Long-Term Plan for Basic Survey

April 9, 2014

Geospatial Information Authority of Japan,
Ministry of Land, Infrastructure, Transport
and Tourism

Ministry of Land, Infrastructure, Transport and Tourism

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The Long-Term Plan for Basic Survey is established based on the Article 12, Survey Act (Act No.188 of 1949), and related documents are available for public inspection at Geospatial Information Authority of Japan, Ministry of Land, Infrastructure, Transport and Tourism (1 Kitasato, Tsukuba, Ibaraki Prefecture).

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1. Introduction

The Long-Term Plan for Basic Survey (hereinafter abbreviated to "the LT Plan") shall be established based on the Article 12 of the Survey Act (Act No.188 of 1949) by the Minister of Land, Infrastructure, Transport and Tourism, and is the plan for basic survey, conducted by Geospatial Information Authority of Japan (hereinafter referred to as "GSI").

The LT Plan secures accurate surveys required for the use and application of the surveying results by clarifying the goal of basic survey and the policies required in order to attain the goal. As well, through the use of the basic survey results, the Plan was also drawn up to prevent redundancy of survey investments by different subjects in order to achieve the aim of the Survey Act.

Further, The Basic Act on the Advancement of Utilizing Geospatial Information (Act No.63 of 2007; hereinafter referred to as "NSDI Act"), states the importance of the highly sophisticated use of geospatial information, in order to realize an economic society where people can enjoy safe and prosperous lives now and into the future. Taking this into account, a geospatially enabled society needs to be attained, supported by high-quality and over-layable geospatial information, by securing the aforementioned survey accuracy.

However, added to this, there has also been a rapid shift from the use of paper-based publications and standard surveying markers to digital data such as Internet maps and observation data of GNSS-based control stations, and the increasing demand for efficiency in administrative bodies with limited staff and budget in recent years. This situation has made the use and application of existing geospatial information a critical issue. To this end, the purpose of the revision in

this LT Plan is to clarify policies that will need to be enforced by GSI.

2. Background of the revision

Since its inception in 1953, the LT Plan has been revised approximately every 10 years.

The last revision of the LT Plan was drawn up in June 2009 to be effective until 2018, and indicated the following five prospects of a desired society that would result from the utilization of geospatial information:

i A safe and secure society

ii A society in which people can live a prosperous and comfortable life

iii A society that maintains the national land environment well

iv A society in which regions are self-reliant and energetic

v A energetic society in which new businesses are created

The plan also pointed out the basic directions and policies that should be implemented to attain these prospects.

Policies laid out in the Last LT Plan were steadily implemented, however, issues like "Changing consciousness of the people," "Changing social conditions and needs, and the latest government actions to meet these changes" and the "New developments in private services," as well as the occurrence of the Great East Japan Earthquake in 2011 have evolved as follows.

A) Regarding the "Changing consciousness of the people," the local governments' and people's awareness of disaster prevention from earthquakes and tsunamis has increased dramatically, based on the recognition of the consequence of the Great East Japan Earthquake in 2011

and fears of serious damages that would be caused by the occurrence of chained giant earthquakes along the Nankai trough in multiple regions.

B) Regarding the "Changing social conditions and needs, and the latest government actions to meet the changes," the following are examples of the former, "Changing social conditions and needs."

- Changes in society like declining birthrates/aging population and the progress of Information and Communication Technology (ICT).
- Technological progress in the fields of surveying and information has led to increased opportunities for overseas development for our country's business activities, and we anticipate ongoing contributions to global sustainable development.
- In order to revitalize the use of survey result, while security and easiness is essential to revitalize the use of survey result, the needs for freshness of such data is growing in addition to positional accuracy.
- A rapid shift is taking place from the use of paper-based publications and conventional ground control point to digital data like Internet maps and CORS (Continuous Observation Reference Station) data in the utilization of geospatial information. Because sophisticated communication terminals (like smartphones etc.) with satellite positioning functions are becoming popular, utilization of existing results on the Internet is also proving to be an effective method in promoting the utilization of geospatial information.

- Geospatial information is becoming more diversified, for example 3D maps.
- There has been a particular demand for transparency of administrative services and improvements in its effectiveness and sophistication in recent years.
- As a result of the accident at the Fukushima Daiichi Nuclear Power Plant, public interest in energy policy is increasing. This leads growing role of geospatial information as basic information required to effectively enforce energy policy.

Next, the followings are examples of the latter, "the latest government actions to meet these changes."

- Following many changes in society in recent years regarding geospatial information, prompted by the Great East Japan Earthquake. The Basic Plan for the Advancement of Utilizing Geospatial Information was established in March 2012 (Cabinet decision, March 27, 2007) to cope with the following needs.

  a) The emergence and diversification of new services accompanied by rapid advancement of ICT.
  b) GIS (geographic information systems) as a tool to solve Japan's various social problems.
  c) Increasing expectations in the use of satellite positioning.

d) Greater demand for geospatial information contributions in the field of disaster prevention and mitigation.

- Following the launch of the first Quasi-Zenith Satellite "Michibiki" (on September 11, 2010), a new promotional policy for space development and use was established in the Basic Plan for Space Policy (Strategic Headquarters for Space Policy, January 25, 2013). As a result, Japan's autonomy has been strengthened due to the possession of a satellite positioning system, improving the availability of satellite positioning with the outlook of its stable use.
- The "Declaration to be the World's Most Advanced IT Nation" (Cabinet decision, June 14, 2013) set the goal to realize the world's highest standard regarding the use and application of Information Technology (IT) and to develop its results overseas. It calls for opening government-owned data to the public (open data) in order to attain a society where new industries and services will be created. Government measures are being taken to encourage the opening of administrative information available for secondary use and to propose the utilization of geospatial information, as proposed in the Declaration, in the fields such as regional vitalization, the establishment of disaster prevention and mitigation systems, and realizing a society with a safe, ecologically friendly, and economically efficient road traffic system. On the other hand, the cabinet decided on the National Security Strategy (December 17, 2013) responding to the need that the government must first understand national interests from a long-term perspective and engage in national security matters collectively in order

to maintain the development of a prosperous and peaceful society. The strategy requires the moderate use of data, taking into account domestic security.

