

# **Basic Plan for the Advancement of Utilizing Geospatial Information**

**(Provisional English Translation)**

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## **Contents**

### Section I. Fundamental Policies on Measures for the Advancement of Utilizing Geospatial Information (AUGI)

1. The significance of AUGI
2. Goal to be Achieved – Realization of an Advanced Geospatial Information Utilization Society
  - (1) Promoting utilization, development, and preservation of the land
  - (2) Enhancing the efficiency and quality of administration
  - (3) Enhancing the safety, security and convenience of people's lives
  - (4) The development and growth of new industries and services
3. Current Issues
  - (1) Promoting the development, provision and distribution of geospatial information
  - (2) Overlaying of geospatial information and the development, updating and provision of Fundamental Geospatial Data (FGD)
  - (3) Promoting research and development, and technical and practical verification related to Space-based PNT
  - (4) Strengthening ties among business, government and academia
4. Important Points for the Implementation and Effective Promotion of the Plan
  - (1) Period of the Plan
  - (2) Important points for implementation mentioned in the Plan
  - (3) Effective promotion of the Plan
    - 1) Development of a comprehensive and systematic infrastructure for geospatial information
    - 2) Measures in the legal system, etc.
    - 3) Linkages with other plans
    - 4) Follow-up to the Plan

### Section II Implementation of Specific Actions on Measures Related to AUGI

#### Chapter 1 General Measures Related to AUGI

1. Developing Institutional Arrangements of Relevant Organizations and Strengthening their Alliances

- (1) Promoting an integrated government policy and developing the associated institutional arrangements
- (2) Linkages and cooperation between the national government and local governments
- (3) Linkages among business, academia and government
- 2. Implementation of Surveys, Research, etc.
- 3. Dissemination of Knowledge and Other Activities
- 4. Nurturing Human Resources
- 5. Utilization of Geospatial Information by Administrative Organizations
- 6. Promotion of International Cooperation

## Chapter 2 Measures Related to Geographic Information System (GIS)

- 1. Establishing and Disseminating Standards, etc., Related to the Development and Provision of Geospatial Information
  - (1) Standardization of geospatial information
  - (2) Rules, etc., related to the general development, updating, provision, and distribution of geospatial information
  - (3) Standards, etc., for developing FGD
- 2. Promoting the Development, Updating and Provision of Geospatial Information
  - (1) General development and updating of geospatial information
  - (2) Developing and updating FGD
    - 1) Developing and updating FGD by the national and local governments
    - 2) Promoting the digitization of cadastral survey maps, registry office maps, etc.
    - 3) Investigations of means for utilizing private sector surveying results
    - 4) Maintenance and management, etc., of control point information
    - 5) Investigation of a system for development, updating and provision that is adapted to locality
  - (3) Provision and distribution of geospatial information
    - 1) Provision and distribution of general geospatial information
    - 2) Provision of FGD
    - 3) Providing information related to the development and updating of FGD
- 3. Promoting the Utilization of GIS
  - (1) Utilization of GIS by the national government
  - (2) Promoting the Utilization of GIS by local governments
  - (3) Utilization of FGD in map-related work

4. Items That Should Be Considered When Utilizing Geospatial Information, such as Protecting Personal Information

- (1) Protecting personal information
- (2) Secondary use of data
- (3) Effect on national security

Chapter 3 Policies Related to Space-based PNT

1. Contact Coordination Related to Space-based PNT for Effectively Maintaining an Environment That Can Stably Receive Services by Highly Reliable Space-based PNT

- (1) Contact coordination with operators of systems involved with global Space-based PNT
- (2) Information provision, etc., that helps to enhance the environment for utilizing Space-based PNT

2. Promoting Research and Development of Space-based PNT

- (1) Basic concepts of research and development related to Space-based PNT
- (2) Promoting basic research on Space-based PNT
- (3) Promoting the Quasi-Zenith Satellite System plan
- (4) Promoting the use of Space-based PNT
  - 1) The national government's role
  - 2) Use of Space-based PNT by local governments and the private sector

## **Section I. Fundamental Policies on Measures for the Advancement of Utilizing Geospatial Information (AUGI)**

### **1. The Significance of AUGI**

Various phenomena that we experience in our daily lives and economic activities are understood through when and where they take place, and hence can be acknowledged by associating them with specific places, areas, points of time, and time periods.

Positional information, which includes time data, as well as information related to various phenomena that can be related to the positional information, are called geospatial information. A couple of important tools that can allow us to make the advanced use of geospatial information are Geographic Information System (GIS) and Space-based Positioning, Navigation and Timing (Space-based PNT). GIS is an information system that provides functions including visual presentation, advanced analyses, etc., of digital geospatial information by processing it in an integrated manner on electronic maps. Space-based PNT uses signals transmitted from satellites to acquire time and position data, which in turn is used to acquire information on routes of movements, etc.

GIS first came into use in the 1970s. In Japan, progress was first made in using GIS to develop and publicly release digital national land information, develop urban planning GIS, establish standards for digital mapping systems, and so on. But the importance of GIS was really understood as a result of the South Hyogo Prefecture (Hanshin Awaji) Earthquake in 1995. Then the government established the GIS Liaison Committee of Ministries and Agencies, and has been coordinating its efforts in promoting the GIS policies. As a result, much effort has been made to establish standards for geospatial information, to advance base map data such as digital map 2500 and 25000, and to enhance information providing services using GIS in individual government agencies. GIS has also come into use in private sector applications such as facilities management by electric power and gas suppliers, marketing, etc.

Regarding Space-based PNT, the Global Positioning System (GPS) was first launched by the United States for military purposes in 1978. But the American policies were later made to recognize civilian uses, which have since grown to include navigational assistance for air and sea traffic, surveying, and other uses.

GIS and Space-based PNT were originally used in limited areas of applications, but with technological advances and cost reduction in computers and the Internet, they have come into more commonly used applications by ordinary people such as car navigation systems and GPS-enabled mobile phones, and are now utilized in our daily lives and economic activities. In addition, the coverage of geospatial information used in these applications is being expanded to include not only the land areas, but also the sea and air.

GIS and Space-Based PNT should be considered as tools that provide appropriate information that allows us to make judgments for our actions, by connecting information on various phenomena with their time and place and by acquiring, managing, analyzing and presenting it with the information communication technology (ICT). In addition, all sorts of information has been digitized in an explosive manner and hence huge amount of digitized information has been amassed. As a result, it has become difficult ironically to find truly necessary information (so-called “information explosion”), which requires us to make effective use of such massive amount of information by managing it in the framework of position and time axes.

Therefore, the advanced utilization of geospatial information using GIS and Space-based PNT is becoming extremely important to achieve the economy and society that could help citizens to lead safe and rich lives, now and in the future.

