# Background of korea NSDI for cyber-land realization

(summary)

1. Objectives

cyber territory-realization for spatial information integration of digital economy visions and policies by sectors

2. Vision

-realizing digital land for leading future

-providing various geospatial information

3. Roadmap

| Two Sector | | 1995-2000 | 2001-2005 | 2006-2010 | 2011-2012 | 2013- |
|---|---|---|---|---|---|---|
| NSDI | 1 | Layering groundwork | | | | |
| | 2 | | Expending Use of GIS | | | |
| | 3 | | | Estabilishing everyday | | |
| system | H/W | | distribution | centralization | integration | Cloud |
| | F/W | | WMS,WFS, CSW,WPS | OpenAPI, Mashup | Citizen participation | RFID,USN |
| | S/W | | Common DB | e-Govern | mobile | embeded |
| | N/W | | | Home-net | Security | Giga-Net |
| | others | | | Homepage | Ubiquitous | Cyber-land |

4. policy

- pursues innovating, improving benefit of survey products users.

First, at the same time of carrying out national control surveying projects as well national base mapping, We''ll fully revise current land survey Act, and establish long-term plan etc, settle firm foundation in surveying & mapping.

Second, We''ll quickly build basic survey, base map, geospatial information, and provide people with various geospatial infomation on-line, transform to land portal service org.

Third, for developing surveying & GIS, We''ll positively take part in the international conference, society, intensify international cooperation, enlarge training program. Lastly, We''ll seek continuous change, innovation to adapt ourself in rapidly changing world situation, and encourage the staff to educate oneself. We''ll intensify our capacity.

| Creating value of national base map and leveraging smart society<br>(76 systems of 23 organizations are integrated) | |
|---|---|
| Renovation of production process (commercial, statistical and city map, urban hazard mapping) | -revision process |
| | -seamless map |
| | -automatic map generalization |
| Extension of data integration and fusion | -combination with marine and aviation data |
| | -search words database |
| | -indoor and underground space mapping |
| Improvement of data application | -time series archive |
| | -semantic web (DXF,NGI,SHP,GML,TIF,PNG) |
| | -crowdsourcing map |

5. The roles of the government

Lay the groundwork for the basic spatial information database

Design and build a database

Digitize and map topographic information

Develop related technologies and train experts

Support the development of core GIS base technologies

Support the development of core GIS application technologies

Educate and train GIS experts

Standardize information compatibility and distribution systems

Standardize the information utilization system

Provide government aid for the development of a GIS utilization system

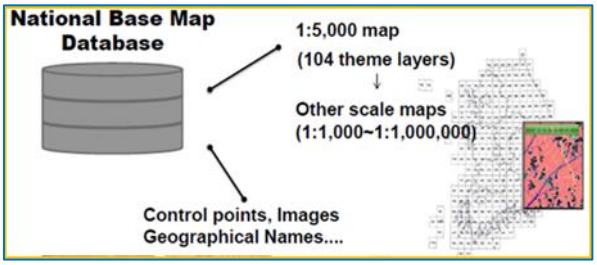
Establish a spatial decision support system (SDSS)

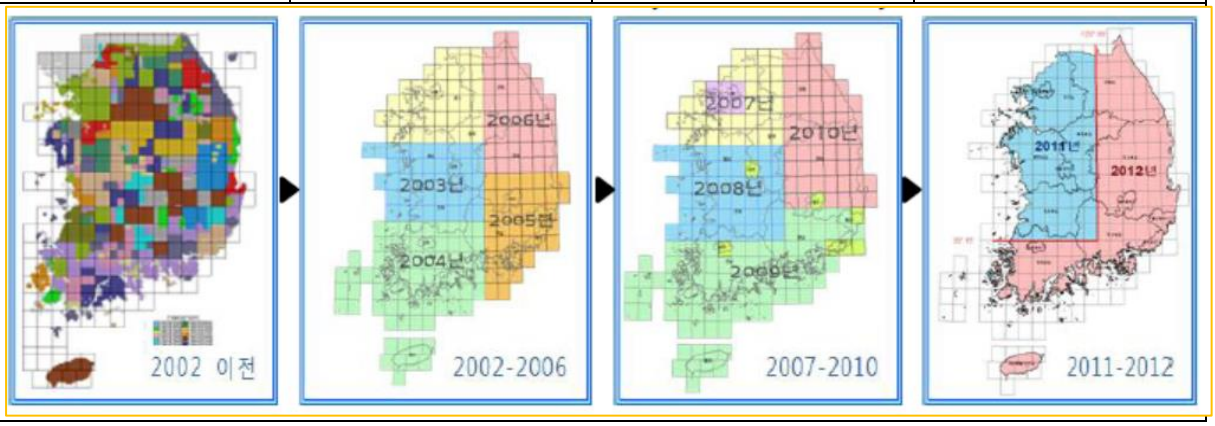
Maximize the distribution and management of spatial information

Establish and operate an institution (“Clearing House“)

Devise other related systems and regulations

6. Revision cycle from 5 years to 2 years(periodic or continuous,regular,whole sector)

<table>
<tr><td>Real-time</td><td colspan="2">(104 Theme Layer)</td><td>cycle</td></tr>
<tr><td>-change detection<br>-extract data<br>-survey,geo-coding<br>-edit national map</td><td colspan="2"> 

(76 system of 23 organization)</td><td>-periodic<br>-continuous<br>-regular<br>-irregular<br>-partial<br>-whole country revision</td></tr>
<tr><td>digital conversion</td><td>every 5 years</td><td>metrocity(2-4 years)</td><td>every 2 years</td></tr>
<tr><td colspan="4"> 
</td></tr>
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7. Expected benefits(annual average benefit per year)

| Item | benefit(M.dollar) | Item | benefit(M.dollar) |
|---|---|---|---|
| urban management | 16.4 | enginnering | 56.9 |
| transportation | 8.6 | web and mobile | 1.4 |
| housing | 15.0 | dissemination | 0.04 |
| agriculture | 11.8 | -transportation and road<br>-water resource<br>-civil engineering<br>-environment, facility etc. | |
| forestry | 4.4 | | |
| disaster management | 8.9 | | |
| underground facility | 7.0 | | |
| annual public sector | $72.1 million | annual private sector | $58.34 million |

# Background of korea NSDI for cyber-land realization

## The First Plan for NGIS Construction

As the nation transforms into an information society, new problems that must be dealt on the national level have emerged. Such problems undermine national productivity and competitiveness, and increase non-production costs.

Since the 1970s, advanced nations including the U.S., Canada, Australia, EU members, and Japan have devised means to utilize a geographic information system (GIS) to address these problems and made investments, recognizing the system as part of their national infrastructure.

Korea, by contrast, is ill-prepared to exploit GIS, and private sectors cannot single-handedly lay the groundwork for GIS for reasons including funding and technologies.

Therefore, the foundation of needs to be built on the national level so as to enhance its development and GIS competitive advantage in the 21st century information age.

### Goals

Based on the premise that GIS is social overhead capital serving as a backbone for national competitiveness and administrative productivity, the nation shall improve the foundation for GIS utilization and improve its user environment by establishing nationwide GIS standards, building a database of basic spatial information, and supporting the development of GIS-related technologies.

Considering the fact that GIS is widely employed in public, national policymaking and administrative spheres (including electricity and gas, roads and railroads, water and sewage, disaster and national land management, and public services), the nation shall enhance the efficiency of GIS construction by gathering opinions across governmental departments.

The Government shall also digitize the spatial information on the surface and underground of the entire national territory, and use the digitized information to create a digital map, which can be efficiently utilized in public, national policymaking and administrative spheres, such as public services, disaster and national land management.

### Objectives

Phase I (1995-200): Laying the groundwork for GIS

Since the stagnant GIS market prevents private sectors from taking the lead in building a GIS, the government needs to create initial demands for GIS through investment and other supportive measures.
Laying the groundwork for the construction of a spatial information database Digitize topographic, thematic, underground facility and cadastral maps Establish national standards to support spatial information gathering, conversion, distribution and utilization. Reorganize the related institutions and regulations, develop GIS technologies, train GIS experts and conduct supporting research

Phase II (2001-2005): Expanding the use of GIS

Develop public services that utilize the spatial information database constructed in Phase I to improve the quality of life

Encourage the active participation of municipalities and private sectors

Build a national spatial information database

Establish a distribution system for spatial information: A system that enables easy access to spatial information

Develop GIS technologies, train GIS experts and conduct supporting research» Spur private investments

Phase III (2006-2010): Establishing everyday use of GIS

Enable the convenient creation and distribution of spatial information to allow all-time, ubiquitous access

Maximize the scope of GIS services, make their use widely available, and create related value-added industries

NGIS project history

-May 27, 1994: “NGIS Construction Measures“ were presented in a briefing at an Economic Ministerial Meeting

-May 19, 1995: “Basic Plan for NGIS Construction“ was confirmed (by the Ministry of Finance and Economy)

* The ministry in charge of the project was changed from the Ministry of Finance and Economy to the Ministry of Construction and Transportation (June 15. 1995)

-March 17, 1997: The first modifications were made to the “Basic Plan for NGIS Construction“

* The target date for the digitization of topographic maps was moved from late 1997 to late 1999

-October 27, 1997: The Second modifications were made to the “Basic Plan for NGIS Construction“

* Cadastre re-surveying was excluded from cadastral map digitization

* Targets were confirmed for thematic map digitization and public GIS utilization system development

-August 24-October 29, 1998: The NGIS project was inspected by the Bureau of Audit and Inspection

-December 8, 2000: The Second Basic Plan for NGIS Construction (2001-2005) was confirmed

-January 2002: Modifications were proposed regarding the Second Basic Plan for NGIS Construction (2001-2005)

The Second Plan for NGIS Construction

Changes brought by informatization in the 21st century and forecasts Knowledge-based informatization is deemed crucial in every field, including industrial, economic, daily life and cultural. Also, the knowledge and information industry is the cornerstone of national development in the 21st century. The advance of information technologies such as GIS is expected to expedite the advent of an economically borderless era of global competition. Advanced nations have strategically strengthened their capabilities for collecting and processing geographic information on their territory.The public need for national spatial information is predicted to increase and diversify.

The goals and objectives of the Second Basic Plan for NGIS Construction

Vision

The First NGIS project shall lay the groundwork for the digitization of national spatial information

The Second NGIS project shall cement this groundwork and establish the wide public use and distribution of NGIS» These projects aim to expand the National Spatial Data Infrastructure and complete the digitization of land information by 2005 Daily life related to national land information in 2005

Anyone can utilize land information anytime anywhere

Create a living environment based on digitized land information, where anyone can find out the location of what they are looking for with speed and accuracy

Society that appreciates creative ideas related to GIS

Establish a society in which good ideas are readily commercialized and introduced to domestic and global markets

Main objectives of the Basic Plan by category

Lay the groundwork for “digital land“ by expanding the base of national spatial information

Enable public Internet access to geographic information

Develop core technologies, the source of national wealth creation, and foster related industries

Constantly improve the NGIS environment through research, standardization, and expert training

implementation strategies by sector

Basic geographic information construction

Objectives

-Build and provide the most basic and commonly used geographic information so that those seeking geographic information can utilize GIS for various purposes

* Scope of basic geographic information (Article 15 of the Enforcement Decree)

-Targets: Administrative sectors, transportation, seas, water resources, cadastral status, surveying control points, topography, facilities, satellite images and aerial photographs

Implementation strategies

-Employ new technologies such as GPS to reorganize national control points, which are required for the construction of accurate and reliable basic geographic information

-Review the results of pilot projects to reestablish comprehensive implementation strategies, which include related policies, technologies, systems, and budget Include pre-existing digital maps and other related information in the construction of basic geographic information, as well as newly created ones

Main projects

-Reorganize the national control points system Execute pilot projects for the construction of basic geographic information

-Build a database for basic geographic information

-GIS utilization system construction

Objectives

-Construct a GIS utilization system focusing on use by central government offices, municipalities and investment institutions, such as agriculture, forestry and mining, ocean and environment, and statistics and underground facilities Implementation strategies by phase

-Continue the construction of the GIS Utilization System, which is in progress as part of the First NGIS Project, focusing on the efficiency of administrative affairs and the quality of public service

-Expand the underground facilities management system

-Complete a water and sewage management system in the 19 base cities by 2002, and expand the system to urban areas across the nation Complete a management system for other underground facilities (gas, communications, electricity, heating, oil pipeline, etc.) in the 19 cities by 2005

-Phase in the construction of a geographic information system for others fields, including agriculture and forestry, ocean and environment and statistics