- The revision of the Disaster Countermeasures Basic Act (Act No.223 of 1961) in June 2012, added the use and sharing of geospatial information to the list of obligations of those in positions responsible for disaster emergency measures in case of disasters. Further, disaster prevention efforts are strengthened through the promulgation of the "Partial Revision of the Act on Special Measures for Promotion of Tonankai and Nankai Earthquake Disaster Management" and the "Act on Special Measures for Tokyo Inland Earthquake" on November 29, 2013, and the "Basic Act for National Resilience Contributing to Preventing and Mitigating Disasters for Developing Resilience in the Lives of the Citizenry" on December 11, 2013.

C) Regarding "New developments in private services," the practical use of the new surveying technologies like MMS (mobile mapping systems) is becoming more advanced. Furthermore, due to improvements in the usage environment of satellite positioning, the acquisition of positional information from mobile devices has become widespread, and the range of use for positional information services is also expanding in the private sector as well.

The changes listed in A) to C) above, have created the following new issues, which need to be dealt with.

a) Regarding the "Changing consciousness of the people," there is a demand for the proper use of geospatial information with regards to administrative policies like grasping the disaster situation, in order to meet the growing public awareness of disaster prevention. For example, at the time of the Great East Japan Earthquake, aerial photographs and maps from GSI were widely distributed through its website, and were utilized by administrative bodies from the national to local levels for their disaster response, as well as private businesses and NPOs who used the same information in their efforts on the field. However, if initiatives to promote further sharing including other disaster-related information was implemented, the provision of even more smooth countermeasures would be expected.

b) Regarding "changing social conditions and needs, and the latest government actions to meet these changes," the following demands must be dealt with.

- Fresh and accurate geospatial information must be developed and provided by taking into account the progress of ICT. Improvements must be made in its convenience for a society facing a declining birthrate and aging population, as well as in the quality of the administration's efficiency and functionality and public services through the information use.
- The use of geospatial information in various fields including disaster prevention and energy policies as mentioned above.
- The use of satellite positioning to contribute to the utilization of geospatial information, and enhancing efficiency of survey projects, and the promotional initiatives to utilize public data.

c) Regarding “New developments in private services,” proper support has been given to promote the practical use of surveying technology, including the incorporation of new technologies adhering to the Rules for Operating Specifications of public survey.

However, with the development of electric mail and SNS (social networking services) and the ease of access to positioning information by virtually anyone with mobile devices, information transmissions including geospatial information has increased dramatically, resulting in a situation where there is a rapid progress in private services.

As a consequence, the public is increasingly utilizing geospatial information not knowing what it is. This situation has created various unanticipated changes that need to be dealt with.

Although it is considered that there is no need to change the vision of the "new society" that should be attained through the utilization of geospatial information as indicated in the previous LT Plan, the visions of the LT Plan is considered to be developing and changing in the following manner, due to the increased levels of interest regarding the growing need of accurate and fresh information, an increase of interest in safety and security and expectations of administrative optimization and the progress of new technologies.

i: The vision for a “safe and secure society” should still be continuously pursued from the standpoint of “Changing consciousness of the people” and

"Changing social conditions and needs, and the latest government actions to meet these changes."

ii: The vision for a "society in which people can live a prosperous and comfortable life" should also be continuously pursued, especially from the standpoint of "New developments in private services," where it is becoming increasingly important for the utilization of new technologies to improve user-friendliness.

iii: The vision for a "society that maintains the national land environment well" should be continuously pursued from the standpoint of the "Changing consciousness of the people" and "Changing social conditions and needs, and the latest government actions to meet these changes."

iv : The vision for a "society in which regions are self-reliant and energetic" should be taken into consideration through the attainment of the other listed visions in order to realize the regional vitalization.

v: The vision for an "Energetic society in which new business are created" should be continuously pursued from the standpoints of the "Changing social conditions and needs, and the latest government actions to meet these changes" and "New developments in private services."

As well, initiatives to promote the government's open data policies and the utilization of public data is being enforced, and there is growing need for attaining administrative optimization and sophistication, through the utilization of geospatial information by the government and people. As a result, "A society in which transparency and reliability of the public sector are improved through

utilization of public data" has also become an important vision to be pursued, while promoting the moderate use of information taking national security into account.

With the above in mind, the five following visions are envisaged in this LT Plan as essentials for the realization of a new society. From the standpoint of the preparation and utilization of geospatial information; "A society that maintains a healthy land environment in national territory." From the standpoint of its utilization especially in disaster prevention and mitigation; "A society that assures safety and security." From the stand point of demand for enhanced transparency, efficiency, and sophistication of public administration; "A society in which transparency and reliability of the public sector are improved through utilization of public data." And as well, "A society in which people can lead a prosperous and comfortable lives embracing with application of new technology" and "A society that is energized by launch of new businesses," from the standpoint of positively promoting the circulation and utilization of geospatial information for better user-friendliness and the creation of new businesses.

The following is the overview of the five societal visions that should be realized in order to attain a new society, and the policy issues of geospatial information field required for its contribution to realize these visions.

(1) A society that maintains a healthy land environment in national territory

(Policy Issue) Contribution to the promotion of the use, development and

maintenance of the national land

The optimization of the use of national land environment can be properly conducted by allowing administrative organizations to develop and use their own geospatial information required in implementing administrative policies and businesses and to use the latest data developed by other administrative organs and private businesses in a user friendly manner.

(2) A society that assures safety and security

(Policy Issue) Contribution to the protection of the life and properties of the people

Accuracy of disaster risk assessment of each region and sufficient disaster preparedness will be achieved by providing territorial risk information such as ground vulnerability prior to the outbreak of disasters in a proper manner, and reflecting the information in hazard maps created by the administration. Disaster damages will be maximally reduced in post-disaster phase through the best possible responsible measures such as accurate and rapid information grasping pertaining to the disaster-stricken areas via various information sources like aerial photos, and sharing this information that allows administrative bodies to quicken their actions to mitigate the damages of the natural disaster.

