

Introduction to the 1st National GIS Project in Korea

Injoon Kang , Jongwoo Oh, Insik Shon and Yongdae Lee

* Professor, Pusan National University

** Director, R&D Center, Korea Geographic Information Industries Cooperative

*** Professor, Pukyong National University

I. Introduction

Since GIS was implanted to the spatial fields related governmental, industrial and research sectors, GIS technology not only promoted ability of the spatial data manipulation but also made necessity of geographic information supplies and uses for the governmental policies, industrial fronts, and R & D institutions that required their own role reevaluation.

GIS policy could be used on almost entire fields of the world, such as the national land management, environmental management, disaster management, enterprise activities, and general lives. GIS policy was called as an infrastructure of the knowledge information on the cultural society. For insuring the national power on the periods of the unlimited competition, it was very important to establish the national information infrastructure.

The National Geographic Information Systems (NGIS) in Korea was established for the construction of the digital land. There were two NGIS stages as the NGIS I and NGIS II. The NGIS I was constructed from 1995 to 2000 and NGIS II was constructed from 2001-2005. This paper was concentrated on the NGIS I on the results with policies. The NGIS I results would consist of not only GIS policies that presented backgrounds with

problems of the technical dependable situations but also detailed construction items that exhibited budgets with assessments of the overall parts. The hypothesis of this paper was that the The National Geographic Information Systems (NGIS) in Korea would be a typical successful model for the small sized countries of the world.

The purpose of the NGIS project I was to development on living benefits of people through an efficiency of policy and rationalism of planning. In order to achieve this purpose, the NGIS project I had been established using the national geographic information based planning. The NGIS project I consisted of the master management part, the geographic information part, the technique development part, the standardization part, and the land Information part. These five GIS project parts were operated by four governmental ministers and related institutions, such as Minister of Transportation and Construction, Minister of Science and Technology, Minister of Information and Communication, and Minister of Administrative and Home Affairs.

This paper dealt mainly with results of the literature materials that combined to previous research papers and to the National Geographic Information Systems (NGIS) in Korea. Through these papers comparisons and critical suggestions

would be taken in order to drive assessment of the results. The national GIS construction in the world was pasted for around ten years. Since that period 11 countries already started for the national geographic information systems construction (Table 1). This paper would be comparable to that results.

In terms of the previous researches 11 countries already started for the national geographic information systems construction (Masser, 1999). This

paper would be comparable to the report of the 1st generation national spatial information infrastructure. This paper indicated that 11 countries would be divided to two categories. The first one was the national GIS constructed by the governmental forced systems as the top-down policy. The other one was the national GIS constructed by the existed organization systems as the bottom-up policy (Table 1).

Table 1. National GIS Policies of the International Spatial Information Infrastructures.

Nations	Name of the National GIS Projects	Years	National Policy
Australia	Australian Spatial Data Infrastructure	1986	Bottom-up Policy
Canada	Canadian Geospatial Data Infrastructure	1996	Bottom-up Policy
Indonesia	National Geographic Info. Sys.	1993	Top-down Policy
Japan	National Spatial Data Infrastructure	1995	Top-down Policy
Korea	National Geographic Info. Sys.	1995	Top-down Policy
Malaysia	National Infrastructure for Land Info. Sys.	1994	Top-down Policy
Netherlands	National Geographical Info. Infrastructure	1992	Bottom-up Policy
Portugal	National System for Geographic Info.	1990	Top-down Policy
Qatar	National Geographic Info. Sys.	1990	Top-down Policy
England	National Geospatial Data Framework	1996	Negotiate Policy
USA	National Spatial Data Infrastructure	1990	Top-down Policy

(Data modified from Masser, 1999)

In terms of the GIS policy the first type was the national GIS constructed by the governmental forced systems as the top-down policy: Portugal, USA, Korea, Japan, Qatar, and Malaysia. The other type was the national GIS constructed by the existed organization systems as the bottom-up policy: Australia, Canada, Indonesia, and Netherlands. **On the England case differed from others due to inactive process neither the government institution,**

Ordnance Survey, nor existed organizations. Korean government emphasized on the NGIS project success by the strong governmental force to the required infrastructure development for the potential digital geographic information technology development. **On the other hand, for the NGIS policy related and supported names of the existed GIS institutions of the each countries were as follows** (Table 2).