## **2. Goal to be Achieved – Realization of an Advanced Geospatial Information Utilization Society**

Expectations are rising that we will be able to materialize a “ubiquitous society” where anyone will be able to access information networks anywhere, at any time, and from any type of medium. Given the advance of the Information Age and the needs of society, we are now working to create an advanced geospatial information utilization society where anyone will be able to use geospatial information at any time, anywhere, and to acquire useful data derived from sophisticated analyses for their activities.

Specifically, we envision the following types of geospatial information applications:

### **(1) Promoting utilization, development, and preservation of the land**

GIS can efficiently manage all different types of data related to social infrastructure such as roads and rivers, as well as topographical, geological and land-use data that show the state of the land, and other pertinent information. That is why it is utilized to develop land-use and environmental plans, manage and maintain public facilities, and so on. In addition, the Space-based PNT is being used to manage and preserve isolated islands which form an integral part of Japan’s expansive maritime regions, and there are expectations that it will also be used to manage and maintain public facilities.

Regarding disaster policy, GIS can be used to run detailed simulations for estimating damage caused by earthquakes, floods, etc., and visualizing the results for easier understanding. The Disaster Information System (DIS) has already been employed to estimate the impact of damage immediately after an earthquake, providing information that relevant organizations can

use to make judgments for taking actions such as initiating first relief activities. In addition, as was seen in the Niigata-ken Chubu Earthquake of 2004 and the Niigata-ken Chuetsu-oki Earthquake of 2007, these organizations can work together to collect, provide and share photos of stricken areas, information on the extent of damage (landslides, etc.) which can enable adequate response and recovery actions to be taken.

Furthermore, in the issuance of damage certification, window clerks can utilize GIS and Space-based PNT to collect and manage information, such as photographic evidence, about stricken areas to confirm the details of the damage of the sufferers. Thus disaster prevention activities would largely benefit from the utilization of GIS and Space-based PNT. It is expected that disasters could be predicted, for example, by linking landslide sensors with earth observation satellites, and by developing a framework to quickly understand damage situations caused by disasters and provide support for recovery and restoration efforts.

It should be noted that there is already a GPS-based control station network system that is designed to create high-density, high-accuracy survey networks and to monitor regional crustal movements.

## **(2) Enhancing the efficiency and quality of administration**

National and local administrative organizations are enhancing the efficiency and quality of their operations by utilizing geospatial information with GIS and Space-based PNT.

Administrative organizations have already been using geospatial information to create various types of maps. However, by integrating and sharing basic map data, they can significantly reduce their mapping costs.

Specifically, if administrative staff, sitting in front of their PCs, can compile and view administrative information from other sections, they will be able to respond more rapidly to residents' inquiries. If they can collect information by address and merge it with corresponding map information to gain a more accurate understanding of the situation, they will be able to provide better services, even when they go to respond to problems on-site. In this way, after implementing an advanced system for sharing administrative information in which the place is critical, they will be able to reduce the time they spend collecting and referencing documents, and use the remaining time instead for making prudent decisions about necessary services.

Furthermore, advanced GIS utilization systems have been employed for various types of planning activities such as developing environment conservation plans by collecting natural environmental data, and integrating residents' opinions and information about town planning by linking GIS and electronic conference rooms via the Internet.

### **(3) Enhancing the safety, security and convenience of people's living**

Many attempts are being made to build a safe and secure society with GIS, for example, by improving disaster prevention measures with distribution information on residences with elderly people and on deteriorating housing units, and by providing citizens with hazard maps and "Hiyari-Hatto" maps (that show areas where pedestrians, drivers, etc., have been alarmed or scared) through Web GIS. In addition, regarding emergency calls on 3G mobile phones, telecommunications carriers are required to equip functions that can provide positional information about the caller. This contributes to the safety and the security of the people, that most 3G mobile phones, which are equipped with Space-based PNT, are able to provide accurate information about their location to organizations such as police, coast guard and fire departments that receive emergency calls on positional information notification systems.

In the future, a platform will be developed to collect, transmit and utilize information about hazards and risks associated with earthquakes, volcanic eruptions, floods, tsunamis, and other disasters. Such detailed information will then be provided to the people in an easy-to-use format and help to raise awareness among individuals on disaster prevention and enhance safety and security.

GIS and Space-based PNT will enable people to easily obtain information they need when they need it. Already, local governments have been offering "one-stop" services via Web GIS to provide information on public facilities, medical facilities, stores, and urban planning regulations, among others. In addition, there are commercial services such as car navigation systems that utilize Space-based PNT and "personal navigation," etc. by utilizing mobile phones equipped with Space-based PNT functions.

Furthermore, it should be possible to improve the convenience in people's daily lives by providing advanced commercial services to, for example, support the movement of seniors using the ubiquitous network, route information of public transportation facilities using real-time information on traffic conditions and schedule data.

### **(4) The development and growth of new industries and services**

The utilization of GIS and Space-based PNT is expected to develop new industries and services, and enhance and expand existing services.

Some private sector companies prepare "contents" information on stores, etc. that can be shown on base maps to run information provision services, which is costly as they need to tailor their contents data to each different base map. However, preparing contents data on a single common base map would make the data positionally aligned with each other and thus reduce the costs of data development. Furthermore, such a common base map would facilitate the

integration and enhanced dissemination of different types of contents, and enable the expansion of making interesting and useful contents broadly available, which should be able to help business opportunities expand as well.

In addition, advances in Space-based PNT technology, and newly distributed geospatial information such as real-time traffic conditions, etc. would lead to the development of various new services that utilize GIS and Space-based PNT, such as on-site emergency services of security companies, detailed public transportation information, market research for developing new fast food restaurants, and so on. In the future, we can also expect the expansion of sophisticated services that combine the functions of mobile telephones and Space-based PNT.

Furthermore, advances in mobile equipment, and the development of seamless indoor-outdoor positioning technology, etc. are expected to lead to the development and growth of new businesses and services that provide real-time information on the location of goods that are being transported, customer distribution in business districts, analyses of shopper movement patterns, and so on.

### **3. Current Issues**

So far, advances in GIS have been made by such means as standardizing data based on geographical information standards, etc., the development and provision of digitized geospatial information, and the provision of administrative services using GIS by relevant government agencies. In addition, regarding Space-based PNT, the American and Japanese governments have confirmed the continued provision of free American GPS services which are being used for a wide array of civilian applications in Japan.

#### **(1) Promoting the development, provision and distribution of geospatial information**

National and local governments develop and store various types of geospatial information for various administrative purposes, including a lot of information that is useful for other organizations or for society in general. However, there is still insufficient progress being made in digitizing and providing such geospatial information, and hence resulting in its insufficient use. It is thus necessary for national and local governments to digitize their geospatial information.

