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**EUROPEAN COMMISSION
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UNION (EUROSTAT)**

**ORGANISATION FOR ECONOMIC COOPERATION
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Topic (ii): Software sharing and shared maintenance

Spatial Statistical Information Services in KOSTAT

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I. Introduction

1. Statistical maps in Korea originally have been made for preventing duplication and omission in statistical surveys and proper distribution of work loads of enumerators as other countries did. The focus on GIS had moved from making digital maps to the services based on digital maps along with getting higher the user's experiences and expectations on information systems. Users want to get their requiring information easily, quickly and intuitively from various information systems. A solution for these requirements is visualization, and in this context, it becomes more and more valuable that providing the geographical information joined with statistical information. It also has important meaning in giving statistical information in more comfortable ways to the users.

2. In Korea, *Ministry of Land, Transport and Maritime Affairs* has responsibility for the policies on digital maps. These policies are called NSDI (National Spatial Data Infrastructures), and each governmental organization attends to this NSDI with their own businesses. KOSTAT also attend to and act in this NSDI with submission of mid-term plan in every 5 years and action plan in every year in the area of statistical GIS.

3. This paper deals mainly with the SGIS (Statistical GIS) services, and a direction for future will be given. The rest of this paper consists of 4 parts. In historical backgrounds part, a brief history on KOSTAT's GIS works from 1993 will be introduced. The next part, KOSTAT's efforts consists of digital map making, improvement of services, cooperation with other agencies and standardization of SGIS Data Management. And in the next part, future directions and works will be addressed. As the final part, a conclusion is followed.

II. Historical Background

4. From 1993, computerization of maps was started in KOSTAT. Before then maps are produced manually from paper maps by traditional manners, blueprints, copying with tracing papers, etc. From then digital maps were introduced as the name of SMS (Statistical Mapping System) (see Fig. 1). In this system there were 2 kinds of digital maps, so-called raster map and vector map. And this mixed state of digital maps was continued to the

end of population and housing census 2000. After then the raster maps were disappeared for their demerits such as consistencies between maps, weak points in enlarging and reducing and so on.

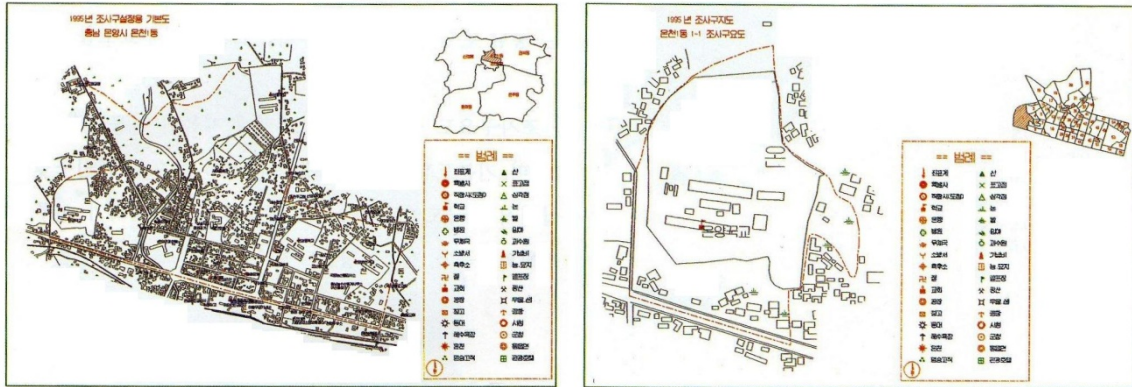


Fig. 1 A Sample of Base Map and Survey Block Map produced in 1993(Scanned image)

5. Originally, there were 2 organizations related to GIS in KOSTAT before 2005, one belonged to Population Census Division and the other was in Survey Systems Development Division. In 2005, for complete preparation of population and housing census 2005 and improving performance of business, two organizations were integrated as 1 division, Statistical Geographic Information Team. The goals for new division were 2, one is the concrete survey support through guaranteeing the freshness of digital maps, and the other is improving services related to statistical GIS. To accomplish these goals, many projects and studies have been started.

III. KOSTAT's Efforts

A. The system for making digital maps

6. Even though KOSTAT had started the NGIS (National GIS, the ex-system of NSDI) in the first phase, the responsibility of making digital maps is for another agency under *Ministry of Land, Transport and Maritime Affairs*, NGII (National Geographic Information Institute). The NGII has divided whole country into 5 regions and digital maps are updated incrementally with these regions. Same as other countries, digital map making starts with taking aerial images and digitizing of the images is followed. In this process, taking aerial images is cost and time consuming procedure, so the NGII updates the digital maps only one region a year for their restricted budget. As the results, digital maps are updated once in 5 years (see the following Fig. 2).

