

GIS Development Strategy of Seoul Metropolitan Government

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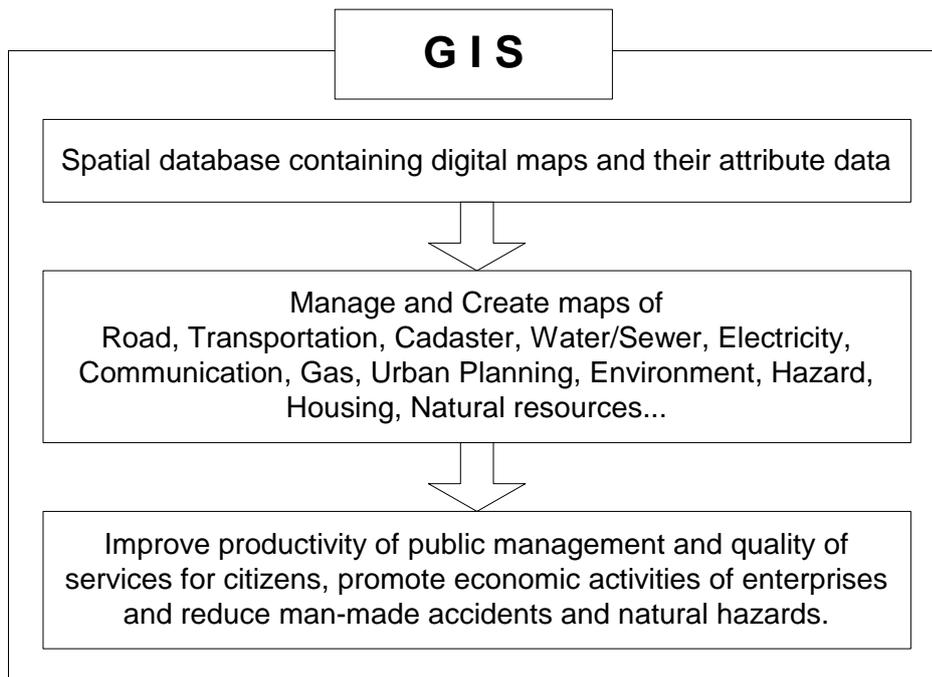
Abstract

Recent years has changed Korea toward digitally-oriented environment in relatively a short period and Seoul Metropolitan Government has played the central role. Especially, numerous efforts for the GIS construction have contributed to building an infrastructure for safe and scientific city management. As Korea has finished the 1st phase of the National GIS project in 1996~2000 and is launching the 2nd plan for 2001~2005, it is necessary to diagnose the past experiences and analyze the future strategies for the GIS development. This paper examines the GIS construction directions of Seoul in the past and the future and makes suggestions for ideal strategies. This effort is also expected to help compare Seoul and Shanghai in their GIS strategies and evaluate problematic and desirable points found in two cities' policies and make suggestions for the better policies.

■ Motivations for the Korea's GIS development

- The GIS emerged as the essential Social Overhead Capital (SOC) for the productivity of public administration and industry.
- Accidents involving gas and subway costing lives and money.
- Becomes in need of systematic facilities management and effective disasters prevention and handling.
- Developed countries were using the GIS from 70's. (beginning with resources management)

■ GIS?



■ History of the GIS (NGIS) by the central government

- Dec. 4, 1994: Underground gas explosion in A-hyun, Mapoh (13 dead)
- Apr. 28, 1995: Underground gas explosion in Deagu (98 dead, 200 injured)
- May. 1995: Master Plan for National GIS project announced (11 ministries-cooperated)
- Jun. 1995: Control was transferred from Ministry of Finance to Ministry of Construction and Transportation
- Jul. 1, 2000: The Law of the Establishment and Use of NGIS enacted
- Dec. 5, 2000: Master Plan for the second NGIS announced

■ History of the GIS by Seoul Metropolitan Government

- 1995: 1st Seoul GIS Master Plan
- 1997: Pilot study on Road management system
- 1998: Digital topography map and digital cadastral map completed
- 1999: Construction of individual facilities management systems (Road, Water, Sewer and underground facilities)
- 2000: Urban planning information system completed
- 2001: - New street address system project launched.
 - 1st phase of aerial photograph database project completed
- Dec. 2001: - Integrated underground facilities database completed
 - 2nd Seoul GIS Master Plan

- Present as of 2002:
 - Experimental running of Seoul GIS's 8 systems
 - Preparing related regulations scheduled for accouchement in November, 2002

※ 8 Systems in Seoul GIS

- road management system
- city planning information system
- new address-granting system
- parking management system
- sewer management system
- land management system
- digital map management system
- integrated management system for underground facilities

■ Problems found in the Seoul's GIS implementation

- Less plans
 - Without sufficient preparations and comprehensive plans, projects were done by individual divisions who are in need
 - Unreliable systems and redundant investment problems
- Less experts
 - Being short of human resources, projects relied too much on private enterprises.
 - Unclear project effect, need continuous complementary efforts
- Less experience
 - Technical level and experiences had not yet been accumulated
 - Doubtful quality of the constructed data.

