GIS in Korea; Present and Future

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Abstract

The current SIT (Spatial Information Technology) of Korea has been bringing the society that we can obtain the various types of geographic information at anywhere and anytime. The geographic information should be easy accessible to user's preference and it should be acquired with the least procedures and proper cost.

This study discusses the current GIS (Geographic Information System) technical trend in Korea such as video GIS, virtual GIS, Mobile GIS and high resolution based satellite images based application system to present the surface information of real world. These expect powerful monitoring, predicting, modeling and analyzing to play a role as decision supporting making system from the central government staff and local government staff.

In the near future, these ST based on advanced telecommunication and IT will change the human life style and shows the possibility of constructing the next ubiquitous generation.

Keywords: SIT (Spatial Information Technology), GIS (Geographic Information System), Satellite Image

1. Introduction

Recently overall society is in a process of transforming into information-oriented society in various fields. As information infrastructure expands and develops, demands and actual use of geographic information are rapidly increasing. Especially, 'Joyful revolution of life', 'City that makes dream of future life come true', 'Ubiquitous environmental city' these are the things that signify the spatial technology which enables the real time network connectivity and provides the management capability of major facilities by linking geographic data and information system.

In order to advance such spatial information technologies, Korean government selected satellite technology and remote observation system as its future promising technologies and heavily invested in core technology field, which enables 3 dimensional image based ubiquitous environment by merging spatial information technology such as GIS, GPS and communication network.

Especially, satellite image and GIS integration technology is not only important in national security level, but also in improving economic activities and quality of human life by providing the detail digital map, city and traffic management, disaster observation, environmental disorder detection, agriculture, fishery, marketing, real estate, tourism, medical service; public and industrial sectors.

Even further, it is a cutting edge technology which can preserve the ecosystem of city and monitor for disaster. Not only it protects lives and properties, but also it promotes the quality of life with pleasant city environment. Staff members need to devote themselves to promote customized administration and civil service, and local community should continuously be part of it.

This study is to look into the spatial information technical trend in Korea and especially providing 3D satellite image based application information system,
which displays real world on existing geographic information service with digital map. It will provide the guidance for our life style environment and become the infrastructure of ubiquitous world.

2. The Current ST (Spatial Technology) in Korea

2.1 NGIS Master Plan

Korea has pursued the national GIS projector since 1995. The first phase of the National GIS Master Plan (1995-2000) focused on expanding the nation’s spatial information infrastructure. The first five year plan involved quantifying the nation’s basic maps and thematic mapping such as administrative district and road mapping. During the second phase of the National GIS Master Plan (2001-2005), the central and local government took the lead in establishing various GIS based information systems. This period focused on constructing digital Korea as well as the distribution and standardization of geographic data, educating people. The third phase of the National GIS Master Plan (2006-2010) is to construct the infrastructure for ubiquitous Korea. Through this period the high quality and the interoperability of geographic data are expected to acquire and GIS based application system in each local government will be integrated in a portal site. Finally, the infrastructure of ubiquitous Korea can be established.

2.2 KOMPSAT-2

KOMPSAT-2, which was launched on July 28, 2006, is an in-country development program to enhance the capabilities of satellite manufacturing technology in Korea. The main mission objectives of the KOMPSAT-2 system are to provide a surveillance of large scale disasters and its countermeasure, acquisition of independent high resolution images for composition of printed maps and digitized maps for domestic and overseas territories, balanced development of Korean territories, survey of natural resources, and continuation of satellite earth observation. The high-resolution image system will allow the realization of 1m multi-spectral high-resolution images.

2.3 LBS/Mobile GIS Technology

This integrates four essential technologies: GIS software, GPS technology, handheld communication devices and wireless telecommunications technologies. Bringing these technologies together makes the enterprise database directly accessible to field-based personnel anywhere and anytime. Also, the term has evolved to refer to automobile systems that combine global positioning satellite tracking and other wireless communications for automatic roadside assistance and remote diagnostics. This mobile GIS industry is not limited to automotive applications but also other applications are being studied or developed for monitoring water and air pollution, medical informatics and health care, and for distance learning in real time.