(3) A society in which transparency and reliability of the public sector are improved through utilization of public data

(Policy Issue) Contribution to optimizing administrative operations and upgrading their function

Expansion of geospatial information use by the government and people leads to the optimization of polices in various fields like community development, urban management and infrastructure management in a cost effective manner, and public participation in the administration, by effectively utilizing existing geospatial information, with reducing cost for data development, and promoting the use of public data like initiatives for open data while taking into consideration national security and spreading the moderate use of information.

(4) A society in which people can lead a prosperous and comfortable lives embracing with application of new technology

(Policy Issue) Contribution to improvement of citizen's wellbeing

The application of new technologies will make the society more prosperous and comfortable. While the application is expected to have a ripple effect on various facets of our society, possible examples are securing children's school routes for safety and security, and autonomous driving and assisting mobility of cars and wheelchairs for supporting the elder and handicapped.

(5) A society that is energized by launch of new business

(Policy Issue) Contribution to the revitalization of economic and social activities and their sustainable development

The benefits of locational and cartographic information will extend not only to surveying field but also to new businesses involved in open data

initiatives for the creation of new services at the national and regional levels. This will allow domestic businesses to extend their operation overseas with the necessary technology and skills for new businesses.

As mentioned above, the differences between the new society proposed in the last LT Plan and the actual conditions of the society have revealed policy areas uncovered the last LT Plan. Furthermore, a policy audit conducted in 2013 appraised the measures by GSI in the last LT Plan and reaffirmed the importance of continuing the development and provision of geospatial information. Also, given the response towards the Great East Japan Earthquake and the changing public awareness of disaster prevention, it was decided that more strengthened efforts be taken to creating a more user-friendly environment for applying geospatial information and supporting related bodies in disaster prevention fields as new directory of measures of GSI.

Taking these factors into consideration, a new LT Plan is established with the aim of tackling the list of issues raised in regards to realizing a desired new society.

3. Basic policy and plan period

(1) Basic policy

The Basic policy of the LT Plan will set focus on geospatial information field that need to be dealt with in order to maintain the accuracy of surveys and avoid redundant investments to public surveys in response to the support societal changes from the previous LT Plan. As the use of geospatial information takes on greater importance, the following two points are identified as priority strategies through strengthened collaborations among national and local government bodies, the private and academic sectors.

"Capacity building for development and utilization of geospatial information on national level (hereinafter abbreviated to CB Strategy)"

"Promotion of distribution and utilization of publicly owned geospatial information for creation of new industries and improvement of citizens' wellbeing (hereinafter abbreviated to PDU Strategy)"

Notably, disaster prevention measures implemented by administrative bodies will be initially targeted in the first priority strategy, because the public interest in safety and security is increasing enormously.

In the strategies, implementation policies related to development, provision and utilization of geospatial information, collaborations for its advancement and research and development (R&D) will be directed towards the various fields in the public and private sectors. Furthermore, a proactive development and provision of geospatial information will be conducted at the national level,

taking into consideration a flexible stance towards the changing and diversifying needs of society. At the same time, GSI will lead the development and utilization of geospatial information under the framework of industry-academia-government collaboration, given that technological advancements are being made in administrative bodies at national and local levels and private businesses.

Full consideration will also be given in implementation of the LT Plan to the consistency of related policies including: the Basic Plan for the Advancement of Utilizing Geospatial Information; the Priority Plan for Social Infrastructure Development (Cabinet decision, August 31, 2012); Basic Plan for Space Policy; Basic Plan on Ocean Policy (Cabinet decision, April 26, 2013); The Promotion of Earthquake Research (Headquarters for Earthquake Research Promotion decision, April 21, 2009 (Revised on September 6, 2012)) and others.

(2) Plan period

This LT Plan will have to be enforced continually for a fixed period in order to accurately and effectively implement each survey like public surveys based on the results of the basic survey. Also, a certain period of time will be required in order for the plan to take effect in society in order to evaluate its effectiveness. Accordingly, the plan period for this LT Plan will be a 10-year period from FY (fiscal year) 2014 to FY 2023.

4. Policy issues in geospatial information field and the role of Geospatial Information Authority of Japan

Different policy issues and the roles of GSI to tackle with the issues are assumed to implement the two aforementioned priority strategies. With regards to CB Strategy, the issue is the advancement of properly developing and utilizing the required geospatial information (development and provision of geospatial information). With regards to PDU Strategy, the issue is the proper circulation of existing geospatial information and promoting its utilization for the creation of new businesses (promotion of dissemination and utilization of geospatial information). Further, the implementation of the strategies will require collaborations with related organizations. With this in mind, the following issues have been laid out.

(1) Problems facing the enforcement of policy issues

In implementing the two aforementioned strategies, the following problems related to the enforcement of policy issues are considered.

1) "Capacity building for development and utilization of geospatial information on national level (CB Strategy)"

a) Efforts are required to enhance the level of support to improve the overall consciousness and knowledge level of the entire nation in line with the expectation of the use of geospatial information in various fields among the government and the people to create new businesses and improve the convenience of the people's lives.

b) The difference in the degree of actions for development and updating of geospatial information taken in each of the administrative bodies is large. While a stable and effective development and update of geospatial information is a prerequisite for fresh and accurate geospatial information that can be used simply, yet sophisticatedly in order to realize a new society.

c) Although the use of geospatial information is expected especially from the standpoint of the optimization and improvement of the administrative services, the degree of actions taken for geospatial information utilization varies nationwide, likewise the case of its development, with the exception of a small group that is enforcing progressive initiatives leaving substantial room for growth in the widespread use of geospatial information to handle large disasters or environment protection.

d) It is essential that actions be taken to share the best practices of local governments and others for nationwide development, considering that knowledge and experience of local government in terms of applying the benefits of geospatial information of disaster prevention systems and urban management is still undeveloped.