■ Setting Goals for Seoul GIS

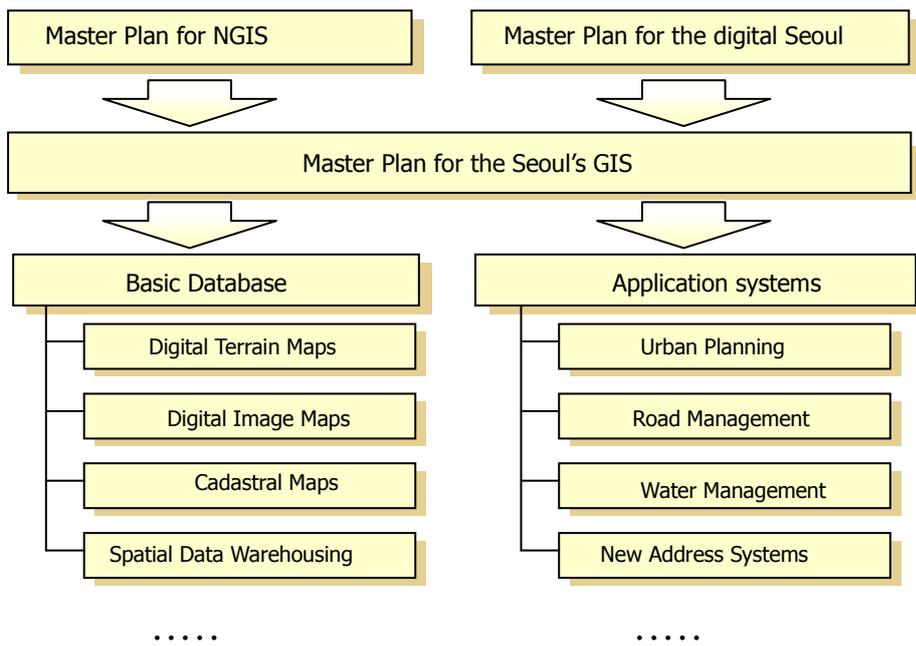
- 1996~2001: Complete base GIS and improve the administration and citizen life quality.
- 2002~2010: Expand the GIS to the general UIS and integrate with Seoul's comprehensive information network.

■ Setting Strategies for Seoul GIS

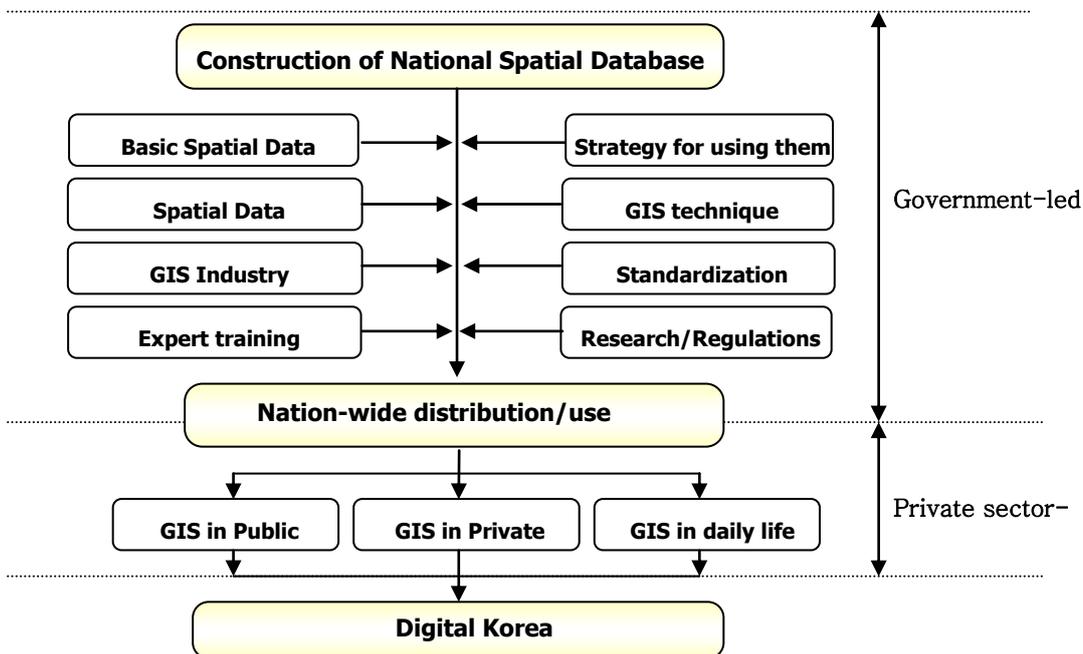
- Systematic approaches
 - Prepare the long-term plan and push forward step-by-step with yearly working plans based on this
- Organize a leading department, utilize experts
 - Create a steering organization responsible for leading GIS projects in comprehensive and systematic manner

- Use related professionals
- Work in concert with the NGIS
 - Reduce errors and budget-waste by keeping pace with the NGIS
- Integrate with Seoul's comprehensive information network.
 - Maximize the use of the GIS by integrating with the metropolitan information network that links Seoul and the wards of Seoul's jurisdiction