In addition, with regard to the geospatial information which should be open to the public, it is necessary that the national government systematically provide the general public with as much information as possible through the Internet for free, or for just a small fee.

Furthermore, to promote the provision of geospatial information and its secondary use (which in the present plan refers to the use or provision of geospatial information that has been

provided by national and local governments, processed to make it easier to use and combined with other information), it is not only important for agencies possessing information to make efforts to provide it. But it is also necessary to prepare clearly defined rules for smoothly providing and circulating geospatial information that has been created by a variety of bodies.

At such time, there are many cases where geospatial information may include personal information, or be subjected to intellectual property rights (such as copyrights, etc.), or its disclosure may affect national security. Therefore, to distribute geospatial information that can be used appropriately and safely by the public, these concerns will also have to be taken into consideration when establishing rules for providing information.

## **(2) Overlaying of geospatial information and the development, updating and provision of Fundamental Geospatial Data (FGD)**

Because geospatial information is utilized for analyses, etc., by overlaying of different types of data with positional information as the “key,” it is important that data developed by different organizations have a common base for the positional information. However, at the present time different base maps are used to develop positional information, and different types of data are not necessarily overlaid properly with each other. As a result, efforts should be made to develop, update and provide Fundamental Geospatial Data (FGD) that should be used as the standard spatial reference for geospatial information. In addition, in order to make different geospatial information, developed by various organizations, geospatially aligned by utilizing FGD as the common spatial reference, it will be necessary to establish the necessary rules and disseminate them.

Regarding the development of FGD at the 1:25,000 scale level, Digital Map 25000 and other digital maps developed based on consistent national standards by the Geographical Survey Institute (GSI) are being used, but for larger scale level, the national government is to develop more versatile FGD using urban planning base maps, etc., prepared by local governments. Therefore, it is necessary that the national government and local governments work together to develop, update and provide FGD. Furthermore, if it becomes easy to use high-accuracy Space-based PNT, it will be necessary to examine accuracy levels of base map data that will be compatible with the improved accuracy of Space-based PNT.

## **(3) Promoting research and development, and technical demonstration and practical verification related to Space-based PNT**

Presently, application using Space-based PNT in Japan is dependent on the capability of the United States GPS. Thus, a close liaison and coordination with the United States government

is needed. Meanwhile, a higher technological base for Space-based PNT in Japan is also necessary to effectively maintain an environment that enables the people to receive highly reliable space-based PNT services. Therefore, given the conditions under which Space-based PNT has distributed throughout daily lives of the people in Japan, it is necessary to promote research and development shouldon the Quasi-Zenith Satellite System project, which will realize a high level of Space-based PNT services. The governmental and the private sector should work together to conduct research and development, and technical demonstration and practical verification related to Space-based PNT and promote its utilization.

#### **(4) Strengthening ties among business, government and academia**

In order to develop new, highly accurate geospatial information and an environment where it can be easily utilized, it is extremely important for the national government, local governments, the private sector, and the academic world, among others, to all play a role in addressing this issue as they form close working relationships with one another. For this purpose, the national government will have to further strengthen its ties with local governments, the private sector, and academia.

### **4. Important Points for the Implementation and Effective Promotion of the Plan**

#### **(1) Period of the Plan**

The period of this plan should last through FY 2011.

#### **(2) Important points for implementation mentioned in the Plan**

Based on 1 through 3 above, the important points for the implementation of the Plan are as follows:

- 1) Prepare draft guidelines related to the development, provision and distribution of geospatial information, and promote the provision and distribution of it.
- 2) Promote the development and provision of FGD.
- 3) Promote the establishment and utilization of a high-tech base for Space-based PNT.
- 4) Strengthen ties among business, academia and government as they relate to the utilization of geospatial information.

#### **(3) Effective promotion of the Plan**

- 1) Development of a comprehensive and systematic infrastructure for geospatial information**

To build a society that effectively utilizes geospatial information, it is not enough merely to digitize geospatial information—it's also necessary to have the technology, system, and personnel, etc., to utilize it. To promote the present Plan, these facets have to be considered as social infrastructure and developed in a comprehensive and systematic manner.

## **2) Measures in the legal system, etc.**

To promote the present Plan, when it appears that related laws need to be revised, they should be thoroughly examined.

## **3) Linkages with other plans**

To promote the present Plan, sufficient consideration should be given to maintaining conformability with such policies as the New IT Reform Strategy, Strategic Principles for Economic Growth, etc., and manifesting synergistic effects.

## **4) Follow-up to the Plan**

To promote the present Plan, the national government should consider more specific targets, achievement periods, etc., of each measure, and every year conduct a follow-up on the state of progress. In addition, it should review the Plan when necessary.

## **Section II Implementation of Specific Actions on Measures Related to AUGI**

### **Chapter 1 General Measures Related to AUGI**

#### **1. Developing Institutional Arrangements of Relevant Organizations and Strengthening their Alliances**

##### **(1) Promoting an integrated government policy and developing the associated institutional arrangements**

To promote the advanced use of geospatial information, improvement of the people's lives, and robust development of the economy, the national government should form close working relationship with relevant administrative organizations so that they work as one body to comprehensively and systematically develop effective measures for promoting the utilization of geospatial information. To achieve this goal, there should be sufficient alliance with IT policy, innovation policy, maritime policy, space development and utilization policy, and so on.

In addition, to effectively and efficiently develop, update, provide, and distribute geospatial information and materialize a Space-based PNT system based on Quasi-Zenith Satellites, institutional arrangements for strategic advancement and associated management methods, as well as business models that utilize geospatial information should be considered.

Regarding the institutional arrangements for promoting AUGI, consideration should be given to institutional arrangements for promoting measures on Space-based PNT to make necessary revisions in accordance with the concepts of the Basic Act by taking into consideration, as needed, the trends in space development and exploitation policies.

##### **(2) Linkages and cooperation between the national government and local governments**

The national government and local governments need to form a close working relationship to promote the utilization of geospatial information by electronically developing, updating and providing FGD and various other types of information, using GIS and Space-based PNT to perform their duties and provide various public services, among other things.

For this purpose, when planning, drafting and promoting national policies for promoting the utilization of geospatial information, the national government should work closely with local governments to develop measures and undertake projects. Especially, the national and local governments should liaise closely in the development, update and provision of FGD through making use of survey results with each other and coordinating their survey work when they conduct basic and public surveys.

##### **(3) Linkages among business, academia and government**

To help enable the society to intensively use geospatial information, it is necessary to formulate policies that take social needs into account, and to develop technologies and services, among other things. This will require the establishment of linkages among business, academia and government.