7. For this reason digital maps from NGII take the time to reflect the changes in survey regions. So the maps from NGII are not sufficiently good to use directly as the survey maps. In the use of survey maps, buildings in the digital maps are crucial in finding survey objects. In KOSTAT, the results from the Survey on Establishments have been adopted for the updates of digital maps, and KOSTAT calls these digital maps as "Census Maps". These census maps contain much information on boundaries of administrative regions, survey blocks, households and individual establishments, etc.

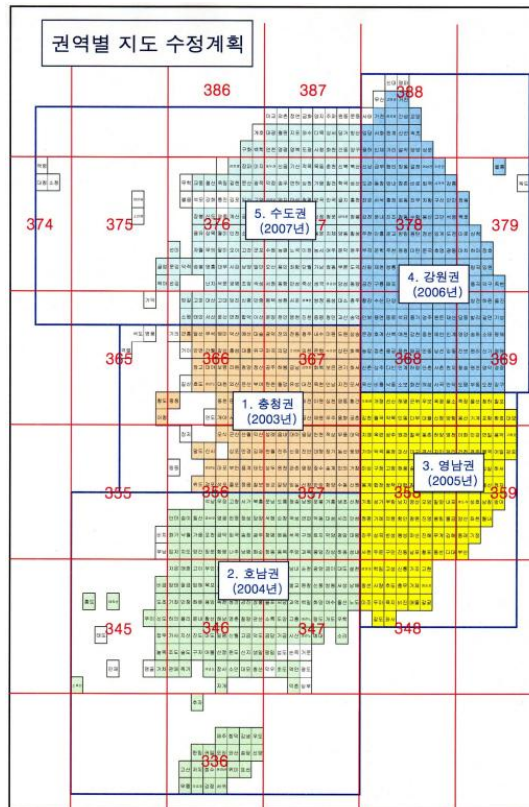


Fig. 2 Incremental (regional) update plan by 5 years by NGII.

8. With these census maps, KOSTAT creates base maps and survey block maps. The other usage of these census maps is creating service maps with addition of POI (Point Of Interest) information, such as hospitals, schools, religious facilities, etc. These service maps are provided to public and private sectors to improve and activate the use of digital maps. This provision could contribute to reduce the waste of budgets to implement GIS data nationwide.

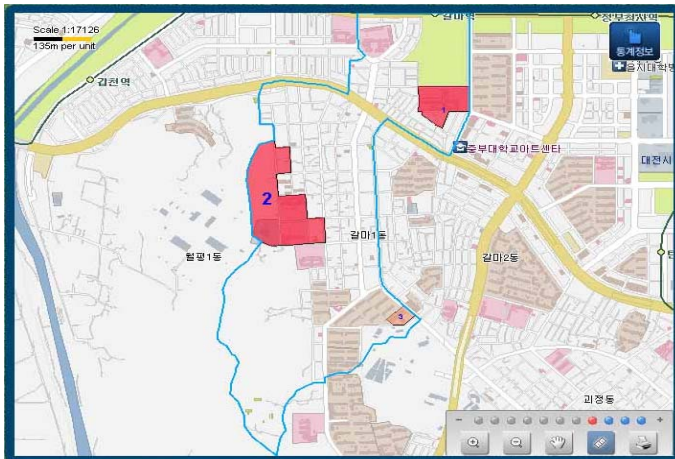
9. From 2012, a new address system will be carried out in whole country. The supervisor of this change is Ministry of Public Administration and Security, and all administrative data held in governmental agencies (in another word register) related to address has to be changed. As the basic data for this change to new address system, the digital maps contain new addresses is being made. And these maps will be adapted to the census maps. The process to adapt to the census maps will be carried out incrementally because the process is predicted to cost and time consuming one. The concrete plan for the adaptation is now under consideration.

10. From 2006, NGII started to lead the conversion of Global Geodetic System. And most of the maps from NGII and from private sectors are already converted. KOSTAT also requested to convert the census maps which made under national geodetic system into Global Geodetic System. The plan for this conversion is also now under consideration, and this will end within several years through a project. This will be expected to improve the compatibility of maps from external sources.