-Support the construction of a public-private GIS utilization system

-Employ a public-private collaboration program to share the burden of funding

- Prioritize projects directly related to public use, and select and support GIS utilization projects that are expected to have a great impact on related application fields and private sectors

-Lay the groundwork for GIS, which includes work guidelines, data formats, and estimate standards compatible with various GIS utilization systems

Geographic information distribution system construction

Objectives

-Construct an advanced system that distributes geographic information to users with speed and accuracy in an electronic environment such as the Internet Implementation strategies by phase

-Conduct base research and carry out pilot projects for the distribution of geographic information

-Construct, operate and improve a nationwide distribution system Concept map of the geographic information distribution system

NGIS technology development

Objectives

Contribute to the successful implementation of the NGIS project, and support export through continuous national investment on GIS technologies

Phase in the development of core technologies related to geographic information gathering, processing, distribution and utilization

Establish a GIS technology center and create a joint (industry-university-institute) “brain pool“ connected with the center, so as to enable collaborative development of technologies and build/utilize a national technological information network

GIS industry promotion

Objectives

Promote the GIS industry in line with the vision and objectives of the basic NGIS plan; the digitization of national land information In order to invigorate the GIS industry, establish “GIS Industry Promotion and Comprehensive Support Measures,“ laws and systems Nurture the industry focusing on users, instead of on developers and suppliers

-Devise public/private measures to encourage the export of domestically developed GIS technologies

Implementation strategies by phase

Promote the GIS industry and conduct research on supportive measures

Analyze the industry status » Draw up comprehensive measures » Establish laws and systems, and carry out supportive measures such as financial aid

-Include the GIS industry in the knowledge-base industry category and nurture small and medium-sized companies

-Implement measures to strengthen the competitiveness of each related sector, select small and medium-sized companies with technological competence and support them with funding and tax benefits

-Adopt measures to support the export of GIS technologies

-Organize and operate a GIS export team, build an export information network, offer information on foreign markets, market domestic technologies in overseas markets and provide support in connection with the Economic Development Cooperation Fund

NGIS standardization

Objectives

Systematically standardize data technologies, and develop a shared GIS model for work procedures, geographic information production, and municipal use

Continue to participate in international standardization efforts such as ISO and OGC to monitor global standardization trends and adopt international standards

Develop and distribute novel technologies so that domestic standards can be employed as international standards

Implementation strategies by phase

Establish a comprehensive system for NGIS standardization based on market needs -National GIS standards

established in compliance with the domestic standardization process (KS, KICS)

* If necessary: Create collective GIS standards by dividing responsibilities among departments

-Carry out a systematic standardization project

* Devise a yearly standardization plan and allocate standardization tasks

-Expand the scope of standardization to include data, procedures, and technologies  Carry out research projects and strengthen collaboration

-Conduct standardization research by institutions, centering on the Standardization Division Committee

-Support international standardization organizations

-International standards monitoring (phase 1) » Lead international standardization (phase 2)

GIS expert training and PR activities

Objectives

Diversify GIS training institutions and provide customized GIS training Build a distance education system through the joint industry-university-institute GIS education network

Increase the public awareness of GIS to promote its use in daily life and enhance the quality of information obtained by the public

Implementation strategies by phase

Differentiate and diversify GIS training institutions » Provide various training opportunities

-Commission training institutes run by public institutions, private associations and cooperatives Strengthen school-oriented education

-Select universities in each area to participate in government-subsidized projects for technology development -Include GIS related materials in the curriculum of

elementary, middle and high schools Establish and operate a GIS training and PR center -Establish and operate a Virtual GIS TC (training center)

-Install and operate an electronic library and a databank for lifelong education in the Virtual GIS TC Develop and implement various PR strategies

-Separately implement PR strategies targeting the general public, such as media coverage and advertisements, and those targeting experts, such as competitions and academic conferences Supporting research and related system improvement Objectives Conduct supporting research

-Practical research required for the efficient implementation of the NGIS project -Systematic and comprehensive research carried out under close collaboration with related organizations

-Diversify research institutes and improve research quality through competitions Improve and complement inadequate systems

-Amend related laws, particularly the Act on the Establishment and Use of the National Geographic Information System, that can be applied to all aspects of GIS including the production, processing, distribution and utilization of geographic information

Improve the surveying system, actively employ satellite images and introduce a supervision system

Implementation strategies by phase

Organize and operate a consultative group for systematic research

-Organize a joint consultative group involving the government, industries, universities and research institutes » Create a blueprint for long-term supporting research» Hold a yearly public contest for research subjects and accordingly carry out research» Publish results

Conduct balanced research on policies, technologies, municipal uses and evaluations

-Conduct research in connection with GIS technology development and standardization

- create synergy

-Place research results in the electronic GIS library and provide them on the Internet free of charge

Support private sectors and reorganize GIS laws, standards of estimate and guidelines

Execution and management of GIS plans

Establishment of an execution procedure for GIS plans Establish, execute, and evaluate basic and yearly implementation plans based on the Act on the Establishment and Use of the National Geographic Information System

The government (Ministry of Construction and Transportation) devises a NGIS basic plan every five years» The NGIS Promotion Committee reviews the plan» Confirmation and execution

-Informatization Promotion Committee

* The same procedure applies when changes are made to the basic plan

The chief of the related central administrative body annually establishes an implementation plan and evaluates results from the previous year.

- Implementation plans are to be established in a way that enables them to be carried out in connection with the basic plan

-Review results from the previous year and devise implementation plans for the following year by the end of May each year» Submit the plans to the promotion committee (review) » Notify the Ministry of Planning and Budget (under prior agreement with the promotion committee) of the plan

The chief of the related central administrative body and the heads of municipalities establish and execute regional implementation plans each year in accordance with the basic plan and implantation plans

-If necessary, gather opinions from the joint consultative body» The chief of the related central administrative body (consultation)» Send notifications of the results to the promotion committee and the Ministry of Government Administration and Home Affairs

Implementation system

The implementation system for the NGIS project consists of the NGIS Promotion Committee, division and sub committees for each field, a private advisory board and a technical support institution. The project shall be carried out with close collaboration of 13 central ministries, municipalities and investment institutions.

NGIS Promotion Committee

Functions:

Establishing and modifying basic plans; establishing and evaluating implementation plans; selecting basic geographic information; distributing, protecting and utilizing geographic information; and establishing and adjusting other principal policies

Organization: consists of 30 or fewer members; Chief: Construction and Transportation Minister; Members: Vice ministers of the 13 central ministries, heads of municipalities, and those from private sectors; Secretary: Directors of the Ministry of Construction and Transportation and the Ministry of Government Administration and Home Affairs

Division committees for each field (8 fields)

Functions and organization: Division committees are installed to facilitate the tasks carried out by the NGIS Promotion Committee, and each committee is comprised of 20 or fewer members (grade 4 or higher officials of administrative offices, members from private sectors)

Division committees for each field, supervisory bodies, and subcommittees General Affairs Division Committee: Supervised by the Ministry of Construction and Transportation

- Organizes and operates a consultative group for supporting research and a system improvement committee

Geographic Information Division Committee: Supervised by the National Geographic Information Institute

-Organizes and operates a standardization subcommittee Cadastral Information Division Committee: Supervised by the Ministry of Government Administration and Home Affairs

-Organizes and operates a standardization subcommittee Technology Division Committee: Supervised by the Ministry of Information and Communication and the Ministry of Commerce, Industry and Energy

-Organizes and operates a related technology (including software) subcommittee, a component and equipment technology subcommittee, a surveying and construction technology subcommittee, and a standardization subcommittee Utilization and Distribution Division Committee: Supervised by the Ministry of Construction and Transportation

-Organizes and operates a GIS utilization subcommittee, a distribution subcommittee and a standardization subcommittee

Expert Training Division Committee: Supervised by the Ministry of Construction and Transportation

- Organizes and operates a surveying expert training subcommittee, a GIS related (including software) expert training subcommittee, and a component and equipment expert training subcommittee Industry Promotion Division Committee: Supervised by the Ministry of Information and Communication and the Ministry of Commerce, Industry and Energy

- Organizes and operates a related industry (including software) promotion subcommittee, a component and equipment industry promotion subcommittee, and an export support subcommittee Standardization Division Committee: Supervised by the Ministry of Information and Communication

- Organizes and operates subcommittees for the development of digital maps, information and software technologies Private Advisory Board and Technical Support Institutions - Private Advisory Board: 15 or fewer private experts from each field

- Technical Support Institutions: research institutes, associations, laboratories and corporations NGIS project implementation system

The Third Plan for NGIS Construction

the 21st century and it is necessary that the NIS's advancement be developed by combining information technologies from various sectors. Under the name of e-Korea Vision 2006, Korea has presented a blueprint to take a step towards becoming a knowledge-information powerhouse.

The Ministry of Information and Communication has established an information infrastructure through its IT839 strategy, and the Ministry of Government Administration and Home Affairs has carried out the Public Administration Information System through this e-government project. The GIS has become the central axis for the NIS as a core technology in establishing an e-government, and producing a new growth engine and the novel services of IT839.

As geographic information becomes more and more important for the social, economic activities of this knowledge information society, it is necessary to improve services and utilize GIS.

GIS is required to expand its existing role based on database build-up and management to include advanced roles such as supporting the working process and decision-making.

it is necessary to expand target user segments of GIS from public sectors such as the central and local governments to include individuals and businesses.

It is necessary to generate synergy and encourage more enhanced uses of GIS by connecting and integrating the GISs of each sector.

User-based GIS should be built to improve the usefulness of GIS.

The e-government was established in an attempt to make administrative processes and public services more efficient and convenient, which requires evolutional improvement of GIS for public sectors. The GIService must be developed in order to meet the public demands for various services of security, health, education and welfare.

Various information service contents have developed through combinations with information technologies, and the steep rise in the use of GIS for location-based services is most noticeable.

The needs to strengthen and pioneer the national infrastructure of geographic information should be stressed to prevent geographic data created by both public and private sectors from being jumbled up and duplicated.

The e-government was established in an attempt to make administrative processes and public services more efficient and convenient, which requires evolutional improvement of GIS for public sectors.

More diverse public-private institutions are expected to produce and manage geographic information by ensuring easier access to the information to more social areas related to economy, society and culture.

Responsibility of the government is required in areas such as ensuring the interoperability of data and systems to make better use of the geographic data of all the different fields.

GIS should be developed so as to be suitable for the upcoming ubiquitous computing environment, allowing better accessibility to the Internet on an "anytime, anywhere" basis.

A more advanced interactive environment is required to freely share information between people, people and devices, and between devices by combining technologies of information, GIS, GPS and sensors. As a core technology to establish a ubiquitous environment, GIS should be more advanced than it currently is.