Table 2. Names of the NGIS projects with institutions of the each countries

Nations	Name of the national GIS projects	Name of the GIS institutions
Australia	Australian Spatial Data Infrastructure	Australian Land Information Council Australian Prime Minister Heads of State Governments Australia New Zealand Land Information Council Australian Surveying and Land Information Group
Canada	Canadian Geospatial Data Infrastructure	Canadian Council on Geomatics The federal Inter-Agency Committee on Geomatics
Indonesia	National Geographic Information Systems	National Coordinating Agency form Surveying and Mapping
Japan	National Spatial Data Infrastructure	The Ministry of International Trade and Industry The Cabinet Councilors Office of the Cabinet Secretariat The National Mapping Agency The National Land Agency NSDI Promotion Association
Korea	National Geographic Information Systems	Minister of Construction and Transportation
Malaysia	National Infrastructure for Land Information Systems	-
Netherlands	National Geographical Information Infrastructure	Dutch Council for Real Estate Information National Council form Geographic Information
Portugal	National System for Geographic Information	National System for Geographic Information Ministry of Planning and Territorial Administration National Center for Geographic Information
Qatar	National Geographic Information Systems	National Steering Committee
England	National Geospatial Data Framework	Ordnance Survey, Federal Inter Agency Committee on Geomatics
USA	National Spatial Data Infrastructure	Federal Geographic Data Committee Office of Management and Budget National Geospatial Data Clearing House National Digital Geospatial Data Framework National Performance Review, Executive Branch US National Academy for Public Administration

(Masser, 1999)

II. Policy of the National GIS I Construction in Korea

1. Backgrounds and Necessities

There were four items of backgrounds and

necessity for the national GIS I construction.

- To prepare for the information society, to accumulate for the national competition and legislative productivity, and to upbringing for the competible industries through GIS developments

- To use the national policy, legislative and public fields such as the national land spatial management, disaster management, and public services, throughout the usages base and condition of the national level GIS
- To prevent from lives and property loose through the insolvent management of the underground facilities
- To effective driving of the national land spatial management through the integrative management of the spatial information

2. Problems

There were three problems for the national GIS I construction.

- GIS usage base and condition week for the requirement of the national policy due to initial stages of the digital mapping for the topographic maps and thematic maps
- Probability question of the GIS engine of Korean made due to the delay of the GIS relative technique development because most GIS relative techniques were dependent upon foreign productions
- Under prepared to the GIS relative law and systems for the GIS early construction and spatial information distribution

3. Promote direction and policy

There were seven promote directions and policies for the national GIS I construction.

- Base spatial DB structure construction and standardization
- GIS relative technique development and manpower education
- Governmental GIS usage system development support
- Spatial information distribution maximization
- Expert driving organization foundation and expenditure support activation

- Mutual fund production of public fields and private fields for the GIS base foundation
- Other relative systems and law adjustment

4. Detail execution items

There were ten detail execution items for the national GIS I construction.

- 1/25,000 Thematic map digitize projects ('98-2000): landuse map, parcel map, administrative map, and etc.
- Underground facility digitize projects ('97-2001): water, sewage, electricity, communication, gas, heat, and oil pipe facilities
- GIS relative technique development such as base and application core software ('95-2003)
- GIS relative manpower education ('96-2000)
- GIS standardization project on the base map and application field information ('95-'97)
- Pilot project on cadastral map digitalization and cadastral survey ('95-'97)
- Pilot project on the underground facility management development of Gwacheon City ('96-'97)
- GIS usage system development on environment, urban, disaster prevention, and etc. ('98-2001)
- National GIS project support research on technique, information accumulation and management ('95-'99)

: Information network link

- High express Information communication network link between the central GIS center and relative government and organizations

5. Role allotment

There were ten role allotments for the national GIS I construction.