2) "Promotion of distribution and utilization of publicly owned geospatial information for creation of new industries and improvement of citizens' wellbeing (PDU Strategy)"

a) Administrative bodies are develop and possess detailed, fresh and various kinds of geospatial information. However, ambiguous accessibility, use restrictions, and ununified formats of the information make it difficult for

the creation of new businesses and services. Therefore, it is necessary to create an environment where anybody can easily obtain and utilize such information.

b) It is necessary to establish a system that facilitate the use of geospatial information owned by administrative bodies nationwide in consistent with the open data initiatives promoted by the government, promoting the moderate use while keeping national security in mind.

c) Further it is necessary to make efforts to realize prospective measures such as high accuracy positioning which utilize the Quasi-Zenith Satellites System (QZSS) and services based on 3D maps.

(2) The role of Geospatial Information Authority of Japan

Taking visionary of the society to be realized in the future and policy issues for the realization, and recognizing its responsibility for the operation and maintenance of the basic geospatial information as a national institution, the required role of GSI has been laid out as follows.

1) "Capacity building for development and utilization of geospatial information on national level (CB Strategy)"

a) The development and provision of survey results should be proactively implemented by GSI like survey with GNSS-based control station. At the same time, the development and utilization of geospatial information represented by Fundamental Geospatial Information should be advanced

in collaboration with relevant organizations.

b) While improved consciousness and knowledge of geospatial information is required for the entire nation, GSI should initially focus on promoting the use of geospatial information within administrative bodies, in responses to the expected roles as a national institution that are enhancing capacity development of administrative bodies including local governments for developing and utilizing geospatial information at national level and resolving variances in such capacity among administrative bodies.

c) GSI is required to take collaborated supportive actions, keeping regional characteristics in mind because concerns such as disaster and environmental affairs differ by regions where administrative bodies stand and variances are also prevalent in the understanding of administrative staff and the development and update of conditions of geospatial information.

d) As public interests in safety and security is considerably increasing dramatically, the use of geospatial information by administrative bodies should be promoted in disaster prevention field as a foothold, and at the same time, contributions should be particularly made for strengthening resiliency of a region.

2) "Promotion of distribution and utilization of publicly owned geospatial information for creation of new industries and improvement of citizens'

wellbeing (PDU Strategy)"

a) GSI should make even greater efforts to publicize its geospatial information.

b) GSI should show a model case for opening geospatial information accompanied by a manual for administrative bodies for opening geospatial information, and by data standardization policy. This will promote the smooth circulation of accurate and fresh geospatial information nationwide.

c) Fresh geospatial information including updated information owned by GSI should be provided to private businesses and others.

5. Measures for geospatial information development and provision

Measures need be taken to properly develop and provide geospatial information as basic social infrastructure and contribute to the improvement of administrative operation efficiency and functionality through information utilization, in order to implement one of the strategies, "CB Strategy". As well, measures will be required to promote the circulation and utilization of geospatial information for the creation of new businesses through the improved information development capacity of administrative bodies.

Specifically, the development and provision of survey results should be proactively implemented by GSI like survey with GNSS-based control station. At the same time, the development and utilization of geospatial information represented by Fundamental Geospatial Information should be advanced in collaboration with relevant organizations.

It is necessary to build the capacity of geospatial information development and provision in disaster prevention field as a foothold, through the transfer of geospatial information knowledge to administrative bodies in reinforced collaboration prior to the occurrence of disasters, taking into account the increasing public interest in disaster prevention in the nation.

At the same time, its development and provision must be implemented reflecting that the needs for geospatial information will vary depending upon users.

Based on the summary mentioned above, the following measures for the development and provision of geospatial information are laid out.

(1) Measures to continually grasp the situation of the national territory and provide the information to related organizations and the public

It is important that a nation bear responsibility in preparing fresh, locationally accurate, and basic geospatial information from a long-term perspective, and that the information is widely circulated as trustworthy and usable one, in order to build its administrative bodies' capacity for developing and utilizing of geospatial information, situated in ever-changing national geography due to natural phenomena like crustal movements and human activities like development projects. This means that basic surveying results like control points, aerial photos, altitude data and the Digital Japan Basic Map of Japan, must be fresh and continuously updated.

Furthermore, the use of geospatial information conforming to actual application of the administrative bodies will be proposed and promoted by providing information continuously through user-friendly means like the Internet. The following measures will be specifically conducted.

1) The following measures will be conducted regarding control points.

- VLBI (Very Long Baseline Interferometry) projects maintain initial point to effectively maintain updated survey results of control point including GNSS-based control stations will be continuously conducted. Furthermore, surveying results as well as supplemental observational data necessary for surveying, and adjusting information will be provided, thereby reinforcing keeping public surveying results fresh. Taking into account of improvements made in both hardware and software and the usage

environment such as operation of multiple satellite positioning systems (GNSS), and optimized surveys sustained by GNSS, future provision of survey results of control points will be made by utilizing crustal movement information derived from GEONET (GNSS continuous observation system), consisting GNSS-based control stations, and utilization trends of control points. Greater improvements will also be made for GEONET services through the collaboration with private businesses.

- The periodic resurvey for existing triangulation survey points at a certain time interval will be reviewed. A limited number of points will be the subject for resurveys and recalculations to cancel unconformities in geodetic results in the regions where large crustal changes and post-earthquake crustal movements are captured by GEONET. As well, survey results and adjustment parameters as well as the use in public survey and current situation of monuments, as additional qualitative information about results, will be promoted.
- Instead of continually conducting periodic resurveys, leveling survey will be conducted for minimum required leveling routes to maintain the altitude system where a constant change was confirmed by GEONET. However, periodic observations will be continued along the routes for monitoring crustal movement and land subsidence, to detect crustal movement and to provide related organizations with survey results.
- Tidal measurements operations to maintain the origin numerical value of height will be continued. Also, tidal height information required for

deciding nationwide mean sea levels and warnings for tsunami and flood tides will be provided to contribute to national land management and safety and security of the nation.