For this purpose, the Business, Academia and Government Association for Geospatial Information (tentative name), which is to be attended by experts and other relevant persons in a wide spectrum of the private, academic and public sectors should be established, and linkages between nongovernmental organizations such as the g-Contents Exchange Promotion Association that is investigating technical, market, and systemic aspects of utilizing geospatial information, etc., should be promoted. In addition, for those measures that require to utilize the technical prowess of the private sector and to accommodate the needs of the public and private sectors for such purposes as formulating rules for developing geospatial information, these three sectors should work collaboratively as exemplified in the JIS Drafting Committee.

Regarding Space-based PNT, the government should work with the private sector to plan the Quasi-Zenith Satellite System, and every effort should be made to make the most use of the technical prowess of the private sector.

In addition, to promote the use of Space-based PNT and the creation of new industries that utilize geospatial information, etc., the national government and the private sector should work together to develop the technology, while the government should hold conferences, symposia, exhibits of new products and new services, etc. At the same time, the government should work with the private sector to hold the Geospatial Information Expo (tentative name) in which experts in the three sectors exchange opinions and information, and to tap into the private sector's innovativeness to create new services and industries and to further develop and integrate existing services.

## **2. Implementation of Surveys, Research, etc.**

To proceed with the planning, formulation and promotion of measures for AUGI, the utilization of GIS and Space-based PNT in various administrative fields and the administrative services that use these applications, it is necessary to conduct appropriate surveys and research.

For this purpose, the national government should conduct surveys and research related to the suitable ways on the provision and distribution of geospatial information that considers the protection of personal information, the secondary use of data, and the national security, methods for improving the development, updating, management, etc., of FGD, the enhancement of administrative services using GIS and Space-based PNT, measures for resolving administrative issues, and other topics.

In addition, the national government, as it promotes the formation of linkages with business and academia, should undertake technical development for advancing surveying technologies, technologies for acquiring geospatial information from sensor equipment, satellite-based remote sensing, development of technologies and associated infrastructure for processing massive amounts of data for effectively utilizing image data obtained from satellites, improvement of technologies for developing and updating FGD using CAD data from construction blueprints, improvement of the workability of GIS, and other activities.

### **3. Dissemination of Knowledge and Other Activities**

To promote the smooth utilization of geospatial information by the national government, local governments, private companies, NPOs, and others, there should be sufficient public awareness of the close relationship between geospatial information and people's daily lives. At the same time, it is necessary to disseminate information and educate the public about the effectiveness of utilizing geospatial information, government policies, and technical information such as geographical information standards.

For this purpose, the national government should hold seminars and prepare brochures and other materials to educate the public about relevant technologies and the effectiveness of utilizing geospatial information.

The national government should also enhance and expand its portal sites, and provide information related to its policies for utilizing geospatial information and their current progress, as well as information about government-provided geospatial information and services that can be accessed through the Internet. In addition, there should be much discussion about working with the private sector to build portal sites that can act as a sort of clearinghouse for information from government and the private sector.

Furthermore, to promote the smooth utilization of geospatial information by local governments, private sector companies, NPOs, etc., it is very effective for support organizations that have specialized knowledge to work together in local communities. For this purpose, the national government should form linkages with universities, private companies, and other groups that have specialized knowledge about geospatial information to help foster core organizations there.

### **4. Nurturing Human Resources**

To promote the utilization of geospatial information, it is necessary to train the people who will be handling it. This means not only the people who have the technical skills to develop and

utilize geospatial information, but also people who can think in spatial terms, or can plan the utilization of geospatial information, or have other relevant skills and abilities.

For this purpose, the national government should hold seminars on surveying- and GIS-related technologies and methods for utilizing geospatial information, providing curricula to and developing texts for partner universities, etc., and promote the nurturing of human resources who can oversee the utilization of geospatial information in universities and local communities.

## **5. Utilization of Geospatial Information by Administrative Organizations**

The national government and local governments need to make a concerted effort to promote the utilization of geospatial information in every administrative field that handles it, to increase the efficiency and level of administrative services, and to enhance safety and security in people's lives, among other things.

For this purpose, the national government should utilize GIS and Space-based PNT to undertake administrative work such as disaster prevention, resource management, forest management, analyses of crime data, environmental protection, etc., for making policy decisions, providing information to the public, and so on.

In fields where the efficiency and level of work in local governments can be expected to increase by the use of GIS and Space-based PNT, the various administrative organizations of the national government should provide information about the effectiveness of GIS and Space-based PNT, and promote the utilization of geospatial information.

Furthermore, the national government should provide technical and financial support to local governments to promote the introduction of Integrated GIS that will help organizations of local governments to share geospatial information among themselves.

## **6. Promotion of International Cooperation**

It is necessary for government policies to be in harmony with international trends on the utilization of geospatial information, and for Japan to play an international role as a developed nation concerning the utilization of geospatial information.

For this purpose, Japan should play a very active role in the International Organization for Standardization (ISO) in formulating international rules for standardization related to geospatial information. In addition, Japan should also be actively involved in international AUGI, through its participation in the United Nations Regional Cartographic Conference for Asia and the Pacific, the Permanent Committee on GIS Infrastructure for Asia and the Pacific, etc., as well as providing GIS-related support for the Global Map Project and participating in international

geodetic observation programs undertaken by the international GNSS (Global Navigation Satellite System) projects.

For Japan to effectively maintain an environment that enables the people to receive highly reliable Space-based PNT services, it should work closely with the United States, which operates GPS. In addition, when necessary, the government should also engage in information exchanges with other operators of Space-based PNT systems, and consider how to undertake international cooperative activities that use Japanese Space-based PNT technologies.

## **Chapter 2 Measures Related to Geographic Information System (GIS)**

### **1. Establishing and Disseminating Standards, etc., Related to the Development and Provision of Geospatial Information**

#### **(1) Standardization of geospatial information**

To promote the effective development and utilization of geospatial information, it is necessary to develop standards for data exchange methods that will enable the mutual utilization of data developed by various organizations. Based on trends in ISO for international standardization of geographic information, the national government has been working with the business industry and academia to develop “Japanese Standards for Geographic Information (JSGI)” as a compatible domestic standard. It is also bringing the JIS (Japanese Industrial Standards) in line with the latest ISO standards, and is disseminating JSGI that has been renewed with the updated JIS. In addition, Geography Markup Language (GML), which is a standard for exchanging geospatial information on the Internet, has become an international standard.