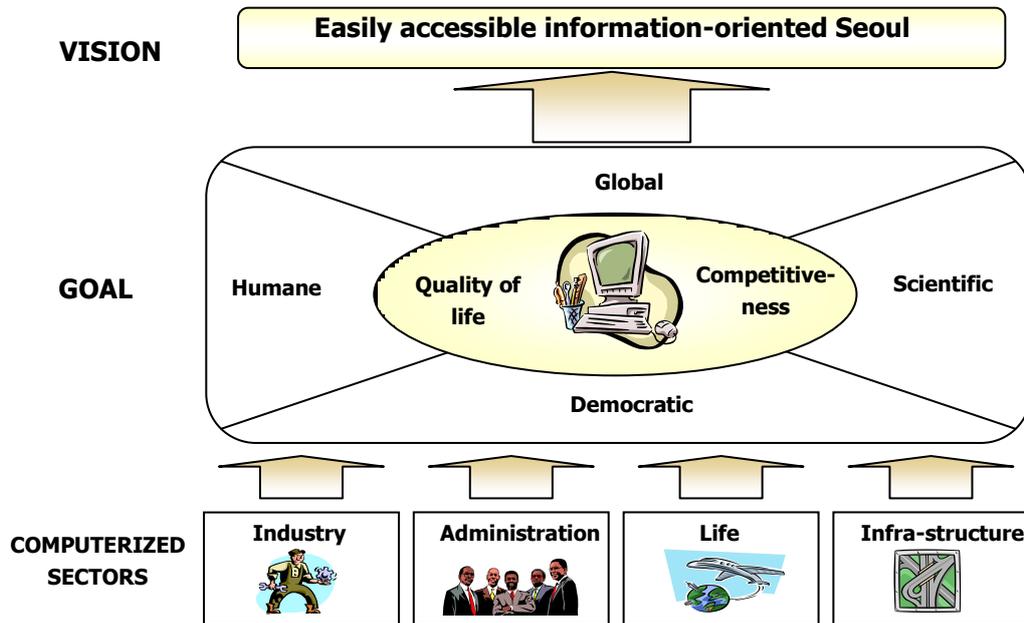
■ Hierarchy of Seoul GIS development



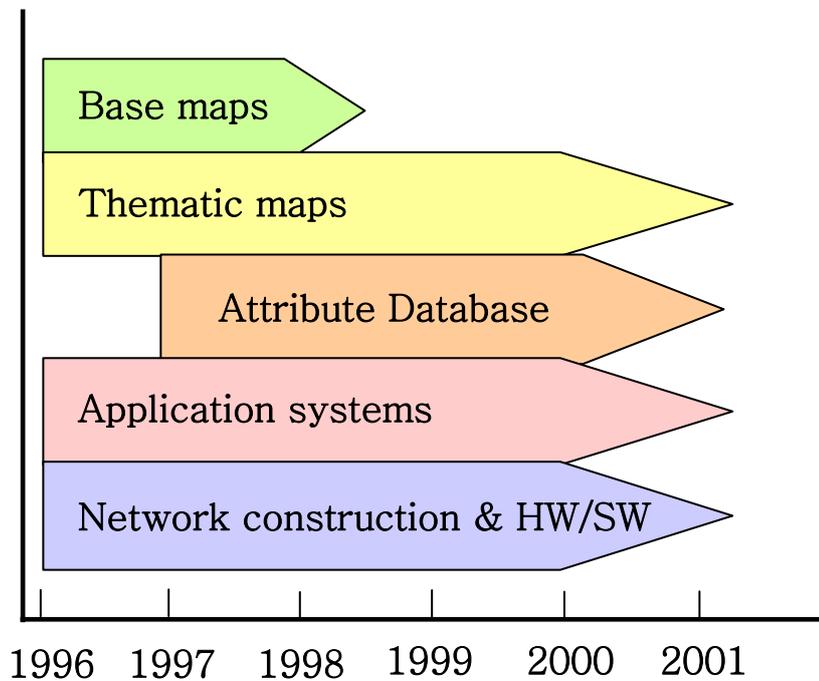
■ The Master Plan for the Second NGIS project (2001~2005)



■ The Master Plan for the Digitalized-Seoul



■ Processes of the 1st Seoul GIS Master Plan



■ Investment of the 1st Seoul GIS Master Plan

Budgets based on items

(million dollars)

Total	Base map Facility map	Undergrnd facillity map	Attribute DB Application	SW, HW Purchase
75.0	13.0	24.2	4.2	33.3

Yearly Budgets

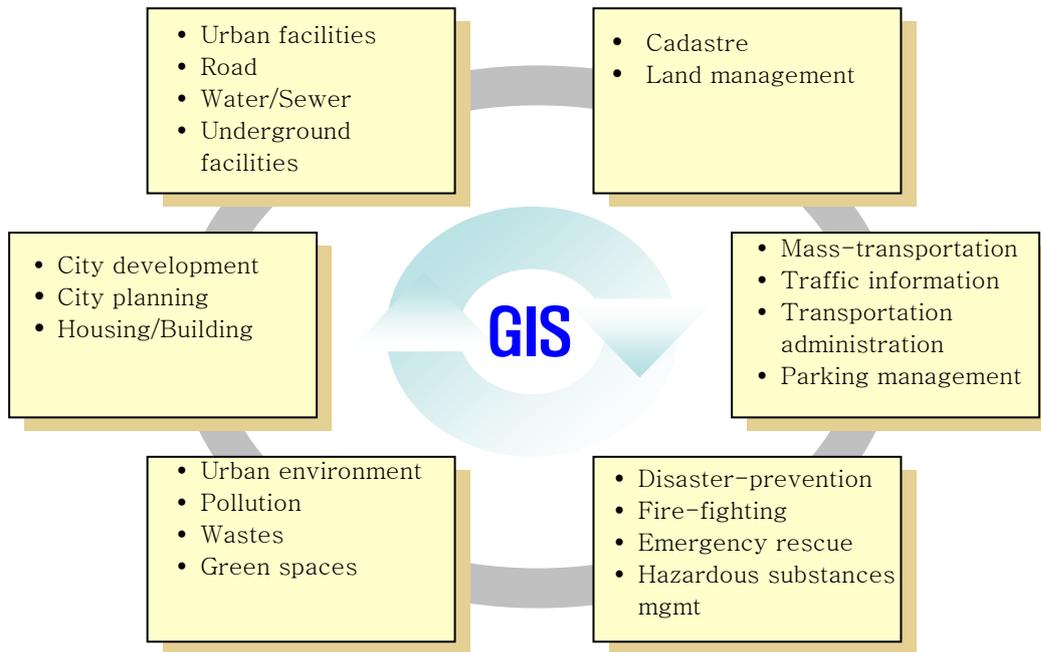
(million dollars)