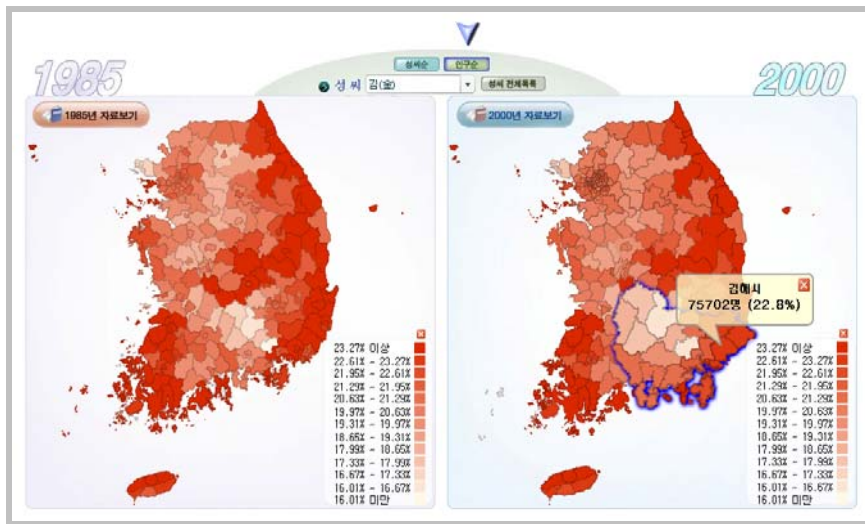
B. Improving service

11. KOSTAT has started SGIS service through web from Dec. 2006, as an extended usage of census maps. Web service in 2006 was only a pilot service and the regional coverage was restricted in Daejeon metropolitan city. Through 3-year-project to implement the infrastructure of census maps, the basis of SGIS service was consolidated. In 2009, the service covered whole country, and the homepage visitors of the service reached 620 thousand. Certainly, before this web service, offline service has been provided and will be continued to the future.

- ✓ **Looking for new neighborhoods** (Finding area by user-defined conditions)



- ✓ **Surname distribution with the results from population census in 1985 and 2000**



13. For support of higher-level use of SGIS service, KOSTAT made an Open API (Application Program Interface) set. This Open API allows users to manipulate the census maps and get the customized products. Fig. 3 shows the procedure from submitting application for using API to get the authentication key, and Fig. 4 is a sample of API utilization with Google Earth.

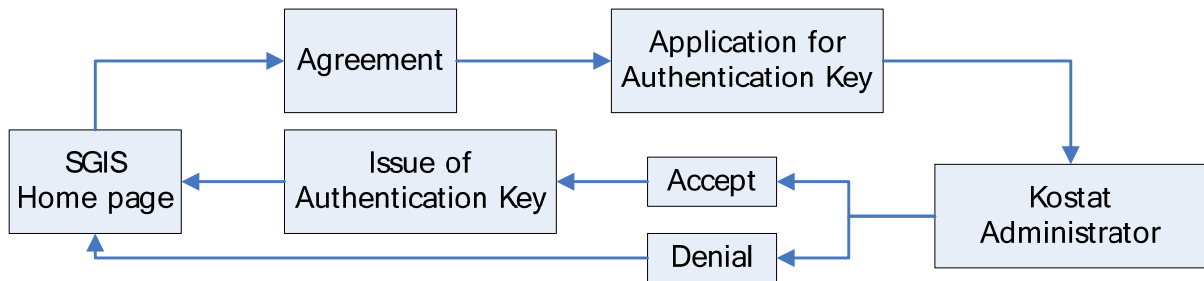


Fig. 3 Procedure for using API

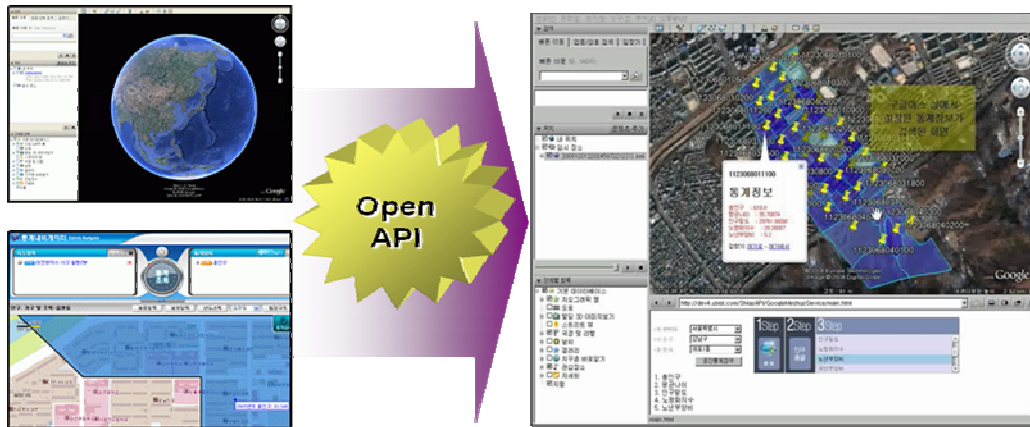


Fig. 4 A sample of using API with Google Earth's satellite images

14. SGIS service can also be used in both public and private sectors. The utilization in public sector is on the policy-making supports. The left side of Fig. 5 is a sample of it, the status of social aging, and this service allows intuitive comparison among the region, to help the rapid policy making. The right side of Fig. 5 is a sample of utilization in private sector, and this is expected to be a good business in the future in Korea as “geoCRM”. And this will be a good model of combination of statistical and geographic information.