The national government should also make an on-going effort to develop JIS standards from ISO standards for which no JIS currently exists and incorporate them into JSGI, and play a leading role in utilizing geographic information and GML to develop and provide geospatial information. Furthermore, it should provide technical and other support for disseminating standards through seminars and other means so that these standards can also be used by local governments, private companies, and others.

#### **(2) Rules, etc., related to the general development, updating, provision, and distribution of geospatial information**

To share geospatial information and use it by overlaying large amounts of other types of data, it is necessary to formulate rules for developing and updating geospatial information that is positionally aligned with each other, rules for easily combining and utilizing ledger and statistical information, image information, etc., with map data, and guidelines for facilitating the

distribution of geospatial information.

Therefore, in order to create rules for the development, updating, provision and distribution of such geospatial information, the national government should conduct pilot studies, etc., to verify them, and consider methods for ensuring that different sets of geospatial information are spatially aligned and for easily combining and utilizing them by the end of FY 2010. In addition, the government should also formulate guidelines for handling personal information, intellectual property rights, etc., as they relate to the provision and distribution of geospatial information.

Additionally, the government should consider methods for utilizing historical materials such as maps and statistical data which were prepared in the past and for which no effort has been made to digitize, provide and distribute.

### **(3) Standards, etc., for developing FGD**

Because FGD is to be used by society at large as positional standards on electronic maps, it is necessary to develop seamless data covering the entire country and provide it at consistent quality in accordance with geospatial information standards.

Therefore, in August 2007 the Ministry of Land, Infrastructure, Transport and Tourism issued an ordinance that defined items for FGD and standards that FGD should meet. It also laid out standards for the seamless development and use of existing FGD and standards related to technical specifications that should be applied when developing FGD.

Data is classified as FGD if it is developed in accordance with the MLIT ordinance, and if it is listed as FGD items such as geodetic control points, coastlines, etc. and included in map data developed during administrative duties and projects such as urban planning, management of public facilities, management of agricultural areas including agricultural fields and forests, etc. In addition, when it becomes possible to easily use highly accurate Space-based PNT, then there should be a review of corresponding FGD items and their accuracies.

The national government should disseminate above technical standards and the ordinance. Given that Rules for Public Surveying Work, which serve as a model for surveying work by adding necessary rules for developing FGD and surveying with Space-based PNT, was revised in March 2008, so that the national and local governments can smoothly develop FGD in accordance with these standards, the national government should promote the applications of these Rules. It should also promote the submission of work plans of public surveys and copies of the results to the GSI.

## **2. Promoting the Development, Updating and Provision of Geospatial Information**

### **(1) General development and updating of geospatial information**

Geospatial information contains various types of information including thematic maps (showing land-use, geology, hazards, etc.) which illustrate the special characteristics of an area such as its natural environment, potential disasters, and socio-economic activities. It also includes urban planning maps, topographic maps, place name information, ledger information, statistical data, aerial photographs, and satellite images, among others. These types of geospatial information are used by many people for a wide variety of purposes. It is particularly desirable to digitize useful information such as that developed and updated by the national and local governments and used by the public.

In addition, when developing geospatial information such as preparing maps for use in various administrative fields, it is necessary for the national government to work with local governments to mutually utilize previously developed FGD in target districts and develop the geospatial information so that it will be spatially aligned with the other geospatial information.

For this purpose, the geospatial information shall be systematically developed and updated as follows:

The national government should consider how best thematic maps, urban planning maps, topographic maps, place name information, and ledger information developed in various administrative fields can be developed in digital form, and develop and update them when necessary for administrative purposes. It should also make an effort to develop and update the geospatial information by using FGD so as to make it more useful and to facilitate its mutual utilization. In addition, further surveying in marine areas should be promoted to develop and update marine geospatial information.

It is very important to use statistical information widely because it forms the information base for the society. Therefore, the national government should develop a Statistical Geographic Information System (“Thematic Maps” (Statistical GIS)) on the “Portal Site of Official Statistics in Japan” (e-Stat) which is a clearinghouse for government statistics in the Official Statistics Sharing System and promote the integration of regional statistics and boundary information for statistical units held by government ministries into the Statistical GIS. In addition, with the revision of the Statistics Law in May 2007, the national government shall work to develop an environment that will enable it to easily provide statistics produced by entrustment, anonymized data, etc., when requested.

In the field of aerial photographs, the national government shall regularly take pictures of the nation’s land areas, including small islands. In addition, it shall promote the development of ortho images, which are photographs that can be overlaid on maps.

The government shall also develop and provide satellite images from such sources as the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), the Advanced Land Observing Satellite “Daichi” which was launched in January 2006.

Local governments have been developing and utilizing various types of highly useful and community-based geospatial information such as thematic maps, ledger information, etc. However, it would be desirable to digitize it so that not only they themselves could use it through GIS, but also local residents and businesses could use it as well. Therefore, the national government shall provide technical support, when necessary, to digitize and update such geospatial information. It shall also provide technical support to develop and update geospatial information using FGD.

## **(2) Developing and updating FGD**

It is necessary to develop and update FGD of consistent quality by following the ordinance of the Ministry of Land, Infrastructure, Transport and Tourism, the technical standards and so on. In addition, because these data are essential for promoting the use of geospatial information, they need to be developed quickly, updated in a timely manner and provided as smoothly as possible. Therefore, FGD shall be developed and updated in the following manner:

### **1) Developing and updating FGD by the national and local governments**

The Geographical Survey Institute (GSI) is developing and updating 1:25,000-scale topographic maps that contain items related to FGD. When other national government organizations develop and update maps containing items related to FGD such as road maps that are used in daily tasks, they shall digitize them following standards and rules for developing FGD, and update them when necessary for administrative purposes.

In addition, the national government shall provide technical support to local governments so that those maps, such as urban planning maps, which the local governments usually develop and update in various administrative fields with items related to FGD, shall be developed and updated electronically based on the standards, and maintained as accurate and up-to-date as possible.

Furthermore, when local governments introduce Integrated GIS that shares GIS functionalities among multiple departments including those that are responsible for tax affairs, urban planning and disaster prevention, the local governments shall promote the development of “shared spatial data,” which is a digital map database that can be shared within the local governments and includes items related to FGD, and the national government shall provide technical and supplementary financial support to them.

In order to utilize FGD as the standard for the geospatial information that various organizations are developing, the GSI shall virtually complete the development of FGD by FY2011 by collecting large-scale map data developed and updated by the national and local governments, and existing Digital Maps 2500 and 25000, by making them seamless by using ortho images, etc., and by promoting the efficient development of highly versatile FGD.