Total	1996	1997	1998	1999	2000	2001
75.0	1.0	4.8	18.0	18.1	18.1	15.0

■ The 2nd Seoul GIS Master Plan

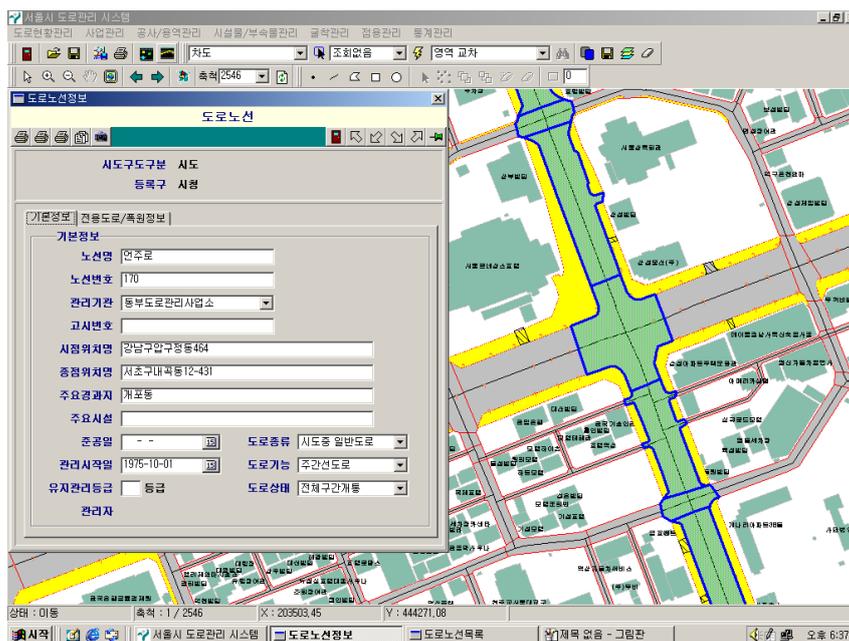
- Background
 - The end of the 1st Master Plan period
 - Need of actions in response of the NGIS Law
 - Need of citizen-oriented GIS services
- Project areas
 - Construction of GIS Framework data
 - Construction of management systems for different areas
 - Establishment of GIS data distribution
 - Advertisement and citizen-oriented services
 - Solidification of organizations and regulations, training and maintenance
 - Maintaining partnership of government/industry/academy
- Strategy
 - Linking with the NGIS master plan
 - Establishment of project area-based implementation plans
 - Pre-feasibility study
 - Yearly estimation
 - Post-maintenance by experts and workers

■ Six Primary Project Areas



(1) Road Management System

- ▶ Database construction of road (total 7,843km) and street facilities (975 in 11 types)
- ▶ Application systems: monitoring, project management, road and facilities management, excavation management, miscellaneous statistics
- ▶ Project Period: Dec. 1997~Dec. 2002 (65% progressed as of Dec. 2001)
- ▶ Expenses: \$ 6 million (currently \$ 4.7 million invested, \$ 1.3 million planned)



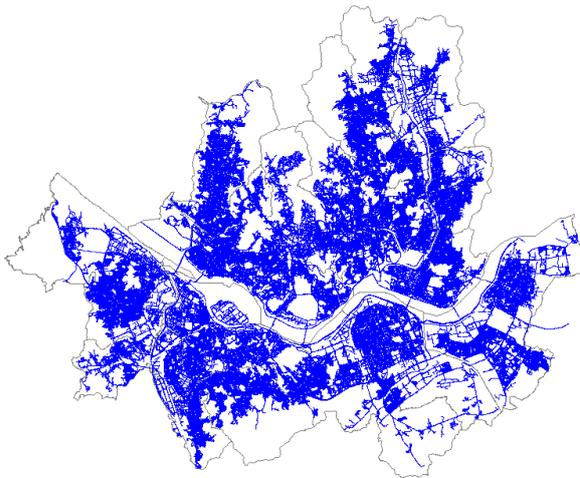
(2) Underground Facilities Management System

- ▶ Database and application system construction for 47,271km of 6 Major underground facilities (Water, Sewer, Electricity, Tele-communication, Gas, Heating)
- ▶ Project completed as of Nov. 2001
- ▶ Expenses: included in the expenses for the Road Management System

