

Basic Plan for the Advancement of Utilizing Geospatial Information (Cabinet Decision of March 24, 2017)

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Abstract

Based on the Basic Act on the Advancement of Utilizing Geospatial Information (AUGI), the third Basic Plan for AUGI was established on March 24, 2017 by a Cabinet decision.

Under the first and second Basic Plans for AUGI, the government developed Japan's own positioning bases by Fundamental Geospatial Data (FGD) and the first quasi-zenith satellite "Michibiki". The third Basic Plan for AUGI aims to solve social issues as well as to create new industries and services through the advanced utilization of more accurate and high value-added geospatial information by these positioning bases in line with technological innovations such as IoT, big data and AI.

In order to strategically promote initiatives for utilizing geospatial information, the third Basic Plan for AUGI selected policies and measures to be prioritized as "Symbol Projects", and represented such projects and businesses in a more tangible way to accelerate them.

The third Basic Plan for AUGI aims to realize a new society of the world's highest level, known as an "advanced geospatial information utilization society", in which geospatial information is effectively used in a wide range of fields such as disaster prevention, transportation and logistics, living environment, regional revitalization, and technology export. The Geospatial Information Authority of Japan is helping to create such a society by developing FGD and the Digital Japan Basic Map, as well as a mechanism for ensuring precise mutual compatibility of positions between FGD and highly accurate three-dimensional geospatial information.

1. Introduction

1.1 Government structure regarding advancement of utilizing geospatial information

With regard to the advancement of utilizing geospatial information (AUGI), relevant ministries and agencies have been jointly working on policies and measures comprehensively and systematically under the governmental "Committee for Advancing the Utilization of Geospatial Information" (hereinafter referred to as "Advancement Committee") (Fig. 1).

As a secretariat member, the Geospatial Information Authority of Japan (GSI) is playing an important role in planning and coordinating the efforts regarding the Basic Plan for the Advancement of Utilizing Geospatial

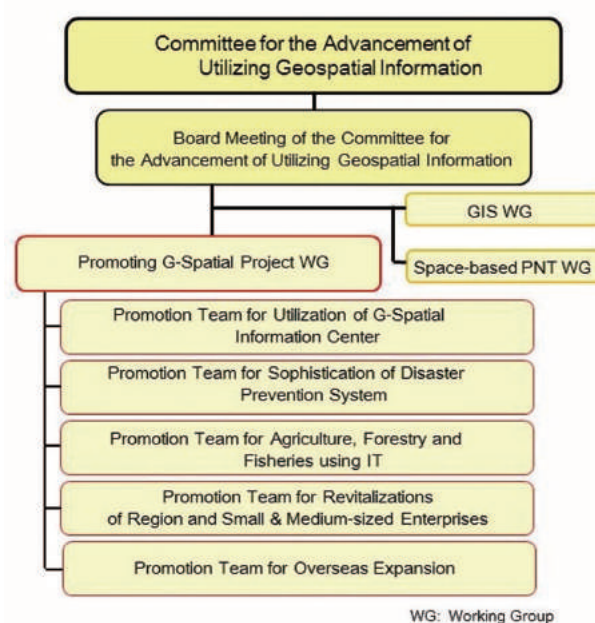


Fig. 1 Government structure for AUGI

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Information (hereinafter referred to as “Basic Plan”).

The government will continue working on solving various issues concerning AUGI, and promote policies and measures in a joint effort of the entire government, while strengthening the framework for powerfully leading the overall operation.

1.2 Background to developing the third Basic Plan

Based on the Basic Act on the Advancement of Utilizing Geospatial Information (hereinafter referred to as “Basic Act”), the government formulated the first Basic Plan in 2008 and the second Basic Plan in 2012, and worked on developing an environment for using geospatial information, including a framework to enable relevant organizations to work on the promotion, development and provision of geospatial information as public infrastructure, establishment of an advanced high-technological base for satellite positioning, navigation and timing (Satellite PNT), and others.

With regard to each policy based on the Basic Plans, concrete goals and achievement deadlines were summarized in the “Action Plan for Advancing the Utilization of Geospatial Information (G-Spatial Action Plan)” under the Advancement Committee, and relevant ministries and agencies have been jointly working on policies and measures comprehensively and systematically.