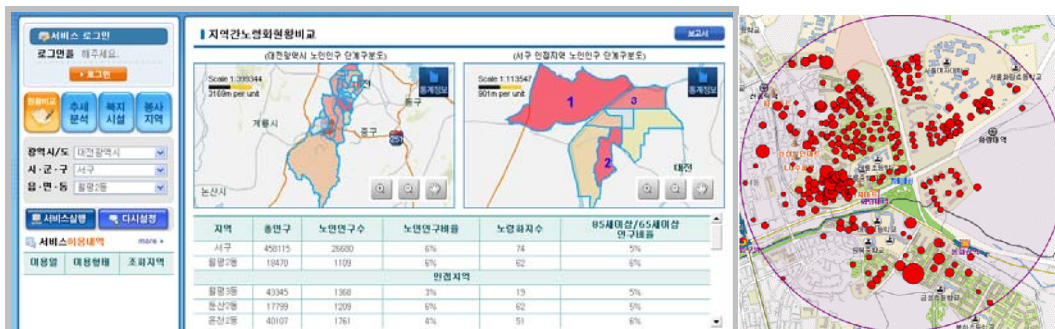


Fig. 5 Utilizations in public (left) and private (right) sectors

C. Cooperation with other agencies

15. In 2010, KOSTAT has joined an MOU (Memorandum of Understanding) with NGII, for the cooperation in supply of digital maps to KOSTAT and of statistical information to NGII. With this MOU, up-to-date digital maps will be provided to KOSTAT stably. And another MOU with private sector is now preparing. The goal of this MOU is mainly on the utilization of aerial images for enumerators to find survey objects in the survey block maps with ease. The impacts of these MOUs are insignificant in budget and other fields now, but KOSTAT expects to make synergy effects through them.

16. For the future, to guarantee the freshness of digital maps and to improve SGIS services, KOSTAT will make cooperative relations with public and private sectors as many as possible without discrimination.

D. Establishment of standards

17. As the results from study projects in 2008, 3 drafts for standard (Data Product specification profile, Reference Model, Data Model) and 1 technical report (Encoding Standard, as a recommendation) on geo-statistical (statistical geographical) information were submitted to TTA (Korea Telecommunications Technology Association) and are now under the process of certification as associative standards. The drafts of the standards already have been applied to the projects in KOSTAT from 2009.

18. In December 2009, a standard (Data Product specification profile) was certified. KOSTAT, which has the responsibility for establishing the standards on geo-statistical information, will continuously play roles to establish the standards and revise them along the progress of technology.

IV. Future Directions

A. Improvement of survey supports

19. As pointed out in the beginning of this paper, the basic objective of statistical maps is survey support, especially for censuses. It is considered that the most important thing for survey support in GIS is the accuracy of the maps. This is guaranteed by maintaining the freshness of the maps. This freshness can be maintained by comparison between the maps from various sources and update the maps. KOSTAT has been eager to obtain the latest maps to apply to the census maps from public sources-mainly NGII. But it is considered that the maps in private sectors such as portal sites which give the GIS service to users are more accurate. So the obtainment of digital maps by KOSTAT will be extended to private sectors.

20. KOSTAT is now making 5-year plan (2010~2014) to achieve the performance on census maps. In the plan, some projects are considered to enforce the function on creating and managing census maps such as Digital Maps Management System, Spatial Data warehouse, etc.

B. Combining statistical and geospatial information

21. The combining of statistical and geographic information is currently implemented on the basis of census maps as described above, and this implementation is time and labor consuming procedure now. Through the project in 2010 on the implementation of infra-structure of establishments information in 2000~2003, a test to improve the ways of input for individual information to the census maps will be occurred. With the result of this test, KOSTAT will find out enhanced input methods for census maps.

22. For giving more useful contents to SGIS service users, the utilization of information from KOSIS (Korean Statistical Information Service) is actively considered especially related on the administrative regions. KOSIS has huge amount of statistical data from KOSTAT and other organizations. So the joining of information from KOSIS and SGIS could be a good chance to improve SGIS service in timeliness, usability, etc.

23. Other considerations to improve SGIS services in are the following:

- ✓ Procurement of mass storage facilities to store large amount information;
- ✓ Utilization of image processing server to shorten the service time;
- ✓ Preparation of light-weight maps to speed up the service.

V. Conclusion

24. Combining statistical and geographic information is powerful tool to get the following benefits:

- ✓ To give easiness and intuitiveness for the statistical information users by giving visualization through digital maps;
- ✓ To enrich the contents of SGIS service by addition of statistical information.

25. To improve above, KOSTAT continuously make various efforts to accomplish two goals for the future:

- ✓ To guarantee the freshness of digital maps for improving survey accuracy;
 - ✓ To give more satisfaction to SGIS service users.
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