◦ Water

Total length: 17,477km

Database mgmt: Water Management



◦ Sewer

Total length: 9,937km

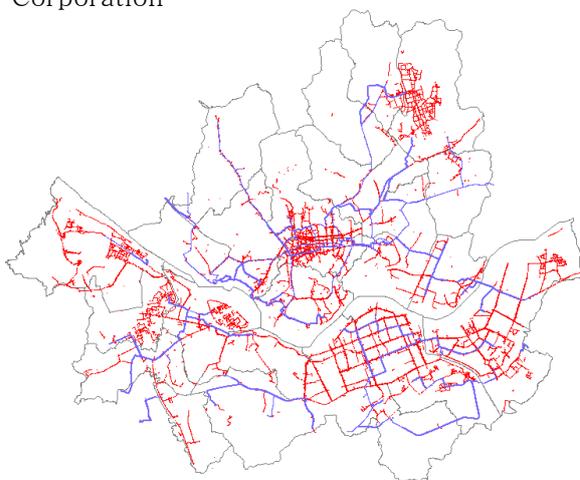
Database mgmt: Sewer Planning



◦ Electricity

Total length: 1,423km

Database mgmt: Korea Electric Power Corporation

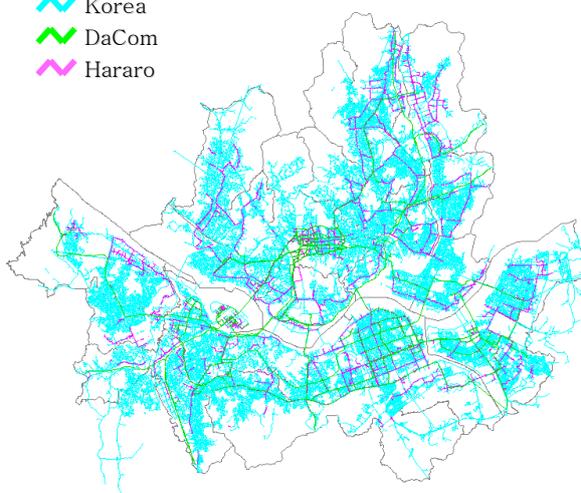


◦ Telecommunication

Total length: 6,768km

Database mgmt:

- ~ Korea
- ~ DaCom
- ~ Hararo

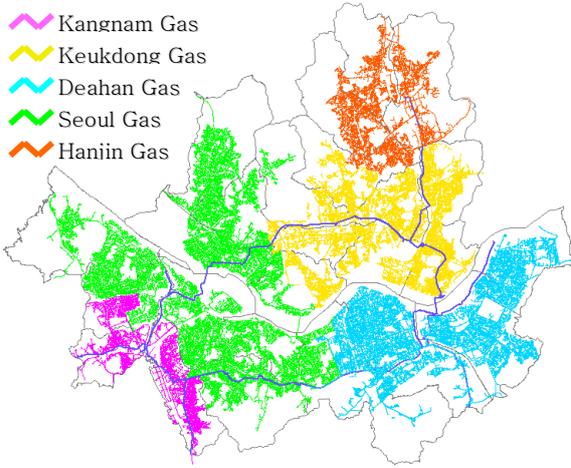


◦ Gas

Total length: 11,144km

Database mgmt:

-  Korea Gas
-  Kangnam Gas
-  Keukdong Gas
-  Deahan Gas
-  Seoul Gas
-  Haniin Gas

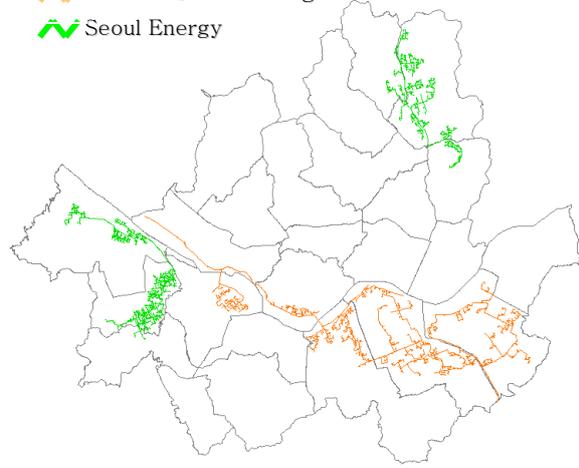


◦ Heating

Total length: 522km

Database mgmt:

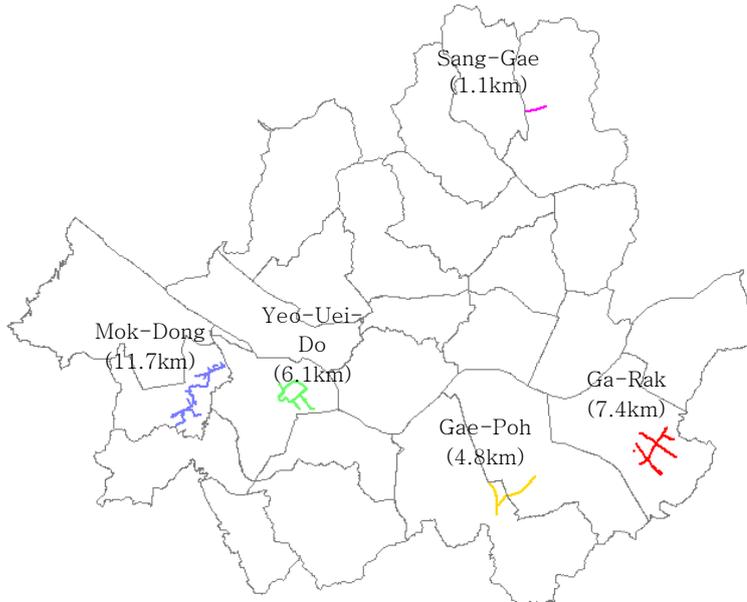
-  Korea District Heating
-  Seoul Energy