The third Basic Plan, with the next five years as the implementation period, aims to realize a new society where each person can perceive “growth” and “happiness”, with technology for using geospatial information playing a key part of the Fourth Industrial Revolution. In order to implement AUGI in society, the government will work on establishing a common base in collaboration with industry, academia, government and citizens, and developing an environment in which anyone can participate in and make use of geospatial information, thus enabling new growth through free competition. Furthermore, the government will promote AUGI to the outside world, expand new business opportunities, and make international contributions toward the Olympic and Paralympic Games Tokyo 2020.

1.3 Contents of the third Basic Plan

The third Basic Plan consists of Part 1 and Part 2. Part 1 explains Japan’s visions by sharing recognition of an ideal society realized by advanced technology of AUGI and summarizing the achievements of the previous Basic Plans and current issues. Part 2 describes specific policies and measures for AUGI to realize the visions.

The following is an overview of the third Basic Plan.

Part 1 Basic policy on the measures for AUGI

Recognition of the policy related to AUGI

- Share the ideal society realized by improving technology for the circulation and utilization of geospatial information.

Current status and issues with geospatial information

- Summarize the achievements of previous Basic Plans and describe issues caused by changes in the social situation.

Visions and basic policies on measures for achieving such visions

- Describe five goals as Japan’s “Visions” based on the above issues.

Effective Promotion of the Basic Plan

- Explain effective promotion methods, such as maintaining compatibility with other governmental plans, to follow up the progress, to select important measures as “Symbol Projects”.

Part 2 Specific policies and measures for AUGI

Development of infrastructure and an environment for utilizing geospatial information in an advanced manner

- Describe the construction of a framework for utilizing geospatial information and developing a quasi-zenith satellite system (QZSS) and GIS.

High-level utilization of highly accurate geospatial information – Showcasing the Olympic and Paralympic Games Tokyo 2020

- Describe the creation of new industries and services and showing the achievements of Japan at the Olympic and Paralympic Games Tokyo 2020.

Utilization of geospatial information that can be perceived in day-to-day living

- Describe the achievement of sustainable land-use that is robust and resistant to natural disasters, realizing a safe, secure and high quality of living, and advancing the efficiency and sophistication of administrative services.

Overseas expansion and international contribution through the utilization of geospatial information

- Describe the assistance of promotion by United Nation committees and cooperation on the development of positioning services by QZSS and the Global Navigation Satellite System (GNSS) Continuously Operating Reference Stations (CORS) network.

Comprehensive policies and measures to advance the development and utilization of geospatial information

- Describe strengthening the promotion framework and collaboration between related entities, promoting dissemination of knowledge and human resources development, promoting research and development strategically, and prioritizing important measures.

2. Current status and issues for realizing the G-spatial society

2.1 Recognition of the policy related to AUGI

Geospatial information, which consists of location, time, and related information, is a key source of innovation to realize a “Super Smart Society” that combines cyberspace and the real world. The Basic Plan describes the basic policy, recognizing that the collection and analysis of geospatial information using IoT, big data and AI will improve the convenience of lives, create new industries and services, and expand employment (Fig. 2).

2.2 Summary of achievements in the second Basic Plan

The following is a summary of the measures implemented under the second Basic Plan pertaining to the GIS, satellite positioning, and initiatives for using geospatial information in the fields of disaster prevention and reconstruction, which have been strengthened since the Great East Japan Earthquake.