- Triangulation points will be installed as required on the remote islands that play an important role in determining territorial waters and exclusive economic zones and continuously maintained. Hence, highly precise positional information can be maintained to contribute to our nation's precise understanding of our territorial boundaries.

2) In collaboration with relevant administrative bodies, aerial photos will be continuously taken and provided not only to contribute to the development and update of geospatial information to administrative bodies, but also to contribute to effective territorial management and quick grasp of disaster situations at the time of a disaster. Orthographic images, which are digital images orthorectified that can easily be superimposed onto maps, will be used continuously for optimization of map updates. As well, efforts will therefore be made to develop digital images and photogrammetric ground control points and to develop their wide use with a view to conducting cartography activities in normal periods, and swiftly creating orthographic images to grasp disaster conditions during times of disasters, through collaborations with local public bodies.

3) Integration, management, and provision of existing and newly developed airborne Lidar data presenting altitude data will be conducted, to contribute to the nation's safety and security through the use of administrative bodies'

tsunami and flood countermeasures.

4) In collaboration with local governments and others, Digital Japan Basic Map will be continuously updated with Fundamental Geospatial Information that is the standard of the position in an integrated form. At the same time, GSI will contribute to the use of Digital Japan Basic Map as a jurisdiction map and background map by administrative bodies, by providing the data through the Internet or with electronic topographic maps, digital maps, printed figures at various scales following the society's needs.

5) In anticipation of greater progress in the future development and utilization of 3D geospatial information, the layered structuring and 3D designing of Fundamental Geospatial Information will be promoted through collaborations with related organizations. At the same time, a mechanism for properly handling the 3D geospatial information including underground space, like contributing to the management of underground installations, will be furthered as well. Furthermore, development and provision of geospatial information to improve user-friendliness for the public and help discover new values, like geospatial information with temporal attributions, geospatial information that elderlies can easily use etc., will also be promoted.

6) GSI will take measures to develop, update and standardize geographical

names and related information of Japanese territory. Collaborating with related organizations, GSI will promote to use unified geographical names of remote islands that authenticate territorial waters, in order to implement appropriate protection and management and increase public understanding. Furthermore, the geographical names will be collected and updated in a database and compiled and provided in a user-friendly form as portal information for locational searching.

(2) Measures to properly devise the development and provision of geospatial information in administrative bodies

It is important that the possibilities of utilizing existing basic survey and public surveying results is examined prior to starting a new surveying work responding to geospatial information needs, in order to improve the development and utilization capacity of geospatial information in administrative bodies. As a result, GSI will duly implement basic surveys, properly maintain basic and public survey results, positively advance their release and provision, and pursue policies based on the Surveying Act like public surveying adjustments even further so as to avoid unnecessary redundant investments, and maximize the use of existing survey results. Specifically, user-friendly environments for applying the results of basic and public surveys will be created utilizing means like the Internet. GSI will deepen its collaborations with related administrative bodies and conduct basic surveys in accordance with society's needs for further use of basic survey results.

(3) Measures to ensure accuracy effectively

Precision of surveying results of public surveys should be secured, and continuous improvement in the standards of surveying work methods is indispensable reflecting the progress in surveying technology and societal changes for the improvement of geospatial information maintenance capacity in administrative bodies.

Therefore, Fundamental Geospatial Information, which provides the basis for the cartographic positions, will continuously be developed and updated along with the Digital Japan Basic Map, in collaboration with local governments. As well, altitude surveys utilizing satellite positioning is enabled and the range of public control points that can be directly installed from GNSS-based control stations can be expanded as a result of the improved usage environment for satellite positioning due to launching of the first quasi-zenith satellite. Therefore, optimization and cost reduction can be attained for businesses of administrative bodies by implementing measures to introduce new surveying methods utilizing GNSS for control point surveys and leveling.

(4) Measures to grasp current risk of the country and provide relevant information to related organizations and the public

Many local public governments are reviewing their local disaster prevention plans, and applying various geospatial information to prepare hazard maps, based on the idea of utilizing hardware and software to help prevent and mitigate the disaster damages, applying the experiences of the Great East Japan Earthquake, to prepare for the Nankai Trough earthquake and the Tokyo

Inland Earthquake that are expected to hit Japan. In the case of developing hazard maps, regional disaster characteristics should be taken into account and map specifications should be unified and consistent over a wide geographical area. It should also be considered that the content and quality of the provided disaster prevention information does not differ in different jurisdictions.

Therefore, land condition information pertaining to disaster risks like earthquakes, tsunamis, volcanic eruptions, and heavy rains, such as susceptibility to ground shaking and liquefaction, must be managed and provided with existing and newly developed data. At the same time, the afore mentioned information and its application method must be provided in a simple manner, taking into account the application situation of the administrative bodies, in order to improve their capacity for geospatial information utilization. As well, efforts will be made to provide geographically seamless browsing of damage assessments arranged by the national government for further use of hazard maps. Geographically seamless browsing of hazard maps will be realized in cooperation with related administrative bodies, when cartographic representation of hazard maps by local governments are unified. Furthermore, improvement in user-friendliness will also be explored by overlaying different hazard maps and superimposing hazard maps with disaster prevention information. Moreover, information pertaining to crustal movement information from surveys in normal periods as well as knowledge on how to apply policies will be provided with a view to enhancing utilization capacity of geospatial information with regards to disaster prevention and mitigation.

(5) Measures to grasp disaster damages of the national territory and provide relevant information to related organizations and the public

In Japan, where frequently occurring natural disasters have a direct impact on the lives and properties of the people, the administrative bodies must be proactive in carefully ensuring the aforementioned disaster preparedness. One of the top priority issues for administrative bodies is to quickly grasp disaster damages, to take proper actions right time and early restoration and recovery, maximizing the use of geospatial information. To this end, the following measures will be conducted.

1) When an earthquake with a magnitude that would generate a tsunami is triggered, the origin of the earthquake will be sought from the crustal movement conditions, and the information required to predict a tsunami will be provided to related organizations without delay. At the same time, earthquake and volcanic activity will be quickly grasped and the information will be swiftly provided with the increased use of satellite positioning technologies in the future.