The basis of the third basic plan for NGIS construction

Vision

Transform the 'digitalized national land' into a 'cyber-national land' suitable for a ubiquitous environment

Establish a 'cyber-national land' which integrates real and virtual spaces by combining information technologies centering on GIS

Create public administration, new business and public services in the 'cyber-national land' environment => Establish a smart 'cyber-national land' in an effort to establish a world of ubiquitous networks The fundamental direction of the basic plan for NGIS construction

Change the focus of NGIS development from quantity to quality

Encourage advanced uses of NGIS and create value from geographic data Continue to advance the NGIS infrastructure, and improve the quality, of geographic information and the user environment

Transform the current provider-oriented geographic database into a user-oriented one

In order to make better use of geographic information, establish a user-oriented NGIS plan for the public sector, individuals and private businesses by actively collecting and applying the users ´ opinions as are received

Develop the NGIS in connection with GIS-related technologies and other informatization policies

Develop the NGIS in connection with GIS-related technologies such as information and communications, as well as GPS and sensor technologies Develop the NGIS in connection with national policies for informatization including the IT839 strategy, the e-government project and the general administration system for municipalities

Establish partnerships by sharing responsibilities and cooperating with the national informatization project The objectives of the basic plan for NGIS construction Establish a GIS-based e-government

Build various kinds of GIS-based information systems that would most effectively connect and analyze spatial information and administrative databases

Establish a GIS-based e-government to enable the public to better use national services such as filing civil complaints, offering services for local communities, building public administrative works, and encouraging public participation

Improve quality of life through GIS services Provide convenient GIS-based services related to security, health, education and culture to improve quality of life

Provide a wide range of geographic information services to create a convenient, secure and comfortable living environment for the public

Create GIS-based businesses

Create GIS-based businesses by making it possible for anyone to have easy access to a geographic database created by public and private sectors

Create location-based information contents required for a ubiquitous environment and establish new businesses based on them

Implement strategies of the basic plan for NGIS construction

Enhance NGIS utilization Enhance Government GIS

-Create values and generate synergistic effects through NGIS utilization by connecting and integrating various kinds of data and systems

-Enhance the system to expand the roles of policy and decision making processes beyond the current scope

Establish wider public use of Citizen GIS

Enhance Government GIS

-Create GIS services for the public in order to distribute the benefits of NGIS construction

-Implement the state-sponsored 'Citizen GIS Pilot Project' to develop various kinds of the GIServices for the public

Facilitate Business GIS establishment

Enhance Government GIS

- Expand the public CRM project and support GIS-based businesses including g.CRM and g.SCM in order to create economic benefits through GIS

- Effectively provide a geographic database built by public sectors to encourage more GIS-based economic activities, and support content creation and geographic data processing

Enhance the NGIS infrastructure

Create sustainable development and enhancement of the NGIS infrastructure Continue to develop, renew and enhance the quality of the NGIS infrastructure including basic geographic information, standards and technologies in response to situational changes

Continue to enhance the NGIS infrastructure in response to global changes and technological improvement and propose the international adoption of domestic NGIS standards Reinforce construction for NGIS infrastructure Establish an effective organizational structure for NGIS construction

Improve the interoperability and quality of geographic information

Devise related regulations and policies NGIS Implementation Systems

NGIS Implementation Systems

NGIS development system NGIS Promotion Committee

Functions: develop and change the basic plans, establish implementation plans, evaluate the results of plans, select basic geographic information, distribute the database, and modulate main policies related to the establishment, management and utilization of NGIS

-Organization: consisting of 30 or fewer members Chief: Construction and Transportation Minister

Members: Vice-ministers of the 13 central ministries, heads of municipalities, heads of local governments, those from private sectors

-Secretary: Director of the Land Bureau, Ministry of Construction and Transportation

NGIS Working Committee

Functions

Facilitate the working process of the NGIS Promotion Committee

Control all inter-ministerial, inter-sectional works and conduct practical works for the NGIS Promotion Committee Deliberate on and vote on the issues discussed in Working Groups of each field

Conduct works related to the modification of regulations and policies of each field

Organization: consisting of 30 or fewer members

Chief: Director of the Land Bureau, Ministry of Construction and Transportation Members: Section chiefs of the 13 central ministries, acting directors of municipalities, those from private sectors

Secretary: Deputy director of the Ministry of Construction and Transportation responsible for the NGIS

Working Group of each field

Functions

Facilitate the working process of each field Set up an implementation plan, and make major changes regarding the plan

Evaluate the results of the plan and modify regulations Prepare discussion items to submit to the committee

Discuss main issues related to the duties of each section, such as discovering potential projects, prioritizing projects and dividing responsibilities.

Organization

Designate and operate a lead agency for each WG, which comprehensively undertakes overall duties beyond the jurisdiction of the agency

The WG consists of 30 or fewer working-level officials and civil experts from related organizations

Designate and manage support organizations that possess specialized skills for each WG

Working Group of each field

WG for basic geographic information WG for standards and technologies

WG for application and distribution

WG for policies and regulations

Private Advisory Board

Functions: consultation about all NGIS-related issues

Members: consisting 15 or fewer members who have expertise in each sector

Technical Support Institution

Functions

Provide support regarding specialized knowledge and skills of related areas Conduct WG secretary´s duties, such as setting up operation plans and supporting meeting organizations

Establish implementation plans, monitor the results, evaluate the results of the plan, publish annual reports, and carry out related studies

Designation

WGs designate each technical support institution for themselves.

Research institutes, associations, attached research institutes, and corporate bodies can be designated for the advisory board.

The third NGIS plan by sector

Build basic geographic information Objectives Build standardized basic geographic information as a framework for NGIS construction and utilization, and as a key element in establishing a cyber land

-Establish basic geographic information that satisfies users´ demands for quality and practicality

-Build basic geographic information and keep it up-to-date Implementation strategies

Found a comprehensive system to produce consistent information by standardizing the process of establishing, and managing basic geographic information

Set up a cooperative system among organizations of development, renewal and management in order to ensure the latest updates of geographic information. Create plans to promote and distribute the GIS in order to boost and expand the uses of the system.

Main tasks of implementation

Define standards for basic geographic information

Establish and manage basic geographic information to satisfy users´ demands Promote basic geographic information

Standards and technologies of NGIS

Standards of NGIS

Objective

Ensure interoperability of geographic data by attaining internal stability of the NGIS standards

Implementation strategy

Set up a process to enact NGIS standards

Define the target and content of the user-oriented NGIS standards

Found a system to enact NGIS standards and continue to manage the standards Actively promote the NGIS standards and create the conditions appropriate for the standards

Main tasks of implementation

Find and create NGIS standards

Manage, modify and renew NGIS standards Monitor international standards Promote and improve regulations to accelerate the application of NGIS standards

Develop NGIS technologies

Objective

Enhance the utilization system of Public GIS and GIService for the public, and carry forward the globalization of the private GIS industry using the core technologies of the new generation GIS

-Provide support to enhance the utilization of Public GIS and GISevice for the public

-Take the initiative to globalize the GIS industry by advancing the core technologies of the new generation GIS

-Enhance the implementation of NIS by utilizing NGIS technologies

Implementation strategy

Develop technologies connected with the NGIS implementation system

Place priority on developing technologies to make the national territory smart and virtualized

Create an effective cycle for developing NGIS technologies

Main tasks of implementation

Technology development project for new generation NGIS -Technology development to improve spatial information quality

-Technology development to enhance spatial information management

-Technology development for spatial information connected with IT

-Technology development to enhance spatial information utilization

Develop cooperative NGIS technologies

-Expand the scale of NGIS technology development projects and conduct joint interdisciplinary development

-Set up a public-private partnership to commercialize NGIS technologies

-Establish a Test-Bed to develop demand-oriented NGIS technologies

Utilization and distribution of NGIS

NGIS Utilization system

Objective

Improve the effectiveness of administrative working processes conducted by government organs and provide user-centered services to the public

-Realize a well-connected administrative network by effectively sharing geographic information in both vertical and horizontal directions

-Set up a public-private partnership to commercialize NGIS technologies

-Provide GIS-based public services available anywhere, anytime

Implementation strategy

renewal duplicated creation of geographic information and encourage the information to be widely shared when it is commonly used in various administrative systems

Offer various information services by setting up a GIS network via wire/wireless Internet

Introduce a comprehensive information management system by closely collaborating with organizations/institutes (systems) related to geographic information

Main tasks of implementation

Integrate key municipal GIS utilization systems, which are the foundation of various administrative works, and establish a common SDI

Establish a GIS utilization system for individual works based on the common SDI
Create a distribution system for national geographic information

Objective

Establish a user-centered utilization environment of geographic information by enhancing the geographic information distribution network

Implementation strategy

Expand the volume of geographic information distributed by the distribution network

Ensure a smooth flow of geographic information by improving the service environment

Improve the practicality of the user-centered geographic information distribution network

Create added values and invigorate industries by facilitating the distribution and utilization of geographic information

Main tasks of implementation

Secure the resources of geographic information for distribution Establish a one-stop combined portal for geographic information

Provide customized geographic information

Modify policies and encourage the utilization of geographic information

NGIS policies and regulations

NGIS expert training and PR Objective Expand training opportunities by diversifying training organizations and programs, and encourage the utilization of GIS and its base by cultivating GIS experts

Create a nationwide public awareness and encourage the public to participate in the NGIS project through a strategic, effective promotion to the public about the policies and the progress of NGIS

Implementation strategy

Provide customized training programs fit for the target, level and purpose of each program

Establish a network-distributed training system to meet the nationwide demands for training

Create synergy in GIS training programs by connecting online/offline courses Establish and implement various promotion strategies for the public

Main tasks of implementation

Provide offline GIS training programs through central training organizations Offer online GIS training programs via the Internet

Promote various GIS businesses

Nurture the GIS industry

Objective

Create added values by actively providing and utilizing geographic information, and establish GIS-based new businesses (g.Business) aimed at boosting economic growth

Implementation strategy

Invigorate the GIS industry by expanding the NGIS construction project

Create the business environment and conditions to invigorate GIS businesses Expand the national support to invigorate GIS businesses

Main tasks of implementation

Establish reward systems for GIS businesses

Modify the price policies of NGI distribution

Retrain existing workers via the Internet

Provide information on the trends and markets of the GIS industry

Promote GIS-specialized agencies

Conduct supporting research for NGIS

Objective

Provide meaningful supporting research to effectively execute the NGIS construction program Modify the system to improve the effectiveness of NGIS construction

Implementation strategy

Ensure research consistency based on long-term plans

Enhance the quality of research results and their utilization through the continuous evaluation of their results and utilization

Establish an implementation system to efficiently provide support to the NGIS construction program

Main tasks of implementation

Long-term tasks of implementation

Support research tasks for NGIS construction program by sector

## Main Contents of the Basic Plan of the Fourth NSDI program

Summary of the basic plan

Background The Act of the Establishment and Utilization of NGIS was abolished and replaced with the NSDI Act on August 7, 2009, which calls for the formulation of the "Fourth Basic Plan for NSDI Construction (2010-2015)," following the "Third Basic Plan for NGIS Construction (2006-2010)."

1st phase (1995-2000): Lay the groundwork for the digitization of this national territory through the NGIS program

2nd phase (2001-2005): Realize a digitalized national territory through the expanded NSDI

3rd phase (2006-2010): Lay the groundwork for a ubiquitous environment for this national territory

## Building National Spitial Imagery Database

## Spatial Images

### Collecting aerial photographs and building a database

#### Overview

To obtain an aerial image, a plane equipped with an aerial surveying camera flies at a constant altitude and captures photographs of the land, overlapping 60%horizontally and 30% vertically, projecting geographic and natural features on

the surface of land.
In 2010, digital color aerial images replaced analog photography.

Aerial images are mainly used for producing, but they are also valuable data for detecting any changes in the condition of national territory, as well as for historical reference. The NGII is archiving a large quantity of aerial images, which can be issued upon application with the exception of images of security areas.

## Related regulations

Regulations for Surveying Aerial Images (National Geographic Information Institute Announcement No. 2009-948; December 14, 2009)

## Timeline

Surveying aerial images

1966-1974: Took aerial photographs at the scale of 1/37000
*August 1966: Agreement on Korea-Japan Joint Surveying of Aerial Images
1974-1995: Took aerial photographs at the scales of 1/37000 and 1/20000
1995-2006: Took aerial photographs at the scales of 1/5000, 1/10000, and 1/20000
2007-2009: Took aerial photographs at the scale of 1/20000 every four years
2010: Complete replacement of analog aerial images with digital color photographs

Establishment and services of the spatial image information database

2000-2004: Establishment of research projects and a 40,000-strong database of aerial images
2004-2005: Development of an online service system
September 2005: Launch of the online service system

April 2010: Launch of integrated service for aerial images and satellite images (http://air.ngii.go.kr)

### Database status

| Grand total | | 308,664 | 125,900 | | |
|---|---|---|---|---|---|
| Year | Scale | Photographed area | No. of images | Target area | Remark |
| 1999-2004 | | 91,100 | 19,314 | | |
| 2005 | 1/20000 | 16,000 | 3,371 | Gangwon-do | |
| | 1/20000 | 11,000 | 337 | | |
| 2006 | 1/20000 | 6,000 | 1,614 | Seoul Metropolitan Area | |
| | 1/20000 | 8,000 | 1,504 | | |
| | 1/20000 | 4,200 | 978 | | |
| 2007 | 1/20000 | 8,000 | 2,240 | Chungcheong-do | |
| | 1/20000 | 6,520 | 1,611 | | Analog mode |
| | 1/20000 | 7,800 | 1,765 | Jeollabuk-do | |
| 2008 | 1/20000 | 8,400 | 2,196 | Jeollanam-do | |
| | 1/20000 | 7,900 | 1,876 | | |
| | 1/20000 | 8,112 | 2,307 | Gyeongsang-do | |
| 2009 | 1/20000 | 11,875 | 2,933 | Taebaek | |
| | 1/20000 | 12,500 | 3,112 | Pohang | |
| | GSD25cm | 7,182 | 3,086 | Sokcho | Digital mode |
| 2010 | GSD25cm | 94,075 | 77,656 | Nationwide | Digital mode |

(Unit: $km^2$ , sheet)