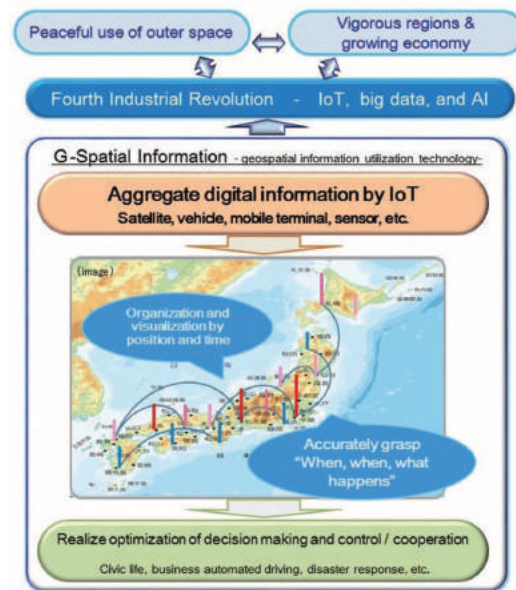


Fig. 2 Recognition of the policy related to the AUGI

Summary of measures implemented under the second Basic Plan

- The government has developed and updated comprehensively the Digital Japan Basic Map and the Fundamental Geospatial Data (FGD), and started providing GSI Maps on the Internet.
- Services that utilize positioning information acquired by QZSS are spreading widely.
- The G-Spatial Information Center began providing one-stop services in November 2016.
- The government has specified the deadline for developing the four-satellite constellation, worked on developing the second to fourth satellites, and developed a ground base for operating the four-satellite constellation.
- It was decided to develop a seven-satellite constellation targeting 2023 in the “Basic Plan on Space Policy” (Strategic Headquarters for Space Development Decision of January 9, 2015).
- The government assisted the initial responses and emergency measures, the restoration of cadastral information at the time of recovery and reconstruction, and the formulation of hazard maps.
- The government has promoted the development of technology for immediately assessing crustal movements using GNSS-based control stations and demonstration projects for transmitting information in underground malls during urban disasters.

2.3 Visions, and measures for achieving them

The third Basic Plan aims to realize an “Advanced Geospatial Information Utilization Society” (hereinafter referred to as “G-Spatial Society”), and to develop an environment that allows highly accurate and useful geospatial information to be used in real time. The aim is to solve social issues of Japan and create new industries and services through advanced technologies such as IoT, big data and AI.

To realize the world’s highest level of G-Spatial Society, the Basic Plan set the following five goals as Japan’s “Visions”.

Visions (five goals)

- (1) Contribution to the formation of disaster resilient and sustainable national land

Strengthen and sophisticate disaster response capabilities in respect of collecting, sharing and providing disaster information, and improve the efficiency and sophistication of maintenance and management of public infrastructure.

- (2) Creation of new transportation and logistics services

Realize a next-generation transportation and logistics system created on the basis of highly accurate geospatial information.

- (3) Contribution to the formation of a safe, secure and high quality of living amid population decline and aging of society

Advance the utilization of geospatial information to improve mobility services and services in fields that are closely associated with local residents.

- (4) Revitalization of regional industries and creation of new industries and services

Save labor and improve productivity in the agriculture, forestry and fisheries industries by using ICT and i-Construction, to accelerate regional revitalization.

- (5) Promote exports of technology and mechanisms for utilizing geospatial information, and international contribution

Package positioning infrastructure, related businesses and human resource development, and expand into the world.

Showcase the G-Spatial Society at the Olympic and Paralympic Games Tokyo 2020.

In order to achieve these visions, the Government is promoting policies and measures by three approaches (Fig. 3).

Three approaches to realize the visions

- (1) Promotion of the circulation and utilization of geospatial information, with the G-Spatial Information Center playing a central role.
- (2) Expand highly precise and highly reliable positioning services while improving the sophistication of QZSS and GNSS CORS.
- (3) Develop a framework for literacy and human resource training related to geospatial information.

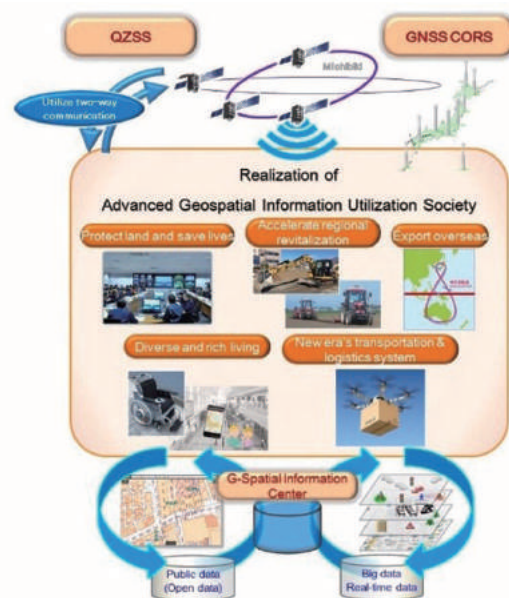


Fig. 3 Image of AUGI society

2.4 Effective promotion of the Basic Plan

Upon advancing the Basic Plan, full consideration will be paid to maintaining compatibility and effective cooperation with other policies.