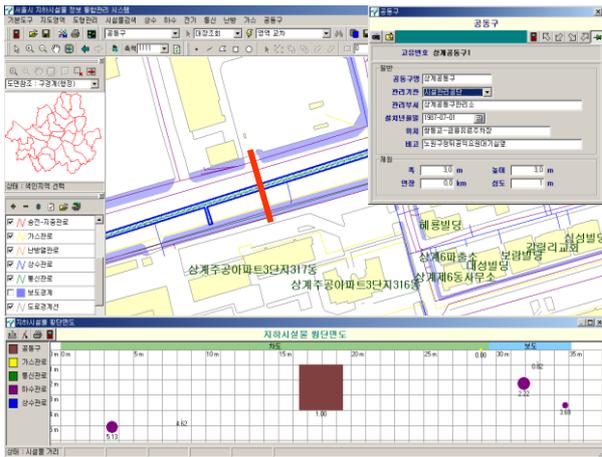
◦ Shared Utility Duct

Total length: 31.1km

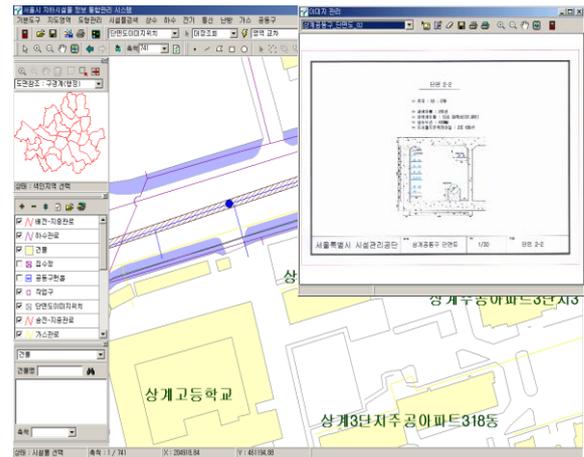
※ Currently installed in 5 areas (see the below)



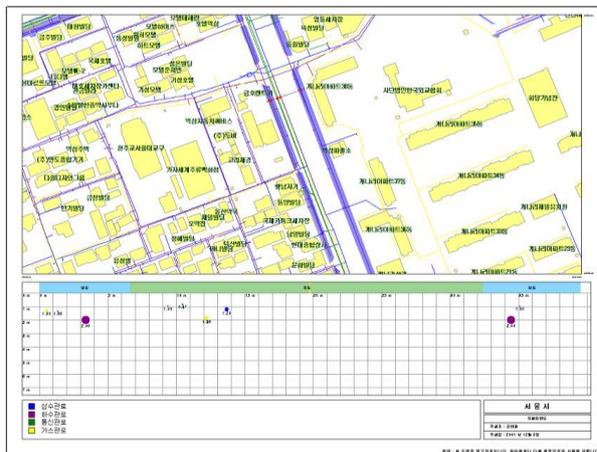
◦ Shared Utility Duct (Cross section checking)



◦ Shared Utility Duct (Detailed section view)



◦ Underground Facilities Integrated System (Digital map)

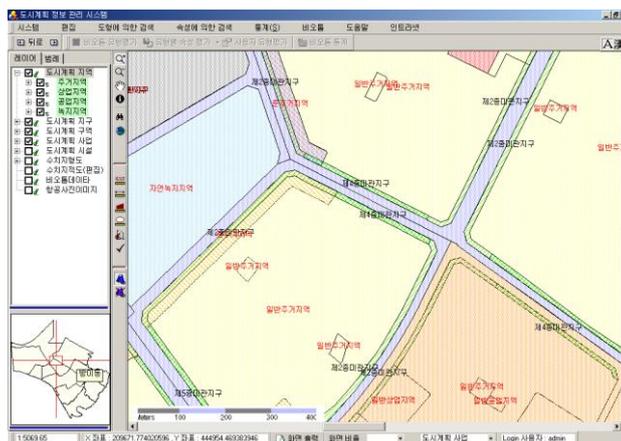


◦ Underground Facilities Integrated System (Aerial photo)



(3) City Planning Management System

- ▶ City planning-related data (total 31,000 cases)
- ▶ Application programs (zoning, planning, facility management, cadaster management, intranet query system, city planning decision support system)
- ▶ Pilot project completed as of Nov. 2001 (Songpa, Kangdong districts)
- ▶ Development in progress in 23 districts of Seoul
- ▶ Expenses: \$ 6 million (currently \$ 4 million invested, \$ 2 million planned)