2) Efforts will be made in collaboration with related organizations and frameworks to make the progress of geospatial information development outside of city planning areas as value as that of city planning areas, in order to quickly grasp the disaster conditions and contribute to its restoration and recovery, with regards to regions where damages caused by trench type

earthquakes are anticipated, concerning the geospatial information of areas outside of city planning areas.

3) The following measures will be devised in the period required to take emergency measures immediately after the disaster outbreak over several days.

- A system will be constructed for integration of each type of information provided by various sources online basis following the disaster outbreak on the electronic map on real time basis, to provide the latest map of the disaster stricken area.
- Crustal movement observations, emergency aerial photos taking, and airborne radar observations will be conducted to grasp the disaster situation. The results will be provided with a simple format like a disaster situation map.
- Land subsidence observation results will be provided to related administrative bodies that can be used for countermeasures to help raise the ground of areas where land subsidence was occurred.
- Collaborations with related administrative bodies will be strengthened by improving the application capacity of geospatial information through disaster prevention drills, so that the bodies can effectively use the required information at the time of a disaster. Also, geospatial information can be provided quickly in user-friendly forms in terms of data specifications and acquisition, which can contribute to the smooth implementation of disaster response and simultaneously provide

information to the public through the Internet by grasping the needs of the administrative bodies. As well, collaborations will also be furthered with NPOs during those times.

4) In the post-disaster period including the reconstruction phase, measures will be taken to revise the result revision method and facilities so that the origin numerical value can be properly calculated and the surveying results can be quickly provided after a disaster as problems may arise if surveying results etc. prior to the disaster are used in areas where crustal movements has occurred.

6. Measures for promoting the use of geospatial information

It is first required to circulate the geospatial information owned by administrative bodies and devise its easy, yet high-quality utilization, in order to devise the second Priority Strategy of the LT Plan, "PDU Strategy".

Based on this perspective, three points are laid out below:

i : An environmental improvement that makes geospatial information like the surveying results owned by the administrative bodies easier to be circulated and used;

ii : An environmental improvement to allow private companies to smoothly use the geospatial information of administrative bodies; and

iii : Development of human resources and diffusing knowledge to support the above points i and ii.

Accordingly, the following measures to promote the utilization of geospatial information will be conducted.

However, these measures will be conducted with private rights and profits and national security in mind as ICT continues to develop and new issues are being raised regarding the handling of secret communications, personal information, privacy and intellectual property rights.

(1) Measures regarding an environmental improvement that makes geospatial information like surveying results owned by the administrative bodies easier to be circulated and used.

The following measures will be conducted, in order to create an environmental improvement that makes geospatial information like surveying

results owned by the administrative bodies easier to be circulated and used.

1) GSI will develop the basic survey result in a user-friendly forms required for local government managements, while taking into account their needs. Further, GSI provide such information with a model facilitating information disclosure to enhance the circulation of geospatial information.

2) Taking into account the actual utilization situation and needs of geospatial information by administrative bodies, GSI will provide services to easily use the latest geospatial information like results of public surveys through the Internet. Also, GSI will continuously improve the provision and utilization services of data reflecting changes in societal conditions and needs.

3) While sharing geospatial information with administrative bodies, GSI promotes creating cloud environments for geospatial information of governments and the shared use of programs related to the development and update in light of promoting the optimization of the administration.

4) GSI will provide local government with geospatial information and knowledge as well as utilization method, making avail of past geospatial information related to disaster information. As well, providing models on disclosure methods to promote the circulation of geospatial information related to disaster prevention and mitigation and disasters themselves

developed and owned by local governments, GSI will contribute to improve their disaster resilience capacity.

(2) Measures regarding an environmental improvement to allow private companies to smoothly use the geospatial information of administrative bodies

An environment where the technology and information owned by various actors like administrative bodies, private businesses and NPOs etc. can be easily and steady used, should be created in order for private companies etc. to smoothly use the geospatial information owned by administrative bodies. To this end, the following measures will be conducted.

1) GSI will develop and provide geospatial information like basic surveying results in forms that are high in utility value and easy to use, in order to contribute to the creation of new industries and the convenience of people's lives, leading to the promotion of circulation and utilization of geospatial information owned by administrative bodies. As well, collaborations will be made with related organizations to join positional information with information including statistics that is currently not geo-referenced for value adding.

2) Efforts will be made to grasp the users' needs, and to continuously reflect them to activities to develop and provide geospatial information. Positive implementations will be made to provide updated data of basic surveying

results including differenciated information, to the private sector, for further circulation and utilization of information.

3) Actions will be taken through the framework of GSI Maps so that the geospatial information that should be provided to the public at large can be accessed for free or at least costs, in accordance with laws including The NSDI Act. As well, GSI will promote the use of public survey results through the facilitation of secondary use of basic survey results and consideration of standardized system for data release and provision according to the government's open data initiatives in a manner that takes into account national security through its moderate use.

4) GIS will develop and, through the internet, provide the latest map information that can superimpose other information on the computer. Also, GSI will develop mechanisms including: a mechanism that shares map information; a mechanism that effectively visualizes the information by superimposing various geospatial information with maps and aerial photos using GIS; and a mechanism that allows easier acquisition of geospatial information, which through its promotion will help further use and applications of various positional information services.

5) GSI will promote the use of new satellite positioning technologies using quasi-zenith satellites towards the creation of new locational based services by private businesses and new industries. Specifically, computer-aided

construction in the construction sector will be promoted through improvements in the usage environment of GNSS-based control stations, as well as the optimization of automatic driving and robot technologies will be encouraged. As well, GSI will promote R&D activities through the encouragement and promotion of software and system development by private businesses and NPOs, with a view to further development of technology.

(3) Measures for Human Resource Development and Diffusion of Knowledge

It is necessary to improve the public consciousness and knowledge regarding the use of geospatial information, to popularize survey and GIS technology, and to promote human resources development and knowledge dissemination, contributing to promoting geospatial information utilization, in order to realize a highly geospatially enabled society that can attain safe and prosperous lives for the people. To this end, the following measures will be conducted.