The government will examine more concrete targets and the planned period for each measure and follow up the progress each year. Also, in order to strategically promote initiatives aimed at realizing a world-class G-Spatial Society, the government selected policies and measures to be prioritized as “Symbolic Projects”, represented such projects and businesses in a more tangible way, and is accelerating such projects in collaboration with industry, academia, government and citizens.

Furthermore, in order to steadily deliver to the general public the outcomes obtained through research and demonstration, the government will formulate a process chart including key performance indicators (KPI) so as to promote such projects systematically. Regarding the process chart, after the state of progress of the policies and measures is verified every year by the Promotion Teams under the Advancement Committee or other groups, it will be revised by the Advancement Committee, where necessary.

The following is the list of 13 Symbol Projects.

Symbol Projects

- (1) Strengthening of the disaster prevention functions of evacuation centers utilizing QZSS
- (2) Operation of a system for estimating tsunami inundation damage
- (3) Promotion of dissemination of the G-Spatial Disaster Prevention Systems
- (4) Promotion of development and dissemination of advanced automated driving systems
- (5) Promotion of unmanned aerial vehicle logistic projects utilizing QZSS
- (6) Promotion of development of an environment for highly precise positioning in indoor spaces
- (7) Mobility assistance to visitors to large-scale events, etc. by using the G-Spatial Information Center
- (8) Promotion of development and dissemination of automated driving technology and other technology for agricultural machinery
- (9) Promotion of growing industrialization of forestry utilizing geospatial information and ICT
- (10) Advancement of utilization of three-dimensional data by promoting i-Construction
- (11) Promotion of R&D and service model development by small and medium-sized enterprises and microbusinesses
- (12) Exports of high-precision positioning services utilizing the GNSS CORS network and QZSS
- (13) Formation of a circulation system for geospatial information

3. Specific policies and measures for AUGI related to GSI

3.1 Development of infrastructure and an environment for AUGI

- (1) Building a framework for utilizing geospatial information that autonomously creates new values:
 - Register particularly useful geospatial information that meets social needs with the G-Spatial Information Center.
 - Develop standardized mechanisms and methods to utilize smoothly and in an integrated manner a combination of information consisting of highly accurate three-dimensional geospatial information and Satellite PNT information.
 - Establish a mechanism to connect geospatial information with high relative positional accuracy to geospatial information with high absolute positional accuracy.
 - Develop a mechanism to achieve highly precise mutual compatibility of positions between Satellite PNT information of various methods and the highly accurate three-dimensional geospatial information.
 - Promote standardization of joint development work in order to facilitate the circulation and utilization of highly accurate three-dimensional geospatial information in various fields.
 - Develop and update unified standards and work manuals, and a framework for ensuring the quality of such standards or manuals based on the latest technology trends in order to ensure the quality of geospatial information.
 - Promptly update the Japan Profile for Geographic Information Standards (JPGIS) and conduct dissemination and awareness-raising activities to promote the use thereof by local governments and private business operators.
 - Formulate technical standards and specifications when new technologies and methods relating to surveying are developed and implemented.

(2) Advancement of development of QZSS and utilization thereof and others

- Maintain and improve GEONET in order to sophisticate the location information bases that enable high-precision positioning.
- Promote the development and practical use of real-time positioning services with a highly accurate and reliable indoor positioning environment, achieved by multi-GNSS with QZSS as the core.

(3) Advancement of development of geospatial information and GIS, which are public infrastructure

- Install, maintain and manage control points on remote islands in order to represent Japan's territory and territorial waters accurately.
- Update the Digital Japan Basic Map and the FGD consistently, and promptly publish it through the GSI Maps.
- Connect the results of very long baseline interferometry (VLBI), geodetic leveling, gravity measurement, and so on with the GNSS-based control stations in order to accurately maintain and manage the positional reference of the national land.
- Develop geospatial information with high temporal resolution based on the absolute positional reference through stable operation, and maintain and improve GEONET in coordination with QZSS.