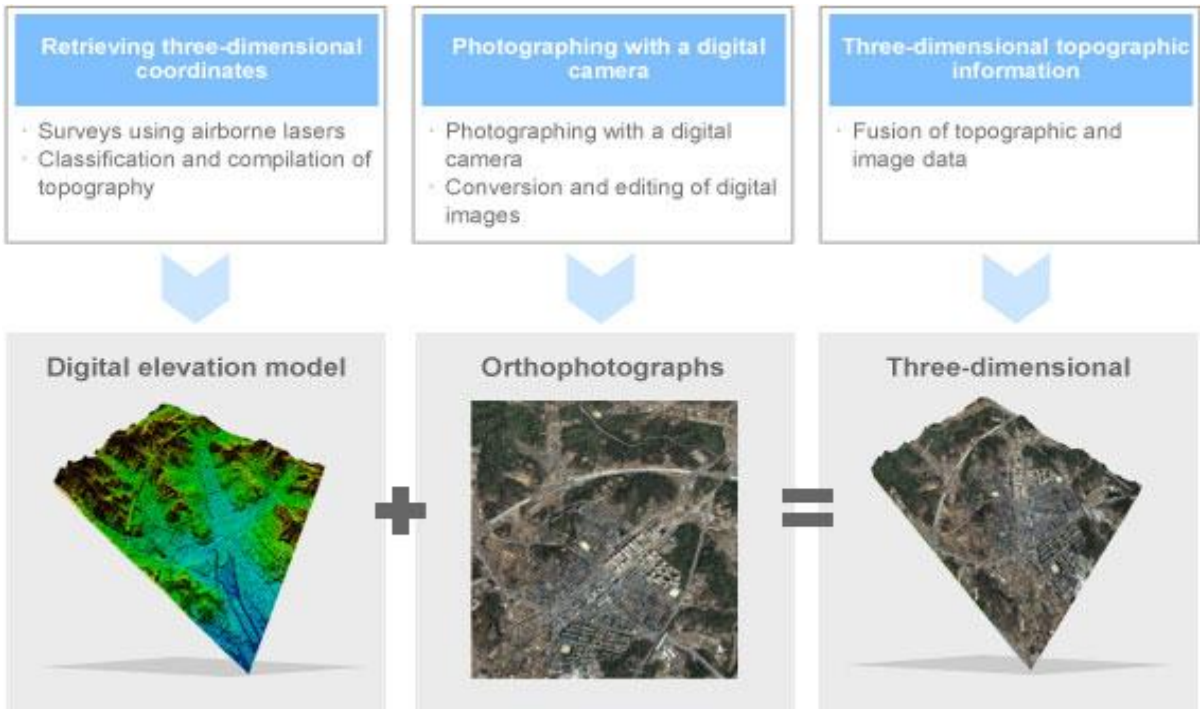
## Digital Elevation Model and Orthophotomap

### Overview

Digital elevation model (DEM) is a term referring to a three-dimensional model that represents the outline of actual topographic land surface features in the form of dots and lines. It uses images or mathematical models to represent

topography or objects. It first retrieves random three-dimensional coordinates from a target area and displays the highs and lows of the land surface in a geometric fashion, enabling the numerical interpretation of topographical features. Research into the theory and application of the DEM was pioneered in America in 1958 by C. L. Miller when he applied the DEM to alternative route assessment and earth-volume calculation in designing roads. In the 1960s, DEM programs were developed based on different kinds of interpolation and, from around 1970, began to be used for developing housing sites and planning and designing routes and dams. For orthophotomaps, topographic outlines are revised through the use of information from aerial images combined with a digital elevation model.

Conversion of a digital elevation model and orthophotomaps




## Related regulations

-Regulations for Preparing Digital Maps (National Geographic Information Institute Announcement No. 2009-946; December 14, 2009)

-Regulations for Surveying Aerial Images (National Geographic Information Institute Announcement No. 2009-948; December 14, 2009)

-Regulations for Producing Image Maps (National Geographic Information Institute Announcement No. 2009-949; December 14, 2009)

-Regulations for Airborne Laser Surveying (National Geographic Information Institute Announcement No. 2009-950; December 14, 2009)

## Timeline

2000: Research on Production of Topographic Data by Airborne Laser Surveying

2002: Produced a digital elevation model of five-meter grids in Seoul and Suwon by using airborne laser surveying

December 2002: Established Regulations for Building Digital Elevation Database

2003: Produced a digital elevation model of 10-meter grids for the entire country

* Excluding islands and coastal areas

2005: Established the Basic Plan for Building Multi-dimensional Spatial Information, which combines a digital elevation model with orthophotographs

2006-2008: Launched projects in 29 cities, including Jeju

January 2009: Established the Regulations for Airborne Laser Surveying

2009: Launched projects in 16 cities, including Seoul

2010: Launched a project in Chungju

## Database status

| Grand total | | 23,274 | | | |
|---|---|---|---|---|---|
| Year | Project area | Area | Digital Elevation | | Orthophoto |
| | | | Method | Grid | Scale |

| | | | | | |
|---|---|---|---|---|---|
| 2006 | Jeju, Ulsan, Wonju, Uiwang, Yangsan, Tongyeong, and Jinhae | 4,650 | LiDAR | 1, 5 | 1/5000 |
| 2007 | Busan, Gwangju, Gunsan, Incheon, Cheongju, Suwon, Daegu, and Osan | 3,235 | LiDAR | 1 | 1/5000 |
| 2008 | Guri, Uijeongbu, Masan, and Changwon | 736 | LiDAR | 1 | 1/5000 |
| | Jangseong-gun | 520 | LiDAR | 1 | 1/5000 |
| 2009 | Gongju and Gwangyang | 1,437 | LiDAR | 1 | 1/5000 |
| | Bucheon, Siheung, Ansan, Gwacheon, Gwangmyeong, Gunpo, Anyang, and Hanam | 621 | LiDAR | 1 | 1/5000 |
| | Gapyeong-gun and Yangpyeong-gun | 1,721 | LiDAR | 1 | 1/5000 |
| | Hwaseong and Pyeongtaek | 1,141 | LiDAR | 1 | 1/5000 |
| | Anseong and Icheon | 1,014 | LiDAR | 1 | 1/5000 |
| | Goyang and Namyangju | 725 | LiDAR | 1 | 1/5000 |
| | Chuncheon | 1,116 | LiDAR | 1 | 1/5000 |
| | Yeosu | 501 | LiDAR | 1 | 1/5000 |
| | Seoul | 605 | LiDAR | 1 | 1/5000 |
| | Yongin and Yeoju | 1,199 | LiDAR | 1 | 1/5000 |
| | Jecheon | 882 | LiDAR | 1 | 1/5000 |
| | Yeongam-gun | 601 | LiDAR | 1 | 1/5000 |
| | Hoengseong-gun | 840 | LiDAR | 1 | 1/5000 |
| | Yeongdeok-gun | 746 | LiDAR | 1 | 1/5000 |
| 2010 | Chungju | 984 | LiDAR | 1 | - |

*Completion of constructing a digital elevation model of 10-meter grids for the entire country in 2003 (Unit: $km^2$, sheet)

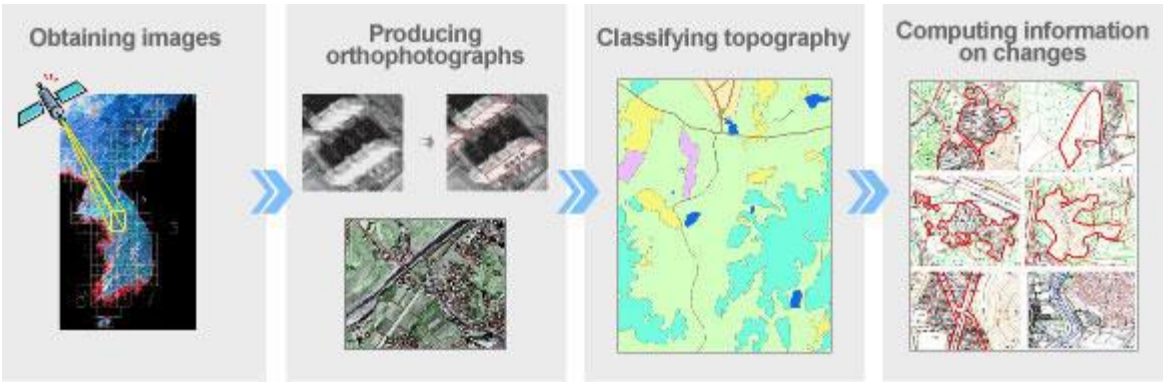
## National Land Monitoring Project

### Overview

The National Land Monitoring Project gathers assorted spatial data (aerial images, satellite images, digital maps, etc.), compares and analyzes them, and classifies topographic features into six categories by 1/5000 map sheet and uncovers information on any changes.

#### Six categories of topographic classification

| | |
|---|---|
| **Urban area** | **Areas in which street networks are formed and communities, factories, houses, apartments, and other structures are concentrated** |
| Suburban area | Areas in which factories, houses, apartments, and other structures are fairly densely located |
| Agricultural area | Areas in which agricultural produce is cultivated and plant clusters (rice paddies, fields, orchards, etc.) are located |
| Hilly area | Areas in which agricultural produce is not cultivated, or undeveloped areas without forests with a gradient of less than five degrees |
| Mountainous area | Areas around forests (conifers and broad-leaved trees) |
| Water system | Areas around seas, rivers, or reservoirs |



Procedure of the National Land Monitoring Project

| | |
|---|---|
| **Producing orthophotomaps** | **To produce an orthophotomap by converting images from satellites or airborne sensors into more accurate forms such as a map** |
| Classifying topography | To classify and calculate the size of topographic features based on major categories (urban areas, suburban areas, agricultural areas, hilly areas, mountainous areas, water systems, roads) based on digital maps and satellite images |
| Computing information on changes | To detect and calculate the size of any topographic changes to a certain area by using data from different time periods |

## Timeline

2005: Pilot project for national land monitoring (Gangwon-do area)

2006: Pilot project for Seoul Metropolitan Area (north and south districts) (including scholarly research)

2007-2009: Chungcheong-do and Jeollabuk-do areas, Gyeongsang-do and Jeollanam-do areas, and Gangwon-do and Gyeongsangbuk-do areas

## Database status

| Grand total | | 120,125 | |
|---|---|---|---|
| Year | Project area | Number of projects | Images in use |
| 2004 | Gangwon-do | 23,220 | Spot, OrbView 3 |
| 2005 | Seoul Metropolitan Area (north district) | 11,780 | Spot |
| 2006 | Seoul Metropolitan Area (south district) | 6,836 | Spot |
| 2007 | Chungcheong-do and Jeollabuk-do | 22,320 | Spot |
| 2008 | Gyeongsang-do and Jeollanam-do | 24,412 | Spot |
| 2009 | Gangwon-do and Gyeongsangbuk-do | 31,557 | Spot |

(Unit: $km^2$ )

## Establishment of National Spatial Data Infrastructure

### Definition of Basic Geographic Information

#### Legal Definition

Prescribed by Presidential decree, basic and major geographic information refers to administrative districts, transportation, seas and water resources (including water systems), cadaster, surveying control points, topography, facilities (including cultural assets designated by the nation, a si or a do), satellite images, aerial photographs, and others items selected by heads of related central administrative agencies upon deliberation by additional committees.

Definition in Work Guidelines on Basic Geographic Information-Notification No. 2004-132, Ministry of Construction and Transportation

“Basic geographic information“ refers to a basic framework to provide a reference system for location or contents and to establish an integrating model in order to integrate and utilize a wide variety of geographic information, and is set by Article 14 of the Act on the Building and Utilization, etc. of National Geographic Information System and Article of 15 of its enforcement decree.