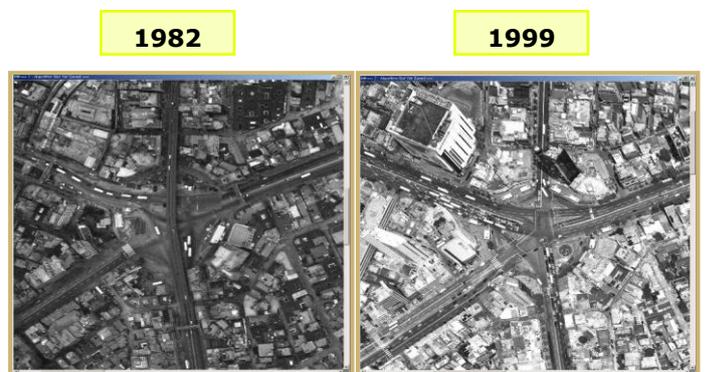
(4) Digital Image-data Reconstruction from Aerial Photographs

- ▶ Converting to digital image data from aerial photographs in film format
- ▶ Scanning 110,000 images and constructing mosaic photos from 66 times of aerial photographing
- ▶ Application system for mosaic photo construction and aerial photo image management
- ▶ Project period: Mar. 2001 ~ Dec. 2003
- ▶ Expenses: \$ 3.2 million (currently \$ 1.5 million invested, \$ 1.7 million planned)

◦ City planning support
(Sangam District Development Plan)



◦ Time-series Contrast
(Transition in Shinchon Cross area)



◦ City tour guidance
(City hall vicinity)



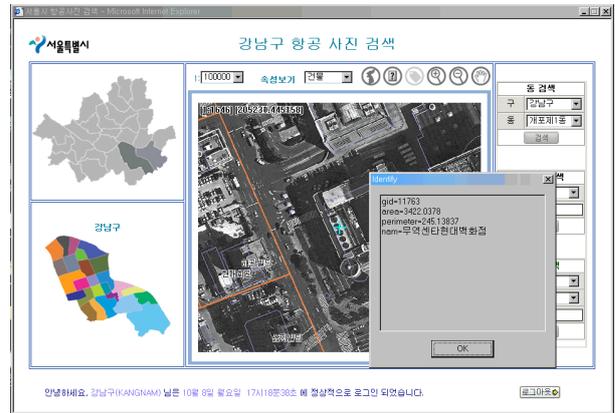
◦ Overlapping of aerial photo and digital map



- Aerial photo service system
(Building query)



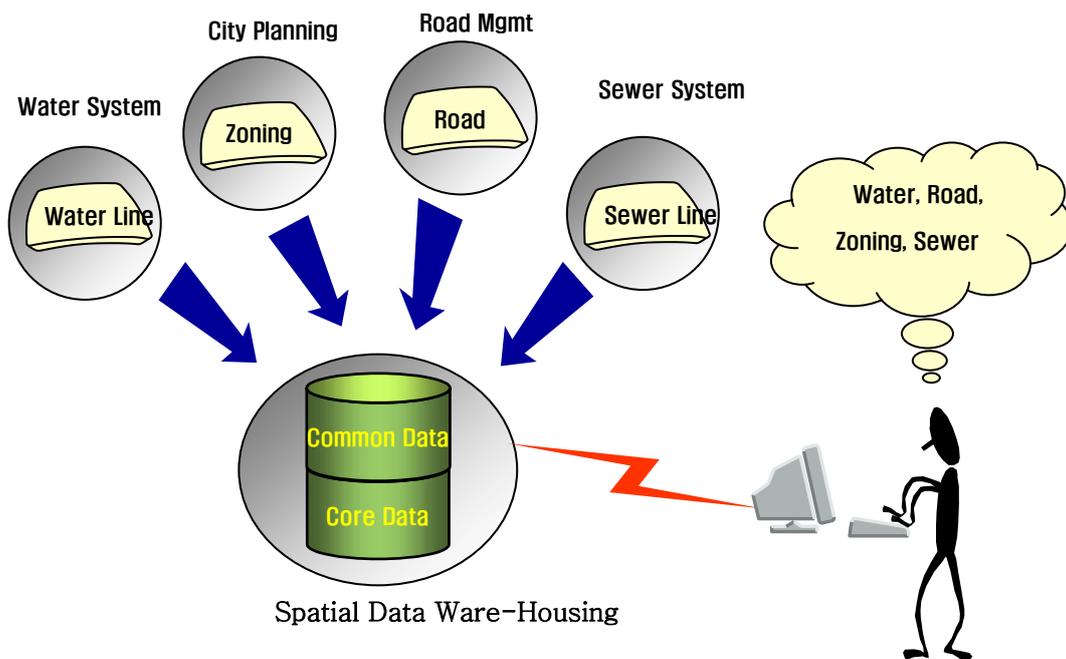
- Aerial photo service system
(Building-attribute query)