## **2) Promoting the digitization of cadastral survey maps, registry office maps, etc.**

Lot line information from cadastral maps and registry office maps can be utilized for developing FGD such as road edge (street block) data. If FGD is developed, it can help cadastral surveys by increasing the efficiency of gathering materials, and utilizing control point information and road edge data in the process of preparing cadastral maps. However, cadastral surveys proceed very slowly, especially in urban areas, so it is necessary to quicken their pace.

Therefore, to promote cadastral surveys, especially in urban areas where relatively little progress is being made, the national government shall survey street blocks, which is a prerequisite for cadastral surveys in densely-populated and business districts, using Fundamental Survey of City Block for Urban Renaissance Survey for Land Use Promotion. Surveys at points that resemble the boundary between private and public land properties have a major effect on public facility management, promotion of cadastral surveys, etc., and steady progress shall be made with such surveying projects.

In addition, the revision of the Land Registration Act has made it possible to have an electronic record of map-based diagrams and registry office maps since March 2005. The national government shall complete the digitization of these maps and diagrams by FY 2010.

The national government shall also use various means to help clarify cadastres, such as the System for Alternative Dispute Resolution (based on the Act on Promotion of Use of Alternative Dispute Resolution), and the land registration based on the Land Registration Act. (This latter case allows lot line registrars to quickly and appropriately identify land boundaries that were recorded based on relevant materials and the opinions of outside experts. It was introduced in FY 2005).

## **3) Investigations of means for utilizing private sector surveying results**

The GSI shall investigate the use of private survey results to develop and update FGD. This shall be especially the case for some aerial photographs taken and maps produced as a result of surveys, which are classified as those other than basic and public surveys defined under the Survey Act (Article 6), which are conducted under the Rules for Public Surveying Work and whose results are summarized in their attached product specifications. The GSI shall assess the

result of investigation on utilizing these private survey results and test to implement it on a trial basis.

#### **4) Maintenance and management, etc., of control point information**

Geodetic control points used in surveying define the framework of FGD, but in Japan, there is concern that positional accuracies are declining due to crustal movements. Therefore, the GSI shall maintain the national control point system and provide accurate positional information by systematically undertaking control point surveys and introducing semi-dynamic correction (which is a method for eliminating the effect of crustal movements from control point survey results).

The GSI shall also make progress with developing, introducing and disseminating “intelligent” control points that are embedded with IC tags, provide technical support to relevant organizations, and make efforts to enhance the maintenance, management and utilization of control points.

In addition, for remote islands, the GSI and the Japan Coast Guard have developed control points in most of them, but there are still some islands that are not covered. The government shall also install, maintain and manage control points on the remote islands in order to facilitate the comprehensive management of the nation’s land and maritime areas.

It should be noted that to promote the transformation of public survey results to the world geodetic system, the national government shall continue to provide local governments with guidance and support for dissemination and education.

#### **5) Investigation of a system for development, updating and provision that is adapted to locality**

In order to efficiently develop and update seamless FGD in a timely manner, given that each locality has different circumstances from others, it is necessary for prefectures and municipalities to form alliances for broader areas, and for prefectures, municipalities and the national government to work together appropriately, to develop, update and provide FGD.

For this purpose, the national government shall consider how to develop appropriate institutional arrangements.

### **(3) Provision and distribution of geospatial information**

#### **1) Provision and distribution of general geospatial information**

The geospatial information that the various administrative organizations of the national and local governments are developing includes a lot of information that has value not only to

different fields of the national and local governments, but also to private companies and citizens, so it is necessary for the national government to make every effort to make its geospatial information available. It is also important that the provision of geospatial information held by the local governments shall be promoted.

Therefore, the national government shall systematically provide as much of its geospatial information as possible, generally through the Internet, for free, or for just a small fee. For example, it shall provide digital national land information on land use, land prices, etc., in digital map form for free through the Internet, and information about the state of environmental preservation using environmental GIS and other media.

Furthermore, to make more efficient use of provided geospatial information, efforts shall be made to promote the utilization of Web mapping systems such as the Denshikokudo (“Digital Japan”) Web System by general users to peruse geospatial information on their browsers, and to continue to provide services such as those to which other information can be added. In addition, such services shall be enhanced to enable even general users to access further information through the Internet, such as aerial photographs taken by the national government, local governments and others.

Statistical information shall be provided through the Statistical Geographic Information System (“Thematic Maps” (Statistical GIS)) on the “Portal Site of Official Statistics in Japan” (e-Stat), which is the access point for all statistical information prepared by the national government. Full-scale operation of this system shall commence in FY2008.

Furthermore, to help local governments provide geospatial information, the national government shall assist with providing traffic regulation information managed by prefectural police organizations and undertake campaigns to educate them about rules regarding the provision and distribution of geospatial information, and the effects and importance of its utilization.

## **2) Provision of FGD**

In order for FGD to be used by the general public as positional standards on digital maps, the national government shall provide its FGD over the Internet, generally free of charge. The GSI shall consolidate existing FGDs that are owned by the national and local governments into a seamless FGD that is equivalent to the scale levels of 2500 and 25000, and provide them over the Internet, free of charge, starting from FY2008. Furthermore, to expand these efforts beyond the national government, the promotion of similar efforts in local governments shall be enhanced, and institutional arrangements that support consultation to local governments shall be strengthened.

To enable the smooth distribution of the various types of FGD obtained from public surveys conducted by the national and local governments, the GSI shall also work to upgrade a clearinghouse that can search data owners, and offer “one-stop” services through linkages with related organizations.

### **3) Providing information related to the development and updating of FGD**

To efficiently develop and effectively utilize FGD, it is necessary to provide information on future plans to develop and update FGD.

Therefore, the GSI shall provide, through the Internet, information about the areas, periods, etc., of basic and public surveys being undertaken.

## **3. Promoting the Utilization of GIS**

### **(1) Utilization of GIS by the national government**

It is necessary for various organizations of the national government to work to take the lead in utilizing GIS for managing map data, analyzing data for making policy decisions, and providing information-based services to the public, and hence to improve the efficiency and level of administrative work and quality of public services.

For this purpose, the national government shall continue to develop and utilize Disaster Information System, the Japan Integrated Biodiversity Information System, etc., and shall provide and improve the Web mapping system that is necessary for various types of information provision services.

### **(2) Promoting the utilization of GIS by local governments**

It is necessary for local governments to make full use of GIS to improve the efficiency and level of administrative work and quality of public services for the administrative areas including those administrative undertakings that uses maps like urban planning, prompt and appropriate responses for natural disasters, and information provision for the citizens, by sharing various geospatial information including maps.

For this purpose, the national government shall provide technical and supplementary financial support to help local governments utilize Integrated GIS that shares GIS among multiple departments including those that are responsible for tax affairs, urban planning and disaster prevention. The national government shall also provide local governments with financial support for the promotion of development and utilization of GIS for agricultural areas including agricultural fields and forests as well as with technical support for advanced uses of such GIS, among other things.