Timeline

First Pilot Project: 2001

Conducted experiments and research on constructing and utilizing a geographic information system (GIS)

Reviewed component technologies for construction of a GIS, and set up future goals

Cheongju (1/1000), Jeju Island area (1/5000)

Second Pilot Project: 2002

Constructed a pilot GIS reflecting the results of experimental research (the entire area of Gyeonggi-do) Reviewed data conversion

Constructed a GIS on a map-sheet basis for Busan, Gyeongsangbuk-do, and Gyeongsangnam-do as a project for revising and renewing a digital map version 2.0

GIS Construction in Transportation (road) Sector: 2003

Constructed database for the transportation (road) sector

Planed to utilize large-scale database

Selected a single unified coordinate system

Devised measures to utilize the selected coordinate system and connect it to application systems

GIS Construction for Water Resources Sector: 2004

Constructed database for the water resources sector

Set up basic guidelines to develop specifications for GIS data production

Evaluated adequacy

Developed specifications for GIS data production by sector

GIS Construction for Facilities (building) Sector and Research Project: 2005

Constructed database for the facilities (building) sector

Conducted experiment on utilization (buildings and administrative boundaries)

Carried out a study of establishing secondary GIS implementation strategies

GIS Database Update Projects: 2006

Constructed database for the railway sector

Updated GIS database established in transportation (road), water resources, and facilities (building) sectors

Following GIS Database Update Project: 2007

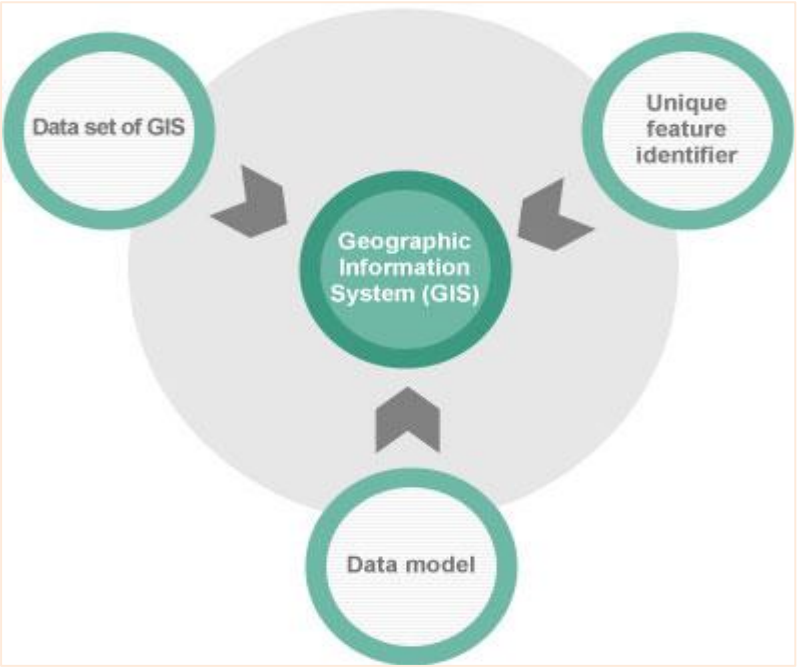
Updated GIS database constructed for the transportation (road), water resources, facilities (building), and railway sectors

-Construction Items and Institutions by GIS Sector

| Sectors | Construction item | Institutions responsible for database construction |
|---|---|---|
| Administrative district | Administrative districts | Ministry of Government Affairs and Home Affairs |
| Transportation | Railway boundaries and railway centerlines | National Railroad Administration |
| | Road boundaries and road centerlines | National Geographic Information Institute |
| Seas and water resources | Coastlines, submarine topography, and maritime boundaries | Ministry of Maritime Affairs and Fisheries |
| | Basin boundaries | Korea Water Resources Corporation |
| | River boundaries, river centerlines, lakes, etc. | National Geographic Information Institute |
| Cadaster | Cadaster | Ministry of Government Affairs and Home Affairs |
| Surveying control points | Surveying control points | National Geographic Information Institute |
| Topography | DEM (Digital Elevation Model) | National Geographic Information Institute |
| Facilities | Buildings | National Geographic Information Institute |
| | Cultural assets | Cultural Heritage Administration of Korea |
| Satellite images and aerial photographs | Satellite images | National Geographic Information Institute |
| | Aerial photographs | National Geographic Information Institute |

## Elements of GIS

Regardless of fundamental geographic information or GIS application systems, GIS consists of three elements: a data set to assist an economic database, a unique feature identifier for connection to an external database, and a data model for consistent data maintenance.




-First Element: Data Set of GIS

The data sets of GIS are made up of three kinds of data: common data required by large numbers of users, reference data used to identify other data, and data which serve as a datum reference.

-Second Element: Unique Feature Identifier

Terrain features are the most fundamental factor in constructing a database for GIS. They can be defined as "a spatial object which can impart a meaning to the real world." Therefore, each terrain feature consists of spatial data marking spatial locations, and is attributed data that describe a meaning in the real world. In addition, there must be an identifier which is used for the two following purposes.

-Connection spatial and non-spatial data

-Reference to terrain features

Third Element: Data Model

A data model is another crucial factor for enhancing the utilization of data, since it describes the associative relationship between data items and their structure. In addition, it enables data specification which clarifies the constraint conditions on data construction. The specification ensures consistency in data construction, enabling multiple data constructers to build distributed data. In general, a data model for GIS is roughly divided into a spatial data model and a terrain feature data model. The spatial data model is subdivided into a geometric data model and a topologic data model. A semantic data model is used to describe the associative relationship between terrain features rather than between spaces.

Coordinate System of GIS (Notification No. 2004-131, the Ministry of Construction and Transportation)

Notification content

Datum point of a simple plane rectangular coordinate system

Name: UTM-K (Universal Transverse Mercator-Korea)

Datum points of longitude and latitude

- Longitude: 127° 30'00.000" east longitude

- Latitude: 38° 00'00.000" north latitude

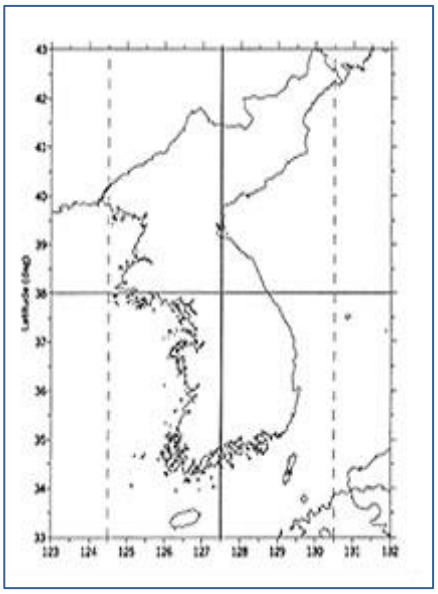
Application area: the entire Korean peninsula

Projection

Use of a Transverse Mercator projection and scale factor of 0.9996

Values of the projection datum

In order to avoid confusion with former Cartesian coordinates and to establish a distinction, the initial values of the projection datum are set X (N) 2,000,000m and Y (E) 1,000,000m.



Entire Data Model of GIS

Regardless of basic geographic information or GIS application system, GIS consists of three elements: a data set to assist an economic database, a unique feature identifier for connection to an external database, and a data model for consistent data maintenance.

The data model of GIS has the following four features:

First, it defines a terrain feature class that represents real-world objects.

Second, the terrain feature class is given a unique identifier so as to identify a specific terrain feature.

Third, it refers to a spatial object class to describe the spatial form of terrain features.

Fourth, it defines an attribute class and a network attribute class in order to link terrain features and an external database.

The following figure shows the four features of a GIS data model in a diagram.

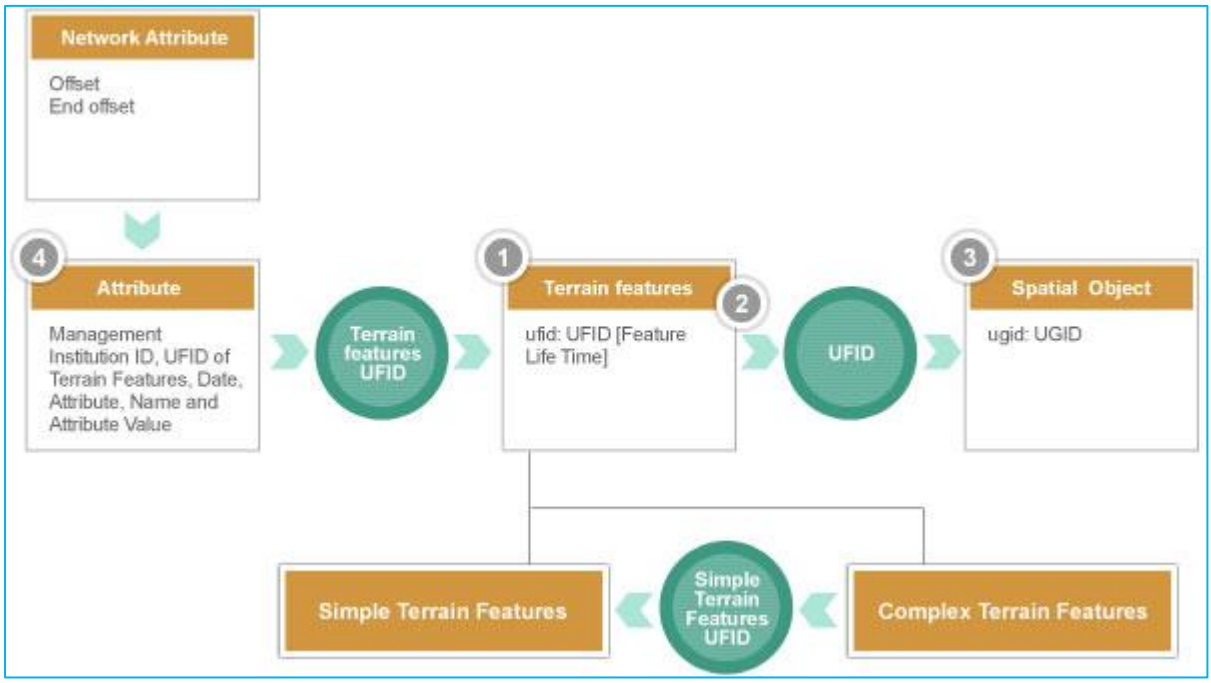



Diagram of GIS Data Model (conceptual model)

1. Describe real-world terrain features, the basic unit of data storage
2. Use as reference
3. Base on spatial model->OGC model, representation of line topology
4. Able to link with external database

## Data Model by Item

Roads

Geographic Feature for database Construction

- Road centerline class: including unit roads and road intersection points

- Road boundary class: including unit road surfaces and road intersection surfaces

### Attribute Information

Attributes of roads are to be described as the central line of the road (unit road). The ratio of the central line to the boundary (unit road «-» unit road surface, unit road surface «-» road intersection surface) is generally 1:1.

Attribute List

| Title | Definition | Attribute type | Remark |
|---|---|---|---|
| Road number | Describe a number of road corresponding to a unit road | Road No. | Local roads and higher grades |
| Road type | Describe the grade of road corresponding to a unit road | National highways, national roads, local road, si and gun roads, myeon and ri roads, etc. | |
| Starting point | Describe UFID of road intersection point where a unit road starts | UFID | |
| End point | Describe UFID of road intersection point where a unit road ends | UFID | |
| Direction of unit road | Describe the direction of a unit road | Both directions | |

Attribute List of the Transportation (Road) Sector

Railways

Railway centerline class: including unit railways and railway intersection points

Railway boundary class: including unit railway surfaces and railway intersection surfaces

Attribute information

Attributes of railways are to be described in the central line of the railway (unit railway), and the ratio of the central line to the boundary (unit railway «-» unit railway surface, unit railway surface «-» railway intersection surface) is generally 1:1.