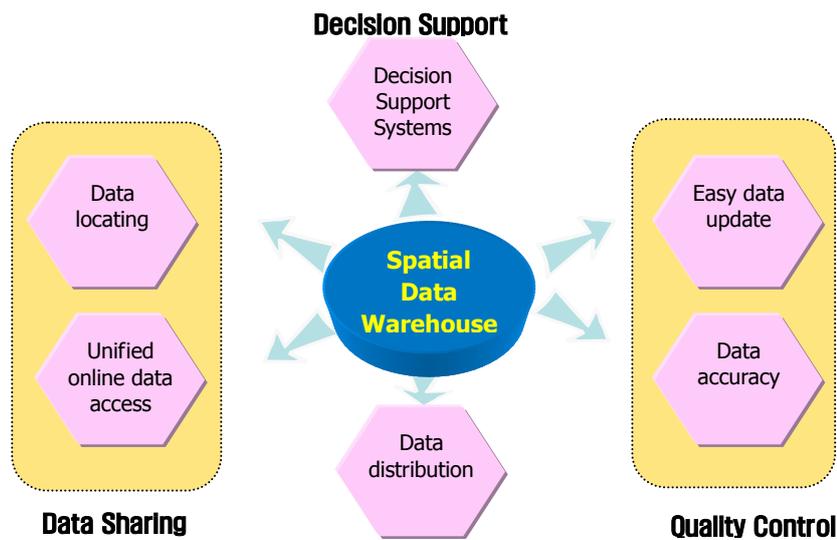
(5) Spatial Data Ware-Housing

- ▶ Integrate GIS databases from different departments to minimize redundant database constructing and facilitate data sharing
- ▶ Construct commonly used spatial data, construct metadata for easier query by users and develop related application programs for efficient use by departments in Seoul
- ▶ Project period: 2000 ~ 2003
- ▶ Expenses: \$ 1.25 million

- Concept of Spatial Data Ware-Housing



◦ Benefits of Spatial Data Ware-Housing



■ **Future Strategies**

◇ Benchmarking Markets and Techniques

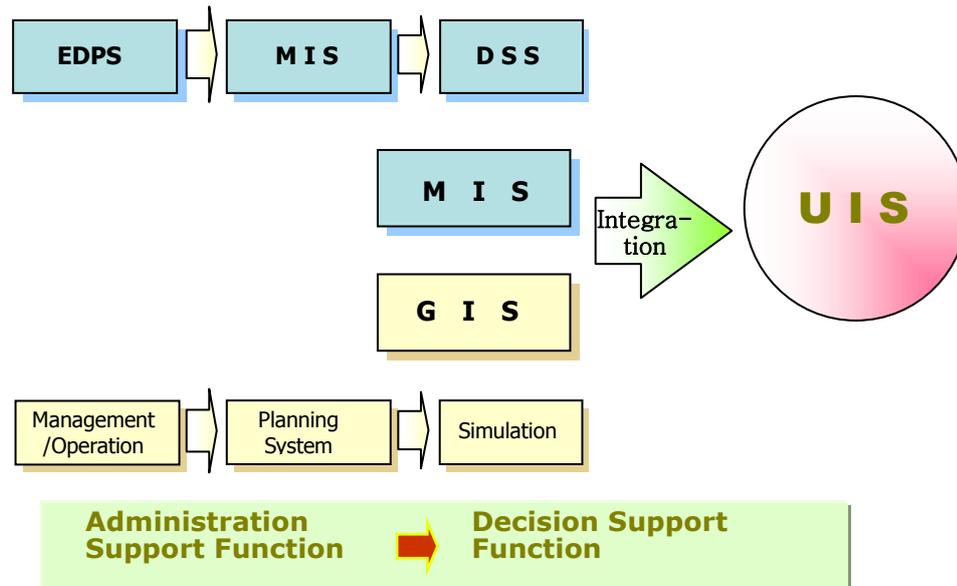
- ▶ Benchmarking advanced GIS cases in foreign large cities
- ▶ Grasping global IT trends

◇ Short/Mid term Strategies (2001~2005)

- ▶ Utilizing individual systems in the GIS
- ▶ Training GIS experts
- ▶ Facilitating GIS data distribution
- ▶ Internet GIS, 2.5 GB-level optic-telecom line
- ▶ Cooperation with central government departments
- ▶ Expanding city's budget for IT and GIS

◇ Long term Strategies (2006~2010)

- ▶ Integrating MIS and GIS → UIS : E-Government
- ▶ ERP-Spatial DB integration, Standardization, Component construction
- ▶ Partnership between industry and academy
- ▶ Integrating GIS and other areas (Industry, Life, Tourism ...)
- ▶ Integration of 4S (GIS, ITS, GPS, RS) technologies
- ▶ Including Seoul DMC plan into GIS projects
- ▶ South-North and international communication/advertisement of Seoul GIS



■ Suggestions

1. Before advancing a GIS project, thorough study must be conducted to clarify the requirements, the benefits, resources and constraints and the current technology available and applicable. Above all, it is essential to draw consensus about the needs for using the GIS. Time and money estimates along with the target level of improvements should also be specified. The project thus should be implemented in such way that a flexible system and accurate data may be developed with minimum necessary skills through identifying the objectives and resources.
2. To avoid un- or counter-productive results from building individual systems and data, it is essential for the central government and local governments to take constructive actions in coordinating different departments and functions. A steering organization is required to be empowered to lead the coordination because, otherwise, individual organizations tend to favor independent establishment of the systems, which leads to ineffective redundant data usage. It is essential to establish easily accessible, common reference frameworks between the organizations. Using common reference index, data from different departments can be effectively linked and shared.
3. The use of framework data must be carefully planned. By using the standardized framework data, various organizations can save time and money in developing data and applications for different purposes. The framework data must be as reliable as possible by being kept updated and accurate. Also, using a spatial data warehouse is expected to facilitate data sharing, data quality control and decision-making. Local governments need to consider securing the budget for implementing the GIS projects by developing and selling the spatial database, which also helps avoiding unnecessary data production.
4. It is also essential to establish professional organizations in the local governments that are solely responsible for the GIS and to deploy the experts to the organizations. The local governments

must also provide concrete measures including the establishment or revise of the related regulations for GIS projects, the operation of the organizations and the plans for maintenance of system and database.

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