1) Measures will be taken to secure and improve the technological strength of the surveyors including the improvement of the qualification system of surveyors, to catch up with the technological advancement in geospatial information field.

2) Measures will be taken to participate in Geospatial EXPO, aiming at knowledge dissemination and human resources development for administrative bodies, in order for facilitated and high-advanced use of

geospatial information.

3) GSI will strengthen the measures to spread the knowledge about geospatial information in the school education through the service of The Science Museum of Map and Survey, exchange promotion with related organizations nationwide to raise awareness of maps, provision of online education via the Internet, and conducting lectures tours, based on deeper collaborations with educators, in order to develop human resources of younger age to carry the field of geospatial information into the future.

7. Measures for collaboration and research and development

It is not possible for GSI alone to implement the measures, which are mentioned in Chapter 5 and 6, required to enforce two priority strategies of the LT Plan, namely "CB Strategy," and "PDU Strategy,". Thus, proactive collaborations with the national and local government, private sector and academic circles will be imperative. As well, technological progress is so rapid that GSI needs to proactively implement advanced R&D which surveying industry should be working on with long-term perspectives. Furthermore, it is also important that international collaborations be made to promote the development and utilization of geospatial information on a global scale, because the target focus on "Promoting the circulation and utilization of geospatial information owned by administrative bodies to create new businesses" is not limited to domestic domains alone. To this end, the following measures for collaborations and research and developments will be conducted.

(1) Multi-sector collaborations regarding Industry, Academia and Government

GSI will strengthen multi-sector collaborations between related national government ministries and local governments, private sector, and academic circles by utilizing the frameworks of Committee for Advancing the Utilization of Geospatial Information hosted by the national government and the Industry-Academia-Government Collaborative Conference on the Advancement of Utilizing Geospatial Information at national level, as well as the multi-sector regional platforms to exchange views and information in order to cope with policy issues in geospatial information fields. In this regard, it is

especially necessary to consciously prioritize the needs and profits of the partners and to work on individual issues while appropriately taking in the opinions of the user, in order for the smooth implementation of geospatial information policy. More specifically, the following measures will be conducted.

1) GSI will develop and update Fundamental Geospatial Information as a single form with the Digital Japan Basic Map by effectively incorporating the information continually developed and updated by the national and the local governments through the required data elaboration with related organizations, with a view to circulating and using the information in a collaborated way. Also promotions for the use of information like statistics that is not currently explicitly geospatially referenced will be furthered with related organizations. Furthermore, collaborations with related organizations will be made, in order to secure the informational continuity with the geospatial information of ocean areas.

2) The development, provision, and utilization of geospatial information will be promoted through: support for building local disaster prevention capacity; development and provision of information like altitude data that administrative bodies require for their administration; implementation of measures to develop human resources and to disseminate knowledge through seminars and lectures; and promoting mutual use of basic and public survey results based on deeper collaborations with administrative

bodies.

3) Contributions will be made to the attainment of a society with advanced utilization of geospatial information through: the promotion of the use of technology and geospatial information owned and/or created by private businesses and NPOs by collaboration; and the support to the system(s) that allows easy search and acquisition of geospatial information developed and provided by industry, academia and the government.

4) The following measures will be implemented in cooperation with the industry, academia and government to promote new technologies.

- GSI will contribute to create an integration indoor-outdoor environment where geospatial information can be highly utilized through: utilization of location information codes and intelligent geodetic control points; and the development of domestic standards and systems for 3D geospatial information, taking future preparation and services development of indoor-outdoor seamless positional information bases into account.
- In collaboration with related organizations, GSI will take measures to standardize geospatial information with regards to new fields like 3D geospatial information and new technologies like work robots, keeping the trends into account.
- GSI will contribute to leading measures required for preparing structures that will help promote the circulation and utilization of big data by utilizing locational information codes, taking into account the

explosive accumulation of geospatial information resulting from mobile information recorded by personal mobile devices.

(2) International Cooperation

GSI will implement measures from geospatial perspective to solve global issues like global environmental issues and realizing good governance in developing countries through the cooperation with international organizations and foreign governments. At the same time GSI will promote Japanese economic activities overseas in geospatial information field, in order to devise the promotion of developing and utilizing global geospatial information through global cooperation.

Particularly, GSI will promote Global Mapping project for the purpose of grasping the conditions of the world's land areas and sharing them in collaboration with the United Nations towards sustainable developments at global level, GSI will also contribute to the implementation of information exchange about policies and coordinating international opinions about the standardization of geographical names and geospatial information. As well, GSI will promote the maintenance and building of world geodetic reference system regarding joint international observation activities like VLBI and GNSS. Furthermore, GSI will contribute to the maintenance of the geospatial information base in the Asia-Pacific region, and at the same time, GSI will continue to implement necessary regular observations to accumulate Japanese scientific knowledge in the Antarctic area.

(3) Promoting research and development

In collaboration with related organizations, GSI will continuously conduct research and development necessary for the steady advancement of handling the policy issues mentioned in the LT Plan, in response to changing social conditions and technological trends.

As well, GSI will also implement basic research and development and feedback the acquired results into GSI operations and academic domain, in order for the results to be fully utilized for the development of various academic fields, considering that GSI's research and development is based on a broad range of academic disciplines such as geodesy, geography, cartography, civil engineering, and information science.

8. Implementation of the Plan and follow-ups

GSI will draw up, implement and update short-term implementation plans for the implementation of individual policies and measures based on this LT Plan. The plans will be periodically evaluated as a follow-up activity. As well, this LT Plan would be reviewed as necessary to keep in high effectiveness amidst ongoing changes in social conditions.