Attribute List

| Item | Definition | Attribute type | Remark |
|---|---|---|---|
| Railway name | Describe a railway name corresponding to a unit railway | Ex.) Gyeongbu Line, Honam Line, Kyonbu High Speed Rail, etc. | |
| Railway type | Describe a grade of railway corresponding to a unit railway | General railroad, high-speed railroad, underground special railroad, etc. | |
| UFID | UFID | | |

Attribute List of Transportation (Railway) Sector

## Facilities (Building) Sector

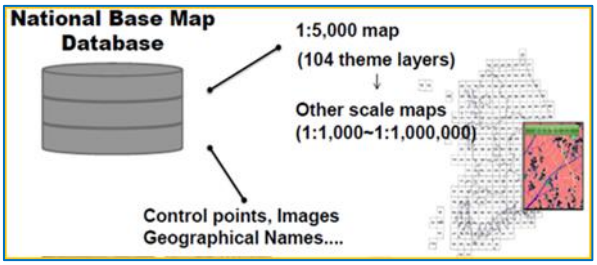
Facilities

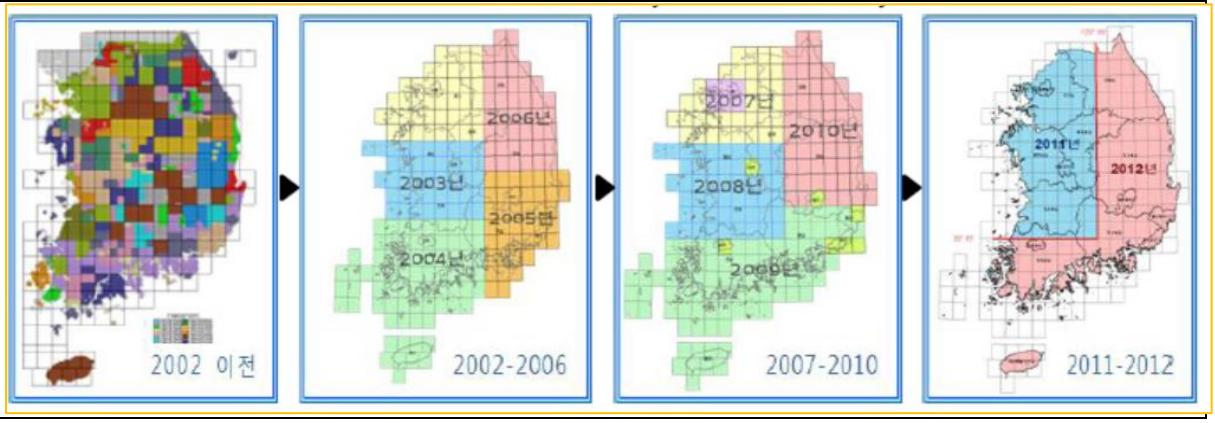
-Terrain feature class residential buildings: General housing and public housing

-Terrain feature class non-residential buildings: Public institution, industry, culture/education, medical/welfare, service and other facilities

| Public housing | Public institution | General housing | education facilities |
|---|---|---|---|
|  |  |  |  |
| **Industrial facilities** | **Medical, Welfare** | **Service facilities** | **Other facilities** |
|  |  |  |  |

Attribute Information

| Real-time | (104 Theme Layer) | cycle |
|---|---|---|
| -change detection<br>-extract data<br>-survey,geo-coding<br>-edit national map |  <br>(76 system of 23 organization) | -periodic<br>-continuous<br>-regular<br>-irregular<br>-partial<br>-whole country revision |
| digital conversion | every 5 years | metrocity(2-4 years) | every 2 years |

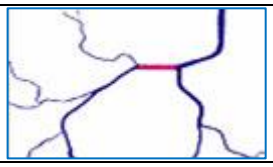
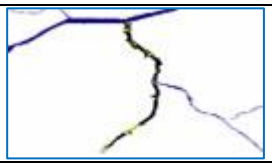


## Attribute List

## -Attribute List of the Facilities (Building) Sector

| Item | Definition | Attribute Type |
|---|---|---|
| Building Type | Select and enter a building type corresponding to a particular building | In the case of a complex facility, select and enter building type in the following order:<br><br>Public instruction > culture/education > medical/welfare > industry > service > public housing > general housing |
| Building Name | Insert a building name that is in use | |
| UFID | UFID | |

## Water Resources (River) Sector

| River Junction | River Flow | River Facilities | Lake and Reservoir |
|---|---|---|---|
|  |  |  |  |
| **River Basin Boundary** | **River Boundary** | **Streamlet** | **River Center line** |
|  |  |  |  |

## Attribute Information

| Item | Definition | Remark |
|---|---|---|
| River Name | River name | Lake/reservoir, boundary of river zone, streamlet, river centerline, river basin boundary, river flow |
| UFID | The unique identifier that pinpoints exactly one river junction among other junctions | River flow |
| River Code | A unique code for river management which describes a code number of a river that contains a river junction | River flow |
| Type of Starting Point | UFID of river junction FT or null | River flow |
| Type of End Point | UFID of river junction FT or null | River flow |

| | | |
|---|---|---|
| Direction of River Flow | Insert â€œstaring an imaginary line,â€ if the value of a direction in a river flow line and a starting point is 0 and a value of an end point is equal to the UFID of a river junction. If starting and end points are equal to UFID of a river junction, then insert â€œflow.â€ | River flow |

Attribute List of the Water Resources (River) Sector

## Measures for Distribution and Utilization

### Attribute Information

### Attribute List

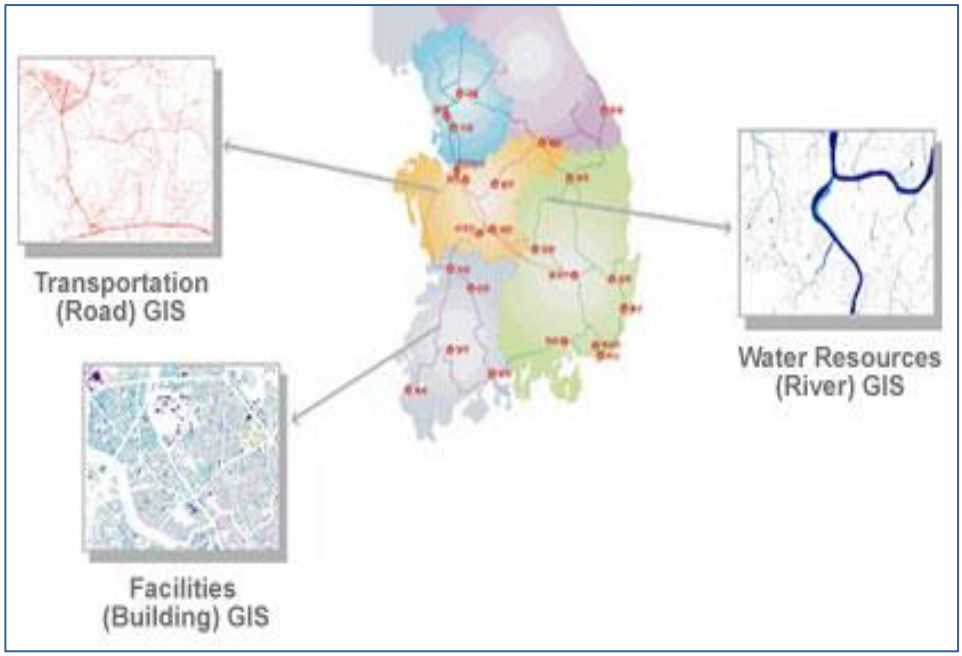
| Division | Data Capacity (based on NGI format) | Price |
|---|---|---|
| Transportation (Road) GIS | 3.06GB | KRW 3/KB |
| Water Resources (River) GIS | 1.453GB | |
| Facilities (Building) GIS | 2.838GB | |
| Transportation (Road) GIS | Price undecided | |

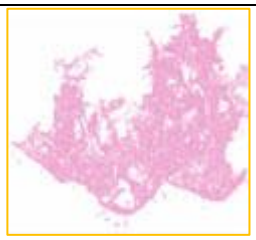
Attribute List of Measures for Distribution and Utilization

### Sales Unit

It is possible to sell it in any format that consumers want

### National Unit



| Transportation road | Facilities (Building) GIS | Water Resources | Digital map |
|---|---|---|---|
|  |  |  |  |
| Facilities (building) | (building) + transportation | Facilities (building) + transportation (road) + water resources (river) | |
|  |  |  | |

## Production and dissemination of national map

### Types of General Maps

### Classification by scale

| Classification | Large scale | Medium scale | Small scale |
|---|---|---|---|
| Range | 1/5000 or larger | Between 1/10000 and 1/100000 | Smaller than 1/100000 |
| Type | 1/1000 and 1/5000 | 1/10000, 1/25000, and 1/50000 | 1/250000 and 1/1000000 |
| Type | Execution designs, basic designs, and urban planning | Urban and local planning | Land planning |

| Classification | General map | Thematic map | Specific map |
|---|---|---|---|
| Characteristics | A map produced by the government, representing all the land in a unified scale | A map that highlights a specific theme by using different colors or symbols | A map designed for a specific purpose |
| Types | National base map (Topographic map) | Map on land use, map on land characteristics, etc. | Geologic map, marine chart, traffic map, tourist map, climatic map, etc. |

### Classification by purpose

※ General maps are widely used as base maps for thematic or specific maps

## Types and Production of Maps Published by the National Geographic Information Institute

| Scale | No. of map sheets | Period of revision | Size of cadastral map | Map distance representing 1km (cm) |
|---|---|---|---|---|
| 1/5000 | 17,383 | Ongoing since 1985 | 1'30'' × 1'30'' | 20 |
| 1/10000 | 282 | 1990-1997 | 3' × 3' | 10 |
| 1/25000 | 811 | Ongoing since 1975 | 7'30'' × 7'30'' | 4 |
| 1/50000 | 241 | Ongoing since 1975 | 15' × 15' | 2 |
| 1/250000 | 22 | Ongoing since 2000 | 1° 45' × 1° | 0.4 |
| 1/1000000 | 1 | Ongoing since 2000 | 6° × 12° | 0.1 |
| Map on land use | 720 | 1982-1998 | 7'30'' × 7'30'' | 4 |

### Production and details of topographic maps

| Scale | No. of map sheets | Period of revision | Size of cadastral map | Map distance representing 1km(cm) |
|---|---|---|---|---|
| 1/1000 | 3,919 | Ongoing since 1995 | 18'' × 18'' | 100 |
| 1/5000 | 17,940 | Ongoing since 1995 | 1'30'' × 1'30'' | 20 |
| 1/25000 | 844 | Ongoing since 1996 | 7'30'' × 7'30'' | 4 |
| 1/250000 | 13 | 2000 | 1° 45' × 1° | 0.4 |
| Land use map | 414 | 2000 | 7'30'' × 7'30'' | 4 |
| Land characteristics map(1/1000) | 9,709 | 1999 | 18'' × 18'' | 100 |
| Land characteristics map(1/5000) | 7,125 | 1999 | 1'30'' × 1'30'' | 20 |

### Production and details of digital maps

### Production of numerical topographic maps in 1/1000 scale

| Grand total | | 33,919 | 114,007 | |
|---|---|---|---|---|
| Classification | Year | Number of projects (map sheets) | Project costs (KRW1 million) | Target city |
| 1st NGIS | 1995 | 329 | 755 | 5 cities including Busan |
| | 1996 | 4,491 | 9,560 | 22 cities including Seoul |
| | 1997 | 5,171 | 14,933 | 26 cities including Seoul |
| | 1998 | 2,053 | 7,738 | 20 cities including Yongin |
| | 1999 | 384 | 1,352 | 4 cities including Seoul |

| | | | | |
|---|---|---|---|---|
| **Subtotal** | | **12,428** | **34,338** | |
| 2nd NGIS | 2001 | 1,100 | 2,975 | 5 cities including Seoul |
| | 2002 | 2,734 | 9,120 | 14 cities including Seoul |
| | 2003 | 2,008 | 6,707 | 11 cities including Busan |
| | 2004 | 1,706 | 6,872 | 14 cities including Busan |
| | 2005 | 2,116 | 8,810 | 17 cities including Daegu |
| **Subtotal** | | **9,664** | **34,484** | |
| 3rd NGIS | 2006 | 2,479 | 8,935 | 17 cities including Incheon |
| | 2007 | 2,594 | 9,368 | 17 cities including Busan |
| | 2008 | 2,481 | 9,206 | 15 cities including Busan |
| | 2009 | 2,056 | 9,188 | 14 cities including Gwangju |
| | 2010 | 2,217 | 8,488 | 16 cities including Incheon |
| **Subtotal** | | **11,827** | **45,185** | |

Map Publication

## 1/5000 scale topographic maps

Large-scale topographic maps that promote the conservation and development of national land, provide fundamental data for statistical research, and support the improvement of land utilization These maps are used for construction design or for detailed land development projects related to roads, railroads, or rivers. So far, 17,524 map sheets have been produced nationwide since 1975.

### Production status

| Year | Production | Revision | Year | Production | Revision |
|---|---|---|---|---|---|
| Total | 17,383 | 37,437 | 1992 | 573 | 240 |
| 1975 | 276 | - | 1993 | 421 | 325 |
| 1976 | 704 | - | 1994 | 284 | 438 |
| 1977 | 634 | - | 1995 | 152 | 375 |
| 1978 | 703 | - | 1996 | 136 | 1,609 |

| | | | | | |
|---|---|---|---|---|---|
| 1979 | 849 | - | 1997 | 107 | 1,517 |
| 1980 | 981 | - | 1998 | 73 | 1,141 |
| 1981 | 1,036 | - | 1999 | 253 | 1,042 |
| 1982 | 990 | 317 | 2000 | 1 | 1,520 |
| 1983 | 1,053 | 160 | 2001 | 312 | 1,018 |
| 1984 | 950 | 150 | 2002 | 12 | 100 |
| 1985 | 866 | 180 | 2003 | 37 | 3,095 |
| 1986 | 900 | 193 | 2004 | 156 | 3,618 |
| 1987 | 900 | 200 | 2005 | 69 | 3,087 |
| 1988 | 914 | 210 | 2006 | 69 | 4,126 |
| 1989 | 800 | 100 | 2007 | 120 | 2,626 |
| 1990 | 843 | 200 | 2008 | 123 | 4,238 |
| 1991 | 750 | 359 | 2009 | 236 | 5,253 |

### Method of production and revision

Aerial images are captured on a scale of 1/20000 and a 1/5000 scale digital map is then created. After a series of processes, involving drawing and editing (generalization, symbolization and exaggeration and/or addition of marginal information in accordance with rules on topographic symbols), a 1/5000 scale topographic map is produced.