- government: base Spatial information DB standardization, technique development, manpower education, relative systeme production,

- GIS project main role, and topographic map digitization cost 50% national treasury provides
- Project on map and application field information ('95-'97) GIS
- Minister of Construction and Transportation: GIS project master control and usage policy development
- Minister of Science and Technology: Technology development and manpower education
- Minister of Information and Communication: standardization for the data exchange
- Minister of Governmental Administrative and Home Affairs: land Information systeme development
- National Geographic Information Institution: digital mapping of all paper maps

- Municipalities: water and sewerage facility map production: 1/1000 topographic map digitization cost 50% national treasury burden (demander burden principal)
- Government invest institutions: own facilities map production: 1/5000 topographic map digitization cost 50% national treasury burden (demander burden principal)
- Private sectors: commercialization lead on the mapping techniques, s/w development and etc.

6. NGIS Expenditure

For the 1st NGIS project the planned total expenditure was 346 million dollars, however, the actual total expenditure was reduced as 199 million dollars (Table 3).

Table 3. NGIS I Expenditure

Project Names	\$
topographic map digitization	53.0
Thematic map digitization	18.4
Cadastral map digitization	11.8
Underground map digitization	64.7
Pilot project of Underground management system development	1.0
Public GIS usage sys. dev.	26.2
GIS tech. development	14.6
GIS Education	5.4
Standardization	1.0
GIS Researches	2.8
Total (Unit: Million USD)	198.9

Sources: The 1st NGIS Plan (1997, Ministry of Construction and Transportation), The 1st NGIS Project White Paper (2002, Ministry of Construction and Transportation)

III. The five major national spatial information systems

The NGIS I project was to establishment of the five national spatial information systems, such as various nationwide digital maps, GIS technique development, GIS education, GIS standardization, and GIS researches,

1. The Master Management Part

This part would operate to support planning, manipulation, evaluation, expenditure, law, pilot project, research, and usage system development fields of the national GIS projects (Table 4).

Table 4. Overview of the Master Management Part

#	Items	Description
A. Planning, Control, Assessment		
1	Main Plan Establish & Manipulation	-1st national GIS projects planning ('95-'00) -New base planning found for the 21C knowledge base hyper-information society

2	Seminar & Workshop Support	-Conference open for the GIS2000 -Conference open for the international base -Workshop for the land management information systems
3	Manipulation Subparts and Fields	-NGIS planning, expenditure management and manipulation for the each field and each year -Meeting open for each field committees, research ,committees and project operation committees -Out of fields, such as road management integration systems of NGIS control meeting open
4	Mid-term Evaluation & R/D	-Mid-term evaluation open for the NGIS project development ideas -GIS policy and teaching support research by KRIHS and KICT
B. Law and Enforcement Ordinance Legislation		
1	Systematic & practical Law/Institution System	-To make a law and system equipment for the effective NGIS project operation
C. Public GIS usage System Development Support		
1	Project Name	-Land management information systems, soil resource info. sys., forest geographic information systems, underwater information management systems, geologic information management systems
2	Duration	1998-2001
3	Main Driver	Mistry of Construction and Transportation, sub-institutions
D. Underground Facilities Digital Mapping Support		
1	Project Name	79 cities
2	Duration	'97-'01
3	Main Driver	Mistry of Transportation and Construction, related municipalities, and related institutions
E. Underground Facilities Digital Mapping Project (Water & Sewage)		
1	Project Name	19 Underground Facilities Digital Mapping Project
2	Duration	'98-'01
3	Main Driver	NGIS team of the Minister of Transportation and Construction

2. The Geographic Information Part presented each base data digitize, regulation and standardization (Table 5).
The National Geographic Institution controled and

Table 5. Overview of the geographic information part

#	Items	Description
A. topographic Map Digitize Project		
1	Project Name	1/1,000 (79 cities), 1/5,000 (nationwide), 1/25,000 (nationwide)
2	Duration	'95-'00
3	Main Driver	The National Geographic Institution
B. Thematic Map Digitize Project		
1	Project Name	Urban plan map, road network map, land use plan map, cadastral map, land use map, legislature boundary map
2	Duration	'98-'00
3	Main Driver	The National Geographic Institution

3. The Technique Development Part

Minister of science and technology would operate to obtain the independent techniques and to support

the education for the experts by the core GIS base technique development support (Table 6).