### **(3) Utilization of FGD in map-related work**

In map-related work, it is necessary for the national and local governments to eliminate duplicated investment in map preparation, and prepare maps that are spatially aligned with other geospatial information by utilizing FGD.

Therefore, when developing geospatial information for creating maps in various administrative fields such as urban planning, management of public facilities, agricultural areas including agricultural fields and forests, cadastral surveys, real estate registration, taxation, and statistics, the national and local governments shall endeavor to utilize FGD that has already been prepared for the target districts.

## **4. Items That Should Be Considered When Utilizing Geospatial Information, such as Protecting Personal Information**

### **(1) Protecting personal information**

The use of geospatial information makes a significant contribution to improving people's lives and enhancing economic development. However, at such times, sufficient consideration is necessary to protect personal information.

When it comes to the issue of personal information, geospatial information needs to be handled in compliance with personal information legislation, which includes the Act on the Protection of Personal Information, the Act on the Protection of Personal Information Held by Administrative Organizations, and the Act on the Protection of Personal Information Held by Independent Administrative Agencies, and regulations on the protection of personal information enacted by local governments.

FGD is a type of geospatial information of public nature that shows the locations of control points, public facilities, etc., and generally does not include information that can be used to identify individuals, so every effort shall be made to develop and provide it.

However, there are various types of geospatial information other than FGD that do include personal information, so adequate consideration is necessary to observe the laws that protect it (It should be noted though, that there are some cases where individual laws including the Survey Act, Road Act and Land Registration Act give priority to public disclosure of information to benefit the public, even when it includes information that can identify individuals such as the names of landowners as shown in survey records on basic and public control points, road ledgers (plans), land registers, etc.). Therefore, practical guidelines on the following items, regarding the handling of personal information in terms of utilizing geospatial information, shall be prepared:

- 1) Guidelines for determining whether or not measures may be needed on particular geospatial information to protect personal information
- 2) Ways to provide geospatial information that includes personal information which has been approved for release and perusal by laws, etc.
- 3) Measures regarding preprocessing, limiting provision, etc., that should be taken to protect personal information when providing geospatial information
- 4) Methods for appropriate management of geospatial information that is necessary to promote the provision of useful geospatial information while protecting personal information

## **(2) Secondary use of data**

When creating and providing geospatial information with greater value added through the secondary use of data, it is necessary for original data providers to clarify beforehand the specific methods for handling intellectual property rights governing the secondary use. Therefore, practical guidelines on the following items regarding the handling of geospatial information shall be developed through the consideration with people from the private sector.

- 1) Methods for processing intellectual property rights, etc. related to original data, and for handling intellectual property rights, etc. related to contractual relationships with parties handling the projects, when the national government, local governments, etc., develop geospatial information that includes FGD
- 2) Methods for handling intellectual property rights, such as permission and restriction to the secondary uses and contracts for data uses, when the national government, local governments, etc., provide geospatial information to the third parties

## **(3) Effect on national security**

Depending on the scale, geospatial information (even if it is just general-use maps), aerial photographs, etc., may have some sort of value for organizations that may wish to harm Japan since it can provide them with useful information for identifying targets to attack, selecting invasion routes, etc. If we tried to eliminate all possible threats to the security of Japan, we would have to limit public disclosure of all such information. However, given that geospatial information can be so useful for the general public and there is public demand for even more information to become available, it is not possible to restrict all public disclosure of geospatial information.

Therefore, when examining points that should be considered from a national security perspective in terms of utilizing geospatial information, it is necessary to take a comprehensive approach by, for example, considering what sort of information might have an effect on national

security under what sorts of conditions, and giving adequate attention to advice from experts about its comparative usefulness to society, the state of information distribution (including over the Internet) and the security environment of Japan. Furthermore, especially regarding digital information, as the quality including the accuracy, etc., can be improved by overlaying different map data, consideration should be given not only to individual information but also to different types of information that are being distributed as a whole.

Specifically, we need to give constant consideration to geospatial information that involves 1) weaknesses in important facilities, etc., 2) the position, deployment, surrounding conditions, etc., of the facilities or members of the police force, coast guard, self-defense forces, American military, etc., (hereafter, “police, etc.”), and 3) information that clearly shows the state of police, etc., operations, or the state of security. It is also necessary to give consideration, when conditions warrant, to 4) information that could hamper the security of remote islands, and 5) information that terrorists and others could use to facilitate their activities when important international conferences are held. Consideration should also be given to information about troops deployed to handle emergency situations such as military attacks, and their areas of activity.

However, even regarding the information described in 1) – 5) above, it is not necessary to consider everything without exception—in the case of most information that related organizations have already publicly released, or that is not publicly released but would not cause problems even if it were released by the relevant organizations, it is probably not necessary to take special precautions. On the other hand, in the case of an emergency situation it may become necessary to take stricter actions, and even if the information has already been released, technologies for applying geospatial information, advances in military technology, changes in the international situation, etc., can change the scope of what should be considered. At the same time, those facilities, which are represented by the geospatial information that might have ramifications for national security, shall also be constantly aware of the fact that such information could exist.

National security is essential for the people to be able to lead secure lives and for the nation to continue its development and prosperity. It should not be compromised with the expanding distribution of geospatial information.

Therefore, the national government shall work to establish a balance between security and promoting the utilization of geospatial information by building a suitable framework for items that should be considered from a perspective of national security.

### **Chapter 3 Policies Related to Space-based PNT**

## **1. Liaison and Coordination Related to Space-based PNT in order to Effectively Maintain an Environment That Enables the People to Receive Stable and Highly Reliable Space-based PNT Services**

### **(1) Liaison and coordination with operators of global Space-based PNT systems**

As for GPS, which is operated by the United States and is one of the Global Navigation Satellite Systems (GNSS), cooperation with the United States shall be enhanced to enable to make stable use of GPS in Japan by holding bilateral meetings regularly, to the extent possible, of the Japan-U.S. Consultations on the Civil Use of the GPS that investigate and discuss important items related to the utilization of GPS, based on the “Joint Statement on Cooperation in Use of GPS” issued by the then heads of the two Governments in September 1998.

Japan shall also participate in the International Committee on Global Navigation Satellite Systems (ICG) and the ICG Providers Forums, which have been established by the Committee on the Peaceful Uses of Outer Space (COPUOS) of United Nations, and follow up on the development and state of use of GNSS of various countries (GPS of the United States, European Galileo, Russian GLONASS, etc.). At the same time, closer cooperation shall be sought among GNSS providers in these countries paying attention to the state of applications of these systems in Japan.