## Details of representation

### Standards for representation

Projection: Transverse Mercator projection based on a plane-rectangular coordinate system

A quadrangle measuring 1.5 minutes of latitude and longitude (an actual distance of approximately 2.75km×2.2km or 55cm×44cm on the map) is created by dividing one grid on a 1/50000 scale map (15 minutes of latitude and longitude) by 100.

### Objects for representation

Features that exist at the time of surveying, are impermanent but considered necessary, or would make the map inaccurate if not represented.

Facilities that are under construction but likely to be completed within a short period of time.

Limits to displacement: When features are represented, the displacement for their planar position can be up to 0.7mm.

### Roads and railways

Omit when they are less than 1cm long on the map.

Proportionately represented roads: roads that are 3.0m or wider from their shoulder to shoulder

Small roads: roads that are 1.6m or wider and less than 3.0m wide

Lane: roads are less than 1.6m wide

Railways: omitted when they are less than 2.0mm on the map

### Boundaries

Mark the boundaries for Seoul Metropolitan City, provincial metropolitan cities, do (province), gun (county), eup or myeon (township).

Maritime boundaries are indicated only when they are undisputed.

When the administrative unit to which islands are assigned needs to be represented, mark it on an appropriate position between two islands to make clear where each island belongs, based on the path of current administrative boundaries.

### Other objects

Triangular point: indicate its order as first, second, third and fourth. The elevation of the triangular point is marked in meters after rounding to one decimal point.

Benchmark: indicate its order as first and second. The elevation is marked in meters after being rounded off to two decimal places.

Elevation point Wherever necessary, an elevation point is marked through potting to represent the conditions in a particular area. Elevation is marked in meters after rounding to one decimal place.

## Contour lines

Based on the mean sea level at Incheon as a reference surface (Jeju Island uses its own sea level as a reference surface)

Intermediate contour: intervals of 5.0m

Index contour: intervals of 25m, marked in a single line every five intermediate contours

Half-interval contour: marked with a dashed line at intervals of 2.5m when intermediate contours are insufficient to represent specific shapes or terrain features due to a gentle slope

Supplementary contour: marked at a 1/4 of intermediate contour interval when half-interval contours are insufficient to represent terrain due to of a gentle slope

## Coordinates

The values for rectangular coordinates are written on each side at an interval of 500m.

Eastern, central, East Sea and western datum points are used for the origins of the rectangular coordinates

The coordinate for each datum is X (E) =600,000m, Y (N) =200,000m

*According to the Act on Land Survey, Waterway Survey and Cadastral Records that took into effect on December 10, 2009, the previous coordinates, X(E)=500,000m(550,000m for Jeju Island) and Y(N)=200,000m are changed to X(E)=600,000m and Y(N)=200,000.

# 1/25000 scale topographic map

## Overview

This topographic map is a scaled, accurate and detailed representation of necessary contents such as the results of surveying the condition of the earth´s surface, the names of major places, and administrative boundaries. The map is designed to be used as a reference material or a base drawing for other maps necessary for the utilization and development of national land, and an array of other different projects.

Used for the comprehensive development of national territory, including roads and urban planning, land utilization, forest development and the production of tourist maps.

### Production status

Produced 811 map sheets spanning the nation since the launch of the project in 1967

### Method of production and revision

In the past, aerial images on a scale of 1/37500 were taken periodically every five to ten years, after which a map was produced and/or revised

Today, a map is produced by scaling down and editing a 1/5000 scale digital map

Make both periodic and as-needed revisions through outsourced projects

### Details of representation

#### Standards for representation

Projection: Transverse Mercator projection based on a plane-rectangular coordinate system

Sectioned as quadrangles measuring 7.5 minutes of latitude and longitude (actual distance of approximately 13.75km×11km, or 55cm×44cm on the map)

| Year | Production | Revision | Year | Production | Revision |
|---|---|---|---|---|---|

| Total | | | | 811 | 5,135 |
|---|---|---|---|---|---|
| Before 1970 | 247 | - | 1991 | 4 | 153 |
| 1971 | 80 | - | 1992 | - | 75 |
| 1972 | 165 | - | 1993 | - | 95 |
| 1973 | 110 | - | 1994 | - | 91 |
| 1974 | 160 | - | 1995 | - | 133 |
| 1975 | - | 115 | 1996 | 1 | 234 |
| 1976 | - | 204 | 1997 | - | 123 |
| 1977 | - | 97 | 1998 | - | 51 |
| 1978 | - | 33 | 1999 | 20 | 134 |
| 1980 | - | 97 | 2000 | - | 5 |
| 1981 | - | 84 | 2001 | 3 | 231 |
| 1982 | - | 107 | 2002 | 1 | 309 |
| 1983 | - | 100 | 2003 | - | 793 |
| 1984 | - | 106 | 2004 | 1 | 189 |
| 1985 | - | 109 | 2005 | - | 139 |
| 1986 | - | 139 | 2006 | - | 176 |
| 1987 | 1 | 106 | 2007 | - | 120 |
| 1988 | 1 | 99 | 2008 | 8 | 184 |
| 1989 | - | 103 | 2009 | 9 | 258 |
| 1990 | - | 110 | | | |

Production status of 1/25000 scale topographic map

## Objects for representation

Features that exist at the time of surveying or are considered necessary

Facilities that are under construction but scheduled to be completed within one year

Permissible error for relocating features´ planar position is up to 0.5mm (12.5m in actual distance), or up to 1.2mm under unavoidable circumstances.

## Types of lines

Lines are classified as solid and dashed, and divided into six types depending on their width, ranging from 0.05mm to 0.4mm.

### Roads and railways

Minimum length of roads: 1mm on the map (5mm for width)

Designated roads: highways, four-lane, two-lane, and one-land roads, road for carts, lanes

Proportionally represented roads: Roads and avenues that are 1.0 mm or wider on the map (25m in actual width)

Railways: In principle, all railways should be indicated.

### Boundaries

Mark the boundaries for Seoul Metropolitan City, provincial metropolitan cities, do (province), gun (county), eup or myeon (township)

Maritime boundaries are indicated up to 1 cm from coastal lines on the map only when they are undisputed.

When the administrative unit to which islands are assigned needs to be represented, mark it on an appropriate position between two islands to make clear where each island belongs, based on the path of current administrative boundaries.

### Other objects

Triangular point: Every triangular point installed as part of basic surveying needs to be indicated with a symbol.

The elevation of the triangular point is marked in meters after rounding to one decimal place.

Benchmark: All benchmarks installed as part of basic surveying need to be indicated with a symbol.

The elevation of a benchmark is marked in meters after rounding to one decimal place.

Elevation point

Wherever necessary, an elevation point is marked through potting to represent the conditions in a particular area.

Elevation is marked in meters after rounding to the nearest whole number.

### Contour lines

Based on mean sea level at Incheon as a reference surface (Jeju Island uses its own sea level as a reference surface)

Intermediate contour: intervals of 10m.

Index contour: intervals of 50m, marked in a single line every five intermediate contours

Half-interval contour: marked in a dashed line at intervals of 5m and used when intermediate contours are insufficient to represent specific shapes or terrain features due to a gentle slope

Supplementary contour: marked at 1/4 of an intermediate contour interval and used when half-interval contours are insufficient to represent a particular terrain because of a gentle slope

## 1/50000 scale topographic map

### Overview

As a scaled-up and edited version of 1/25000 scale map, this is the topographic map in greatest demand and is mainly designed for comprehensive national land development plans, inventorying of forests, and production of tourist maps.

### Production status

Produced 241 map sheets spanning the nation since the launch of the project in 1973

| Total | | | | 241 | 1,271 |
|---|---|---|---|---|---|
| Year | Production | Revision | Year | Production | Revision |
| 1972 | - | - | 1991 | - | 42 |
| 1973 | 33 | - | 1993 | - | 25 |

| | | | | | |
|---|---|---|---|---|---|
| 1974 | 206 | - | 1994 | - | 28 |
| 1975 | - | - | 1995 | - | 45 |
| 1976 | - | 30 | 1996 | - | 48 |
| 1977 | - | 39 | 1997 | - | 30 |
| 1978 | - | 34 | 1998 | - | 7 |
| 1979 | - | 10 | 1999 | - | 2 |
| 1980 | - | 47 | 2000 | - | 1 |
| 1981 | - | 40 | 2001 | - | 41 |
| 1982 | - | 30 | 2002 | - | 153 |
| 1983 | - | 30 | 2003 | - | 40 |
| 1984 | - | 32 | 2004 | - | 62 |
| 1985 | - | 34 | 2005 | - | 38 |
| 1986 | - | 36 | 2005 | - | 38 |
| 1986 | - | 36 | 2006 | - | 46 |
| 1987 | - | 37 | 2007 | - | 32 |
| 1988 | - | 27 | 2008 | 2 | 54 |
| 1989 | - | 28 | 2009 | - | 80 |
| 1990 | - | 30 | | | |

Production status of 1/50000 scale map

## Details of representation

### Standards for representation

Projection: Transverse Mercator projection based on a plane-rectangular coordinate system

Sectioned as quadrangles measuring 15 minutes of latitude and longitude (actual distance of approximately 27.5km×22km, or 55cm×44cm on the map)

### Objects for representation

Features that exist at the time of surveying or are impermanent but considered necessary

Facilities that are under construction but scheduled to be completed within one year

Permissible error for relocating features´ planar position is up to 0.5mm (25m in actual distance), or up to 1.2mm under unavoidable circumstances

Types of lines

Lines are classified as solid and dashed, and divided into six types depending on width, ranging from 0.05mm to 0.4mm.

Roads and railways

Minimum length of roads: 10mm on the map (5mm for width)

Designated roads: highways, four-lane, two-lane, and one-land roads, road for carts, lanes

Proportionally represented roads: Roads and avenues that are 1.0mm or wider on the map (50 m in actual width)

Railways: In principle, all railways should be indicated.

Boundaries

Mark the boundaries for Seoul Metropolitan City, provincial metropolitan cities, do (province), gun (county), eup or myeon (township)

Maritime boundaries are indicated up to 1 cm from coastal lines on the map only when they are undisputed.

When the administrative unit to which islands are assigned needs to be represented, mark it on an appropriate position between two islands to make clear where each island belongs, based on the path of current administrative boundaries.

Other objects

Triangular point: Every triangular point installed as part of basic surveying needs to be indicated with a symbol. The elevation of a triangular point is marked in meters after rounding to one decimal place.

Benchmark: All the benchmarks installed as part of basic surveying need to be indicated with a symbol.

The elevation of a benchmark is marked in meters after rounding to one decimal place.

## Elevation point

Wherever necessary, an elevation point is marked through potting to represent conditions in a particular area.

Elevation is marked in meters after round to the nearest whole number.

## Contour lines

Based on mean sea level at Incheon as a reference surface (Jeju Island uses its own sea level as a reference surface)

Intermediate contour: intervals of 10m

Index contour: intervals of 50m, marked in a single line every five intermediate contours

Half-interval contour: marked in a dashed line at intervals of 5m and used when intermediate contours are insufficient to depict specific shapes or terrain features due to a gentle slope

Supplementary contour: marked at 1/4 of an intermediate contour interval and used when half-interval contours are insufficient to identify particular terrain due to a gentle slope

## Coordinates

Indicate geological coordinates at the four corners on an inner map quadrangle

The values for rectangular coordinates are written on each side at an interval of 1 km.

Eastern, central, East Sea and western datum points are used for origins of the rectangular coordinates.

The coordinate for each datum is X (E) = 600,000m (550,000m for Jeju Island), Y (N) =200,000m

1/1000000 scale Map of Korea

## Overview

This map is designed to be used as a resource for policymaking, education and tourism, allowing an accurate portrayal of overall information about Korean national territories including locations, geographical features, transportation networks and administrative districts.

## Production status

The map was first produced in six colors in 1965, and a revision was published in 2000.

### Method of production and revision

The map is produced by scaling up and editing 1/25000 scale topographic maps.

In 2000, a revision was produced by scaling up and editing 1/25000 scale maps that had been modified based on satellite images.