Table 6. Overview of the technique development part

#	Items	Description
A. GIS Technique Development Project		
1	Project Name	GIS Engine, DB tools, Mapping Techniques, System Integration
2	Duration	'95-'99
3	Main Driver	Minister of Science and Technology
5	Results	
B. GIS education for experts		
1	Project Name	Education
2	Duration	'96-'00
3	Main Driver	Minister of Science and Technology
5	Results	700 experts educated per year

4. The Standardization Part

The main purpose: Minister of information and communication presents a research and development

of the GIS Standardization for the base data construction and circulation (Table 7).

Table 7. Overview of the standardization part

#	Items	Description
A. GIS Standardization Projects		
1	Project Name	GIS Standardization Establishment for the GIS Data Construction, Circulation, and Usage
2	Duration	'95-'00
3	Main Driver	Minister of Information and Communication

5. The Land Information Part

Minister of administrative and home affairs presents the digitize cadastral map and land information

systems construction for the high GIS usage requirement (Table 8).

Table 8. Overview of the land information part

#	Items	Description
A. Cadastral Map digitize Project		
1	Project	Forest Cadastral Maps: 702,372 sheets
2	Duration	'98-'00
3	Main Driver	Minister of Administrative and Home Affairs

There were some problems occurred, however, such as work cooperation problems due to many institutions participation, work delay problems due to a scarcity of control authority holding systems, work consistence and continuity problems due to

short term transfer of workers positions and shortage of the expenditure investment due to national economic decay. These suggestive points should affect to the second NGIS planning and implementation (2001-2005).

IV. Policy direction for the future

It is necessary to promote the national geographic information systems for the future policy points. Five items were selected for the further national GIS directions.

1. Construction of the national GIS project boundaries and role readjustment in viewpoint of the national spatial information infrastructure
2. Renovation of the mutual cooperative system of the each committee and empowerment of the master control ability
3. Construction of the effective evaluation system for the national geographic information systems
4. Renovation of the tethering budget system and of the execution structure
5. Creation of the practical ideas for the government and private cooperation on the national GIS project.

V. Conclusions

The Korean NGIS project had been transformed from the dispersed and mal-planned dogmatic GIS projects to the systematic planned GIS projects through the 1st NGIS project (1995-2000). Korean government emphasized on the NGIS project success by the strong governmental force to the required infrastructure development policy for the potential digital geographic information technology development as the top-down process.

Optimistic outputs of the 1st NGIS project in Korea resulted in prevention from overlapped expenditure investment and ensuring interoperability of the systems and spatial database. The invaluable result of the NGIS I project was to establishment of the nation fundamental spatial information systems, such as nationwide digital maps (topographic maps, cadastral maps, thematic maps, underground facility maps), GIS technique development (GIS engine with applications, spatial database tools, spatial data integration, and mapping techniques), GIS education, GIS standardization, and GIS researches.

As the results of 'the National GIS Policies of the International Spatial Information Infrastructures' data (Table 1), 1st National GIS project policy of the Spatial Information Infrastructures exhibited the results of the strong governmental driving forces were more affected to the systematic results than the existed organizations driving forces as the bottom-up process. The 2nd generation NGIS policy will be guided two different aspects: changeable governmental policies and active global events.

NGIS is realized as the most important national infrastructure for the national competition power and productivity expansion. NGIS should be constructed by the government as a huge project scale because not only GIS is required abundant buffet and used for the publics, but also GIS will be treated as governmental properties due to its attribute information, geographic elements and national concept.

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