3.2 High-level utilization of highly accurate geospatial information – showcasing the Olympic and Paralympic Games Tokyo 2020

(1) Creation of new industries and services through high-level utilization of highly accurate geospatial information

- Implement policies and measures such as i-Construction to improve productivity by utilizing three-dimensional data and ICT.

(2) Show the world the achievements of Japan at the Olympic and Paralympic Games Tokyo 2020

- Advance the registration and installation of “public tags” such as Wi-Fi and beacons for indoor and underground spaces where satellite positioning is unavailable.

3.3 Utilization of geospatial information that can be perceived in day-to-day living

(1) Sustainable land-use that is robust and resistant to natural disasters

- Develop software and work manuals for the development of correction parameters that are required for the prompt and efficient restoration of public survey results when recovery projects are being implemented properly, to enable people to continue using accurate location information.
- Provide information on damage obtained by emergency photography by operating a survey aircraft with a high level of mobility or small unmanned aerial vehicles that provide an understanding of the detailed conditions of disaster sites.
- Carry out satellite SAR observation in order to monitor changes and detect crustal deformation caused by earthquakes, volcanic changes, and ground subsidence.
- Utilize an advanced radar satellite, conduct research and development of airborne SAR, develop advanced data analysis methods of GEONET, and study methods of grasping the scope of inundated areas at night.

(2) Realization of a safe, secure and high quality of living

- Implement policies and measures such as mobility improvement services by utilizing automated driving technology, and mobility support by improving the indoor and outdoor positioning environment.

(3) Advancement of efficiency and sophistication of administrative services

- Realize infrastructure management utilizing ICT such as utilization of Location Information Codes for identifying management facilities.
- Implement technical assistance, disseminate technical manuals and incorporate such manuals into the Rules for Operating Specifications in order to further improve the efficiency of public surveys utilizing new surveying techniques.
- Assist human resource development by administrative agencies by making continued efforts including providing information and training, in order to

coordinate efficient tasks in basic surveys and public surveys.

3.4 Overseas expansion and international contribution through the utilization of geospatial information

- Support the development and maintenance of the geodetic reference frames through global-scale international joint observations, including International VLBI Service for Geodesy and Astrometry (IVS) projects, international GNSS Service (IGS) and other projects in line with the initiatives of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM).
- Play a central role in the Regional Committee of United Nations Global Geospatial Information Management for Asia and the Pacific (UN-GGIM-AP), which was established to promote the development of a geospatial information base in the Asia-Pacific region and exchange information on related policies.
- Provide assistance in accurate surveys of latitude and longitude for countries where no positional references have been established, in collaboration with the United Nations, the International Association of Geodesy (IAG), and the International Federation of Surveyors (FIG), as one of the advanced countries in this field, with the aim of building a Global Geodetic Reference Frame (GGRF) which serves as a reference for accurately measuring latitude and longitude.
- Provide assistance in the Global Geodetic Observing System (GGOS) and the strengthening of the infrastructure of the geodetic reference frame of the Asia-Pacific region to promote the development, circulation and utilization of GNSS data in respective countries.
- Lead the regional VLBI joint observations in the Asia-Pacific region, while providing cooperation and advice on the development of the GNSS CORS network, for example, accepting trainees from and dispatching experts to such partner countries in close collaboration with the Japan International

Cooperation Agency (JICA) and other relevant organizations, taking advantage of Japan's long experience in operations while taking the local situation into consideration.

- Study the development of a support package incorporating technical standards, institutions, human resource development and others by combining i-Construction with the highly precise positioning, navigation and timing functions of QZSS or the GNSS CORS network.
- Advance the development of a package of intangible and tangible support including Japan's cutting-edge GIS technology and technology related to Satellite PNT and human resources development, through a joint effort by industry, academia, government and citizens.
- Actively contribute to discussions at international conferences, including the UN-GGIM, the plenary meeting of the International Organization for Standardization (ISO) Geographic Information/Geomatics Technical Committee (TC 211) and other conventions.