### Details of representation

#### Standards for representation

Projection: Transverse Mercator projection based on a plane-rectangular coordinate system (lines of latitude and longitude drawn every 30 minutes)

#### Objects for representation

Objects to be represented need to be determined after a thorough examination of their significance and shape. Important objects are not to be omitted or depicted as different from their actual features.

Permissible error for relocating features´ planar position is up to 0.5mm (125m in actual distance), or up to 1.2 mm under unavoidable circumstances.

Types of lines

Lines are classified as solid and dashed, and divided into six types depending on their width, ranging from 0.05mm to 0.4 mm.

Roads and railways

Minimum length of roads: 10mm on the map

Indicate all highways, general national roads and provincial roads (including other important roads).

Boundaries

Mark the boundaries for Seoul Metropolitan City, provincial metropolitan cities, do (province), gun (county), eup or myeon (township)

Place indications of the administrative unit to which islands are assigned in an appropriate position.

Contour lines and coordinates Triangular point and elevation point

Contour lines are divided into 100m, 500m, 1,000m and 2,000m

The values of geological coordinates are written on each side of the coordinate on every map.

1/3000000 scale Map of Northeast Asia

## Overview

The map has been produced and distributed to raise awareness both at home and abroad about Korea ´s precise location and its geological relationship with neighboring nations, thus increasing its national status.

1/3000000 Scale Map of Northeast Asia

## Timeline

In 1996, a research project for the production of a special map was carried out by the Korean Society of Surveying, Geodesy, Photogrammetry and Cartography.

Produced both a Korean and English-language version of a 1/3000000 map of Northeast Asia

In 1997, the first edition was printed and distributed.

In 2000, the map was distributed for promotional purposes at the 29th International Geographical Congress, held in Seoul, Korea.

In 2000, the English edition was offered twice to the Korean Overseas Information Services, a division of the Government Information Agency.

Targeted at overseas diplomatic offices and major overseas map producers, publishing companies, university libraries and media

Used for promoting the use of the name East Sea (15,000 copies printed)

Requested to adjust the names of places on the map in compliance with the new Korean Romanization (officially announced on July 7, 2000)

Requested to mark East China Sea on the map

Allowed for use by Korea Information Service, indicated at the bottom of the map

In 2005, a revised edition was published.

In 2008, a revised edition was published.

Publication of land use map

## Land use map (1972-1998)

### Overview

Produced in accordance with Article 14 (2) of the Act on the Utilization and Management of the National Territory (Management Obligation by Specific Use Area) and Article 12 (9) of the Act ´s Enforcement Decree (Research on Land Use Status)

Served as a basic resource for developing national territory and land utilization plans

1/25000 scale map that classified uses of land according to land cover characteristics

### Production status

Between 1973 and 1980 produced 720 map sheets spanning the nation

Classified land into 41 categories, including sufficiently-irrigated fields, according to the condition of land use by conducting field research based on 1/25000 topographic maps

## Method of production and revision

Revised 483 map sheets from 1982 to 1998 based on field research

The rate of revision stood at only 67% due to low demand and insufficient funding

## Digital map of land use (2000)

Produced in accordance with Article 14 (2) of the Act on the Utilization and Management of the National Territory (Management Obligation by Specific Use Area) and Article 12 (9) of the Act ´s Enforcement Decree (Research on Land Use Status)

Served as a basic resource for developing national territory and land utilization plans

1/25000 scale map that classified uses of land according to land cover characteristics

## Production status

Produced 414 map sheets spanning the nation as part of the year 2000 project of creating a digital map of land use

Estimated budget was KRW7.6 billion

Method of production and revision

Based on aerial photography and field research, produced digital map (shp format) that classifies land use into 38 categories according to land cover characteristics

In 2000, the digital map project was undertaken as part of public works program in response to the computerization of thematic maps.

In 2001, the project was suspended for the second year due to the Board of Audit and Inspection ´s recommendation that a project of computerizing the land use map was inappropriate.

## Details of 2000 land use map project

### Project overview

Project title: Digital mapping of land use map

Project period: November 11, 1999-November 10, 2000

Project scope: 414 map sheets at 1/25000 scale (about 55% of the entire national territory)

| Title of public work projects | Budget | Budget | Commissioned | Project executor |
|---|---|---|---|---|
| Digital mapping of land use map | KRW7.8 billion | KRW7.6 billion | To private organization | Korea Institute of Construction Technology |

Project details:

### Project objective

To examine the current status of land use and enhance the basis for developing national territory utilization plans and making policies, as well as to allow public access to information on the conditions of land cover

### Project effects

Provide regular daily employment for 440 people and create jobs for 109,500 people a year

Boost related industries by producing a land use map that represents the changes in national territories´ spatial structure and status of land utilization, allowing it to be used as basic data for national resource management

Production of map of Dokdo Island

## Background and objective

Claims over the ownership of Dokdo (designated Natural Monument No. 336), which is a part of Korean territory, are emerging as a diplomatic issue between Korea and Japan.

A great number of institutions have collected, examined and offered a vast amount of information about the island´s history, geography, culture and geographical features, but this research is being done sporadically and is focusing on diverse areas. This can lead to damage to the information´s credibility at home and abroad.

## NGIS´ performances and timeline

December 1961: Conducted an astronomical survey of Dokdo and produced a 1/3000 scale topographic map (plane table surveying)

May 1980: Conducted an aerial and astronomical survey

-Took a 1/5000 scale aerial photograph and produced a 1/5000 scale map

May 1998: Conducted a precise primary control point survey using GPS (Triangular point Dokdo 11)

August 2000: Conducted an aerial survey and produced a 1/1000 scale digital map

-Took a 1/5000 aerial photograph and surveyed a ground control point using GPS

March 2001: Officially announced the outcome of the surveys of Dokdo (1/1000 scale digital map)

December 2004: Conducted a third control point for Ulleungdo Island and Dokdo Island using GPS

-Officially announced and promoted the results of the survey

April 2005: Produced a three-dimensional stereo image map of Dokdo

-Used Aero-Lidar and digital photography

June 2005: Officially announced government standards of Dokdo´s general information

-Coordinates, land size, circumference, number of affiliated islands, etc.

December 2005: Codified the names of Dokdo´s affiliated islands

December 2005: Published "The Geography of Korea" (southeastern region including Dokdo)

April 2006: Produced both Korean and English-language versions of a world map that names Dokdo

December 2006: Planned to install a GPS observation station

September 2007: Launched a project to establish a digital library covering Dokdo´s geographical information

Revised the 1/1000 and 1/5000 digital maps, photographed using Lidar and digital cameras, and produced promotional materials

The project was launched according to the Plan for Sustainable Use of Dokdo Island (former Ministry of Maritime Affairs and Fisheries)

2000 report on Dokdo surveying (open to public)

Geographical location: Seodo (west island) is at the center of the islands, and Dongdo (east island) is located at the Dokdo 11 triangulation point

-Seodo: 37° 14´ 30.6" N, 131° 51´ 54.6´´ E

-Dongdo: 37° 14´ 26.8" N, 131° 52´ 10.4´´ E

Land Area: 185,059.01m²

-Seodo: 87,848.52m²

-Dongdo: 71,757.05m²

Geographic shape: Composed of two main islands together with 78 rocky islets and reefs

-Circumference: 5.4 km (Dongdo: 2.8km, Seodo: 2.6km)

Revision Plan for National Base Map (2011--2012)

Periodic revision

Produce a revised map through correction plotting based on aerial images

Revision was conducted every four to five years over the past decade and the majority of the modifications were completed nationwide. Over the coming few years, the map will be revised only for those areas identified in aerial photographs as having changed.

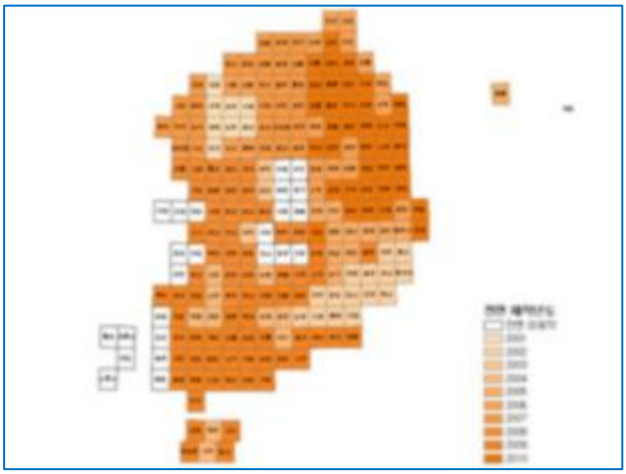
The level of difficulty of terrain in areas such as metropolitan cities, cities, and counties will be taken into consideration.

Reproduction will proceed for some areas that show a low level of accuracy.

About 1,000 map sheets that were created by scanning a paper map (central inland area)

Island areas where field surveying and research were difficult

About 3,000 map sheets covering large urban areas where the full maps were produced too long ago (capital area and Busan)



Year of Completed Map Production

(Completed map is yet to be produced)

Areas Scheduled for Reproduction

Modifications to the national base map will be made at the time of field research

The representation of terrain and features on the map was previously based on the timing of aerial photography.

Following aerial photography, roads and major structures that are newly built or scheduled to be competed will be examined through supplementary field surveys (aligned with ongoing revision).

### Ongoing revision

Make occasional modifications to those areas that have undergone territorial changes over a certain scale range (length: 1 km, area: 53,8200ft² )

Take advantage of as-built drawings, aerial images, field surveys, MMS (mobile mapping system), and other methods

Monitor alterations by using Korea Online E-Procurement System or public surveying system

Minimize omissions by monitoring changes from the commencement of planning stages, including construction drawings

Inform the public of the monitored changes by amending the changes to the National Base Map on a monthly basis

Conduct field surveys when the elevation above ground level changes due to factors like residential land development

Previously, when supplementary field surveying was conducted, only planar coordinates were produced through GPS

### Promotion of related research (Prioritizing and promoting on a yearly basis)

Reestablish the level of accuracy for digital maps and study future models of these maps

Conduct research on improving map quality standards to reflect the latest surveying technology

Develop new approaches to improve field research in terms of techniques and items to be examined

Look for ways to improve projection methods and management systems for map sheets

Examine standards for enhancing the use of seamless data

Refine and polish the map to increase the satisfaction of and utilization by paper topographic map users

Conduct research into automatic mapping technology based on integrated digital maps

Overhaul the related rules, including a work standard for writing digital maps and review the estimated manpower and materials

Develop a customized work standard, such as digital plotting and digitalizing

Focus research on specific areas: objects for representation, standards, symbols, colors, and attributes

Reexamine the supply system, including metadata for each map sheet and layer, as well as pricing policy

Manage metadata based on a shortened cycle of periodic revision and year-round modification

Establish a cooperative system for establishing administrative boundaries and monitoring topographical changes

Work with related authorities including the Ministry of Public Administration and Safety, the Ministry of Land, Transport and Maritime Affairs, and local governments

Develop measures to monitor changes using the databases of other organizations

### Aerial photography

2011 aerial photography will cover areas scheduled for map revision in 2012 (Geospatial Imagery Information and Photogrammetry Division).

Capture a digital color aerial photograph with spatial resolution 25cm or higher (East-south region).

### Amount of investment

| Category | 2011 | 2012 | Subtotal |
|---|---|---|---|
| Digital aerial photography | 4,491 | 4,500 | 8,991 |
| Revision of National Base Map (Periodical) | 28,957 | 32,089 | 61,046 |
| Revision of National Base Map (Ongoing) | 2,000 | 2,000 | 4,000 |
| Related research projects | 500 | 500 | 1,000 |
| Grand total | 35,948 | 39,089 | 75,037 |

* Scheduled aerial photography is subject to adjustment in connection with the project to establish three-dimensional spatial data.

| Region | Type of revision | Number of map sheets(1/5000) | Unit price per map sheet (KRW) | Amounts(KRW1 million) |
|---|---|---|---|---|
| West region (Capital Area + Chungcheong-do and Jeollabuk-do) | Full revision | 1.951 | 6,866 | 13,396 |
| | Partial revision | 5,275 | 2,950 | 15,561 |
| | Subtotal | 7,221 | - | 28,957 |
| East-south region (Gyeongsangnam-do and Jeolla-do+ Gangwon-do and Gyeongsangbuk-do) | Full revision | 1,333 | 6,360 | 8,478 |
| | Complete revision | 8,810 | 2,680 | 23,611 |
| | Subtotal | 10,148 | - | 32,089 |
| Total | | 17,369 | - | 61,046 |