### **(2) Distribution of information, and other measures that could realize better the environment for utilizing Space-based PNT**

To effectively maintain an environment where highly reliable Space-based PNT services can be utilized stably, investigations shall be made, based on the needs of users in Japan, on how to create a system to accurately transmit information such as that related to the operation of GPS to the users who need. Measures shall be taken, if necessary, based on the outcome of such investigation.

## **2. Promotion of Research and Development for Space-based PNT**

### **(1) Basic concepts on research and development related to Space-based PNT**

Considering that the use of Space-based PNT has distributed throughout the daily lives of the people, and recognizing that it is necessary for Japan to have technological foundation for Space-based PNT capability, while bearing in mind the need of making full use of the vitality of the private sector, encouraging industries and promoting the applications in new areas, the national government shall play a major role in R&D to complement Space-based PNT systems. For the enhancement of Space-based PNT systems, the private sector shall play a major role,

and the national government shall offer necessary support and cooperation to efforts of the private sector such as high-risk R&D.

## **(2) Promoting basic research on Space-based PNT capability**

Experiments on Space-based PNT systems shall be conducted using the Engineering Test Satellite VIII (ETS- VIII) launched in December 2006 which has missions such as acquiring large deployable antenna technology and mobile communication technology, and necessary efforts shall be made in order to accumulate basic Space-based PNT technologies.

Research on high-accuracy navigation system using Space-based PNT capability shall be promoted.

## **(3) Promotion of the Quasi-Zenith Satellite System project**

The Quasi-Zenith Satellite System (QZSS) project aims to realize advanced Space-based PNT services by means of injecting a satellite into a quasi-zenith orbit, where the satellite is visible near the zenith from the ground, and of reducing effects of negative factors on the applications of Space-based PNT systems such as shadow of mountains and buildings.

As Space-based PNT capability can be applied to various areas including safety and security of the nation and the people, the government and private sector shall promote in cooperation the QZSS project step by step.

The national government shall undertake research and development of technological capability for high-accuracy quasi-zenith positioning experiment of high-accuracy Space-based PNT technologies such as synchronization of atomic clocks onboard satellites, of technologies for reducing the weight and extending the life of satellites, and of highly precise augmentation technologies for mobile vehicles and surveying.

To promote the verification of technologies and applications using the first Quasi-Zenith Satellite (1<sup>st</sup> stage), the Ministry of Education, Culture, Sports, Science and Technology (MEXT), taking into account the nature of verification of technologies and applications, shall play a central role in promoting the 1<sup>st</sup> stage in collaboration with the Ministry of Internal Affairs and Communications (MIC), the Ministry of Economy, Trade and Industry (METI), and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT). JAXA, the Japan Aerospace Exploration Agency, shall be in charge of the development and operation of the 1<sup>st</sup> stage of QZSS.

Quasi-Zenith Satellite System Navigation Service Interface Specification for QZSS (IS-QZSS) are open to the public in order to get a wide range of opinions and ideas for developing the first Quasi-Zenith Satellite.

The national government shall play a major role of launching the first Quasi-Zenith Satellite (to be launched by an H-IIA Launch Vehicle in FY2009), and MEXT, MIC, METI, and MLIT shall undertake technological, and the private sector and ministries and agencies shall take part in application demonstration.

While the private sector has not yet indicated its intention to invest in the demonstration of technologies and applications in the first stage of the QZSS project, when the private sector makes a new proposal, it shall be considered. In addition, ground-based application demonstration shall be implemented by the private sector, ministries and agencies, and other entities, and collaboration between the private sector and government for application shall be also considered.

The national government shall take measures such as making its R&D results open to the public and offering necessary information appropriately to the private sector so that the private sector may steadily implement application demonstration using the first Quasi-Zenith Satellite and may promote an investigation on industrialization and other issues.

After demonstration of technologies and applications at the 1<sup>st</sup> stage of the QZSS project, the results of demonstration shall be evaluated, and then the national government and the private sector shall proceed with planning of the 2<sup>nd</sup> stage of system demonstration with three Quasi-Zenith Satellites including the first one.

The private sector shall decide on the business feasibility based on the results of demonstration of technologies and applications at the first stage of QZSS project and other conditions, and then shall promote the project by making investment commensurate with the contents, scope, and other aspects of the expected businesses.

#### **(4) Promoting the use of Space-based PNT capability**

##### **1) The national government's role**

In order to play a leading role in realizing a society that makes advanced use of geospatial information, the national government shall take measures, including the following:

###### **(i) Utilization of Space-based PNT by national government organizations and others**

- Use Space-based PNT systems to find the location of investigators, helicopters, etc.
- Use Space-based PNT systems to determine orbits for satellites and other spacecraft.
- Use Space-based PNT systems to assist the navigation of aircraft, ships, and other vehicles of the self-defense forces.
- Use Space-based PNT systems to prepare land registry maps at registry offices.
- Use Space-based PNT systems to observe crustal movements as part of seismic surveys and research.

- Use Space-based PNT systems to conduct research and development for enhancing disaster prevention technologies in rural areas and autonomous operation in agricultural land.
- Use Space-based PNT systems to conduct research to monitor the behaviors of marine organisms.

(ii) Providing information for utilizing Space-based PNT systems

- Provide GPS augmentation information for ensuring the safety of water and air traffic.
- Acquire and provide GPS observation data in the GPS continuous monitoring system.

## **2) Use of Space-based PNT systems by local governments and the private sector**

To realize a society that makes advanced use of geospatial information, the private sector and local governments are also expected to promote the use of the information in accordance with their respective roles.

Some local governments have already been making use of Space-based PNT systems, for example, a crime prevention system that utilizes cellular phones equipped with satellite-based positioning functions, and an imagery tracking service of industrial waste materials that utilizes Space-based PNT systems. It is expected that local governments shall be working on the utilization of Space-based PNT systems to improve the efficiency and level of administrative services and vitalize communities by making use of their local features.

Regarding the utilization of Space-based PNT systems by the private sector, applications including car navigation, personal navigation and location-based services with cellular phones equipped with satellite-based navigation functions have been widely distributed. In addition, a vehicle management system, for example, is being developed to remotely manage working machines. It is expected that proposals and creative ideas for utilizing Space-based PNT systems shall be developed, and that support for enhancing and diversifying services based on Space-based PNT systems shall be provided, and local communities shall be vitalized through alliances with local public sector organizations.

Universities, research institutes, and similar organizations are expected to promote research for the enhancement and application of Space-based PNT systems, and develop human resources for Space-based PNT systems.

The national government shall take positive steps to make open to the public the information on its leading work that contributes to better public services based on Space-based PNT systems.