3.5 Comprehensive policies and measures to advance the development and utilization of geospatial information

- (1) Strengthening of promotion framework and collaboration among related entities
 - Build a framework for collaboration and cooperation based on the actual circumstances of each region to efficiently utilize and share geospatial information developed and owned by the central or local governments so that such geospatial information can be used for maintaining and updating geospatial information, including the FGD and the Digital Japan Basic Map.
 - Strengthen the joint initiatives with officials and experts from industry, academia, government and citizens, including private enterprises, universities and research institutes.
- (2) Promotion of dissemination of knowledge and human resources development

- Create new industries and services, invite proposals and stimulate innovation by private business operators, and disseminate and raise awareness about geospatial information among the people through “Geospatial EXPO” in collaboration with industry, academia and government.
- Implement measures to help enhance geography education continuously, as increasing awareness of the importance of geospatial information such as Comprehensive Geography has been adopted as a mandatory subject in high schools.
- Carry out policies and measures to develop collaboration with engineers in other fields and survey engineers, or measures to enable engineers in other fields to learn surveying techniques.

(3) Strategic promotion of research and development

- Conduct sustained verifications of the results of various researches by following up this Basic Plan and other efforts, and also develop a framework to smoothly implement new technology so that the government can steadily deliver such new technology to the day-to-day living of people.

(4) Measures to be prioritized

- GSI plays an important role in the symbol project “Exports of high-precision positioning services utilizing the GNSS CORS network and QZSS by collaboration with the National Space Policy Secretariat, Cabinet Office (Fig. 4).

In view of the growing interest in the GNSS CORS network and QZSS in the ASEAN region and Australia, a highly precise positioning service that fully utilizes the mechanisms thereof will be developed. Specifically, the government will promote highly precise positioning services while taking into consideration the requests and needs of the partner country so that the GNSS CORS network can be operated in an integrated manner and the correction information for high-accuracy positioning can be made available to the private sector, while also developing an environment for using the world geodetic system and QZSS common to Japan. In this

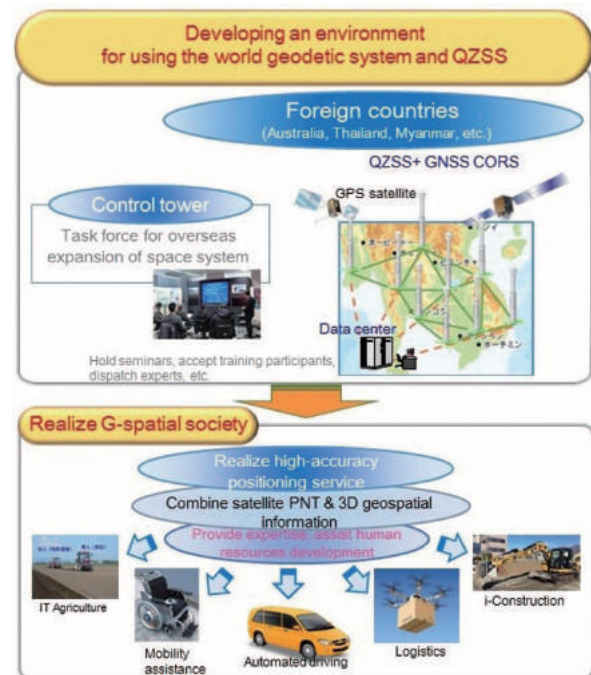


Fig. 4 Exports of high-precision positioning services utilizing GNSS CORS network and QZSS

way, the government will contribute to the building of a convenient and secure society.

4. Conclusion

The third Basic Plan was established by a Cabinet decision on 2017, 10 years after the Basic Act was enacted in 2007.

The previous Basic Plans focused on maintaining fundamental infrastructure in order to utilize geospatial information. The government launched the first quasi-zenith satellite, and developed FGD and the Digital Japan Basic Map, GEONET, and the G-Spatial Information Center.

The third Basic Plan aims to realize an advanced geospatial information utilization society through high-accuracy positioning technology by using these infrastructures.

The GSI will promote the Basic Plan by improving infrastructure for geospatial information and promoting the further utilization of geospatial information. It will also implement policies for collaboration between the geodetic reference system and positioning infrastructure, and will support the development of human resources

through geography education.

Furthermore, as a member of the secretariat of the Committee for Advancing the Utilization of Geospatial Information, the GSI is actively promoting the utilization of geospatial information.

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