2.4 Satellite Image based Virtual Mapping Technology

This is a large, multifaceted project to allow navigation of and interaction with very large and high-resolution, dynamically changing databases while retaining real-time display and interaction.
The user can not only view these terrains from any viewing angle but also buildings, roads, high resolution imagery draped on the terrain, and other features. It can be used for urban planning, evaluations of vegetation, soil, waterway, or road patterns, flood planning, and many other tasks. For example, urban planners can see the layout of streets, buildings, and parks on actual topography and can thus evaluate site lines, congestion, where sunlight strikes.

2.5 3D Satellite Image based Multimedia Mapping Technology

In order to reflect the field status information on the computing system, video GIS method was used in this study. For this, GIS data was constructed by mapping GPS data to the certain location scene of video. In this study the definition of video data is to let GPS coordination data mapping to digital topography map and video data computing the time and coordination so that the exact location of certain feature and status around it have figured out efficiently. Here, the orient concept of mapping method is “Synchronization” to map GPS data received from field surveying to start point to of video GIS data.

3. The Practical Approaches of GIS for the U-Korea

In this chapter, the trend of new spatial technologies in Korea, especially which integrates with the high-resolution images based application, is shown for the management of urban, water resource and forest area.

3.1 Urban Information Management using Mobile GIS

This system was to develop for urban facility information management such as street light in real time as shown in Fig. 5. Especially, this system integrated 3-user mode; 1) client and serve system for practical affairs in a office, 2) web based system for general people and 3) mobile system for facility management outside office. All database of this system has operated in real time and expect to be applied for the other urban facilities.

3.2 Coastal and Water Resource Information Management using virtual GIS

The virtual flood simulation could be performed on 3D viewer and its flying and rotation from various angles on desired maps also could be also implemented as shown in Fig. 6.

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Fig. 3 The integration of 3D real world and 3D objector

Fig. 4 The concept of video GIS based on 3D satellite image

Fig. 5 Urban facility management system using LBS

Fig. 6 Flood simulation system using virtual GIS
Especially, the virtual flood simulation could present the overflowed status depending on the height of sea in study area and indicates the high hazard area.

### 3.3 Forest Road Information Management using Video GIS

This system is to manage forest road by mapping each video scene to GPS data and 3D satellite image map. Related forest staffs could monitor the broad area or difficult to accessible area through using satellite images while video GIS information could reflect the detail status information in small region. Especially, this video GIS is considered gaining the high efficiency to acquire site information within lower coast.

![Fig.7 Forest road information management using Video GIS](image)

### 3.4 The Construction of U-Korea

In order to construct the successful ubiquitous Korea, Intelligent Land Information Technology Innovation Project has bee taken in Korea. There are three large technical categories; GIS, LBS, CALS and Ubiquitous. There have sub categories such as 3D GIS, 4D GIS (Time-Space integration), Remote Sensing (Satellite Imaginary) for GIS, network based positioning, GPS based Positioning, P2P/ad-hoc positioning, active sensor based location manage for LBS, XML, SOAP, UDDI, WSDL, Document standard platform for CALS and Mobile RFID, smart card, USN, 3G, DMB, BeN, FTTH, Wibro/WiMax, S/W, IT SoC for ubiquitous.

Through these above intelligent Korea strategy, the spatial infrastructure information, national monitoring, urban facility management, and software industry will be successful obtained.

4. **The Perspective of GIS Technologies in Future Korea**

The launch of KOMPSAT-2 announces the beginning of new spatial information era in Korea. This satellite based geographic information service, which delivers fast and accurate scientific information, will bring the changes of our industry and life style.

Especially, the integration of satellite image and GIS is not only important in national security level, but also in improving economic activities and quality of human life by providing the detail digital map, city and traffic management, disaster observation, environmental disorder detection, agriculture, fishery, marketing, real estate, tourism and medical service.

This study is to look into the spatial information technical trend in Korea and shows the possibility of how spatial technology will open the next ubiquitous world.

### References