Attached Table: Goals of the main measures of GSI

1. Measures for geospatial information development and provision

	Goals of the main measures of GSI
(1) Measures to continually grasp the situation of the national territory and provide the information to related organizations and the public	1) Measures regarding the Control Points - VIBL International observations <Continuously> - Continuous GNSS observations with GNSS-based control points and the provision of the results <Nationwide / Continuously> - Update and provision of crustal movements parameters for semi-dynamic correction <Nationwide / Once a year> 2) Measures regarding aerial photos - Taking and providing aerial photos <Nationwide / As required> - Development and provision of orthographic photographs <Nationwide / As required> - Development and provision of photogrammetric ground control points <Nationwide / As required> 3) Measures regarding elevation data - The integration, management, provision, and utilization of existing and newly developed elevation data (including data from airborne Lidar surveying) <Nationwide / Continuously> 4) Measures regarding Digital Japan Basic Map

	- Continuous updates of Digital Japan Basic Map, and its provision as electric topographic maps and digital maps <Nationwide / Continuously> - Continuous update and provision of the areal value of municipalities such as cities, towns and villages using the Digital Japan Basic Map <Nationwide / Once a year> 5) Measures regarding 3D maps - Promoting layered structuring and 3D designing of Fundamental Geospatial Information - Promoting building up a framework for properly handling 3D geospatial information - Promotion towards the development and provision of geospatial information with time attribution 6) Measures regarding geographical names - Development, update and standardization of geographical names <Nationwide / Continuously>
(2) Measures to properly devise the development and provision of geospatial information in	1) Measures regarding the utilization of surveying results - Creating a user-friendly environment for applying surveying results <Nationwide / Temporary>

administrative bodies	
(3) Measures to ensure accuracy effectively	1) Measures regarding Fundamental Geospatial Information - Provision of Fundamental Geospatial Information <Nationwide / quarterly> 2) Measures regarding the introduction of new surveying methods - Utilizing GNSS for control point surveys and leveling <Nationwide / Continuously>
(4) Measures to grasp current risk to the national territory and provide relevant information to related organizations and the public	1) Measures regarding risk information of disasters - Promoting the development and utilization of geospatial information regarding risk information of disasters <Nationwide / Continuously> - Development and provision of crustal movement information <Nationwide / Continuously>
(5) Measures to grasp disaster damages to the national	1) Measures regarding actions immediately after an earthquake and tsunami - Quickly grasping the earthquake and/or volcanic activity situation and providing information <As

territory and provide relevant information to related organizations and the public	required> 2) Measures regarding development of information required to grasp disaster situation - Promoting the development of large-scaled geospatial information with regards to areas outside the city planning areas, devised in cooperation with related organizations 3) Measures regarding emergency support - Real-time information integration using an electronic disaster prevention information system <As required> - Implementing emergency photography directly after disasters and providing to related organizations <As required> - Providing damage maps of disaster situation <As required> - Providing crustal movement results <As required> 4) Measures regarding reconstruction support - Quick implementation of result revisions when surveying results before the disaster cannot be used due to the effects of crustal movement <as required> - Developing and updating of the Digital Japan Basic Map for smooth reconstruction activities in affected areas of the Great East Japan Earthquake <At suitable times according to reconstruction situations>

2. Measures for promoting the use of geospatial information

	Goals of the main measures of GSI
(1) Measures for creating an environment improvement that makes geospatial information like surveying results owned by the administrative bodies easier to be circulated and used	1) Measures regarding the provision of basic survey results - Developing and providing geospatial information in user-friendly forms required for administrative bodies, taking their needs into account 2) Measures regarding result utilization services - Providing services allowing an easy use of the public surveying results through the use of the Internet. 3) Measures increasing efficiency in administration - Promoting the shared use of geospatial information among administrative bodies. 4) Measures regarding the capacity building of disaster resilience - Supporting administrative bodies through providing disaster prevention geospatial information, its utilization methods, and related knowledge
(2) Measures for creating an environment which allows private	1) Measures promoting the circulation and utilization of administrative information - Promoting the development and provision of geospatial information with a high utility value and easy to use

companies to smoothly use the geospatial information of administrative bodies	2) Measures regarding users' needs - Reflecting users' needs to activities to develop and provide geospatial information 3) Measures regarding geospatial information provision to the public at large - Utilizing public surveying results through considering a system for the standardized data release and provision method 4) Measures regarding the easier acquisition of geospatial information - Developing mechanisms for sharing and facilitated acquisition of geospatial information 5) Measures regarding the utilization of new technologies - Promoting utilization measures of new technologies
(3) Measures for human resources development and knowledge dissemination	1) Measures for securing and improving the technological strength of certified surveyors - Improving the qualification system of surveyors 2) Measures regarding knowledge diffusion and human resources development of administrative bodies - Implementing seminars, lectures, lecture tours <Continuously> 3) Measures regarding the development of human resources to carry the field of geospatial information

	into the future - Spreading knowledge and raising awareness on geospatial information through the outreach activities of The Science Museum of Map and Survey <Continuously>

3. Measures regarding collaboration and research and development

	Goals of main measures of GSI
(1) Multi-sector collaborations regarding Industry, Academia and the Government	1) Measures regarding Fundamental Geospatial Information - Promoting the circulation and utilization of geospatial information through collaborations with related organizations 2) Measures regarding development, provision, and utilization of geospatial information - Development and provision of information required by administrative bodies for implementing policies of measures - Promoting the mutual use of basic and public survey results 3) Measures regarding the realization of a society with utilization of geospatial information in a sophisticated manner - Support for building a system that allows easy search and acquisition of geospatial information developed and provided by the industry, academia, and the government 4) Measures for promoting the utilization of new technologies - Promoting the preparation and standardization of

	structures regarding new fields and new technologies that promote the circulation and utilization of geospatial information
(2) International Cooperation	1) Measures regarding the promotion of developing and utilizing geospatial information at global level ・Coordinating the measures regarding international standards, such as the United Nations Conference on Standardization of Geographical Names ・Promoting the Global Mapping project ・Promoting the maintenance and building up of world geodetic reference system ・Promoting the utilization of geospatial information under the United Nations framework, and supporting the development of geospatial information in Asia and the Pacific region. ・Implementation of regular observations in the Antarctic area
(3) Promoting research and development	1) Measures regarding the implementation of research and development ・Steady implementation of research and development to cope with policy issues ・Implementation of basic research and development