for the citizen based service is necessary and the related technologies related on Enterprise GIS are demanded currently.

The third stage of the unified level is to focus on the initiatives of GIS integration for increasing the information use through integration with service and information based integration infrastructure and technologies in the second stage. Therefore the service of online participation system follows the citizen participation. In the second stage, the administration service that has providing the present Internet GIS. Also, a unified portal service for sharing and using the geo-data and the integrated service in order to revise the current national geo-information distribution system as a clearinghouse could be established.

The fourth stages that will center to the future ubiquitous technology need continuously to develop diverse service such as located based service using GIS as well as to develop GIS technologies to graft the ubiquitous technology in the acquisition and management of the spatial data. Otherwise the vertical or horizontal cooperation system between organizations is to need for the geo-data integration within the government.

<Table 2> the initiatives of integration e-Government with NSDI

e-Government		Item of driving model with NSDI	The initiatives for integrating NSDI	The goal of e-Government
The fourth parts	10 prime agenda			
Working type's innovation of government	Set up digital work process	Technology	Develop application that can easily get spatial data Develop Mobile GIS technology for using spatial data in the e-Government Develop GIS integration technology with Ubiquitous for acquiring and management of spatial data	Working efficiency
	Expansion of administration information sharing	Information integration & use	Research on Metadata for managing effective spatial data Research contents of common spatial data within sharing data use of administration information Improve & integrate geo-data DB catalogue of each organization Develop effective maintenance technology of geo-data Improve a current clearing house Data integration using Enterprise GIS Research real-time spatial data acquisition Develop spatial data management system using Ubiquitous GIS	
	Redesign work process based service	Technology	Develop Enterprise GIS technology for integration based on geo-information Develop LBS application system for e-Government service	
Innovation of citizen service	Improve the customer service	Service Technology	Develop One-Stop service of geo-information for general user Develop online Mapping technology Construct delivery mechanism for accessing geo-data Develop voting management system using GIS Develop online community system Develop GIS portal service	Improve citizen service
Data resource Management renovation	Unified standard of data resource	Infrastructure	Develop GIS standard for data sharing Apply the developed standard to the public sectors	Construct infrastructure
	Strengthen information protection	Infrastructure	Prepare the private protection related NSDI and e-Government	
	Capacity building	Organization	Prepare capacity building institution for GIS Establish the special community for integrating NSDI and e-Government	

e-Government		Item of driving model with NSDI	The initiatives for integrating NSDI	The goal of e-Government
The fourth parts	10 prime agenda			
Revise law/institution	Revise e-Government related regulation	Infrastructure	Revise business regulation to apply for GIS Revise law/institution that pursuit the integration with NSDI and e-Government	

5. CONCLUSION

This paper proposes the strategy of integration with NSDI and e-Government through analyzing the overall perspective as a part of digital paradigm. Thus a driving model, strategies, initiatives for proposing the integration was identified for integration each other. The core model of an integration model of NSDI with e-Government can be an established integration strategy that considers the important things on the NSDI perspective.

The integration model with NSDI and e-Government was proposed for the future initiatives in the perspective of integration of NSDI in order to move mature stages step by step because the current e-Government has a driving plan to adapt the specific characters of a driving model of e-Government. The living paradigm will be changed with the rapid growth of mobile communication in near future. Therefore there will be a improvement of the service direction in line with customer oriented approach coping with inter or outer environments under the goal of e-Government including NSDI.

REFERENCES

- Dale, P.F. and Mclaughlin, J.D., 2000. Land Administration. Spatial Information Systems and Geostatistics Series. Oxford University Press, Oxford.
- Jury Konga, 2003, e-Government : The New Reality, URISA Workshop.
- URISA, 2003, Gov evolution, Vision, Models & Challenges, URISA Workshop.
- URISA, 2003, Envisioning Neighborhoods GIS Information Design, URISA.
- Lee, Y.-H., 2006. The role of the cadastral system for good land administration in Korea, FIG commission 2006, Munchen, Germany.
- MOCT, 2005. Framework for an NGIS for digital nation, MOCT News Release.
- MOGAHA and MOCT, 2005. Final report of the KLIS project.

BIOGRAPHICAL NOTES

Young-ho Lee is an assistant manager at the business development team, Korea Cadastral Survey Corporation. He was acquired a Master Degree from ITC, the Netherlands. His professional interests are improvement quality of cadastral information based on survey measurement as well as distribution of cadastral data via Internet.

CONTACTS

Young-ho Lee
Korea Cadastral Survey Corporation
45 Yeoido-dong Yeoundungpo-gu
Seoul
Republic of Korea
Tel. + 82 2 3774 1208
Fax + 82 2 3774 1229
Email: horey@kcsc.co.kr
Web site: <http://www.kcsc.co.kr>