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THE FIRST BASIC SPACE PLAN OF JAPAN: WHAT WILL BE CHANGED?

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ABSTRACT

This paper will examine Japan's first comprehensive space policy, Basic Space Plan (BSP) released on 2 June. BSP was formulated by the Strategic Headquarters for Space Development consisting of all Ministers in accordance with Art.24 of the Basic Space Law (BSL), Japan's first national space law promulgated in May 2008. BSP, which will determine the directions of Japan's space development and use for the next 5 years unless a big change occurs, is made up of 7 Action Plans with 6 Basic Targets. BSP demonstrates several things: first, Japan's defense space program is considerably modest, and there is no possibility that Japan would be a space military power; second, the shift from the development to utilization of space is clear, reflecting the provisions in the BSL. Focus is now placed on the space commercialization. As a result, the Governmental measures to commercialize space activities are enumerated in detail; third, the concept "space diplomacy" is newly introduced for Japan's space activities, where Asia is given a special status for the strategic cooperation. Finally, a unique plan is proposed for the lunar exploration. Robots will have landed and done research on the Moon by 2020 before possible manned exploration begins. While the detail of the lunar exploration remains to be decided, such robots may include human-figured 2-leg robots as a substitute of human astronauts.

FULL TEXT

1. Introduction

Japan's first comprehensive medium-term space policy, "Basic Plan for Space Policy" (hereinafter referred to as "Basic Space Plan" or "BSP" unless the formal name is required in the context.) was released on 2 June 2009. This paper will examine the change that the Basic Space Plan will bring about to the Japanese space development and use. First, the background of the Basic Space Plan is briefly explained. Second, the contents of the Basic Space Plan are explained in some detail. Then, the impact of the Plan to the

Japan's space activities is assessed.

2. Road to the first Basic Space Plan

2.1. Basic Space Law as a Basis of the Basic Space Plan

Japan adopted the first national space legislation, "Basic Space Law" in May 2008.¹ Basic Space Bill was first submitted to the House of Representatives by the Ruling Coalition Parties, or the Liberal Democratic Party (LDP) and the

¹ Basic Space Law, Law No. 43 of May 28, 2008.

New Komeito on 20 June 2007.² Primary purposes of the Basic Space Bill include: (a) to promote industrialization and commercialization of Japan's space activities; (b) to relax the interpretation of "peaceful use" of outer space from "non-military" to "non-aggressive" in order to use space for defense purposes; and (c) to streamline Japan's space organizations to better adapt to the new era of space activities in which the use of space for the economic purposes is conspicuous.

The largest Opposition Party, Democratic Party of Japan (DPJ), originally planned to submit its version of a bill on space activities. However, ironically, the difference of the space policy is smaller between the LDP and DPJ than the LDP and the New Komeito,³ and the agreement was reached in late April 2008 between the Ruling Coalition Parties and the DPJ on the prospective Basic Space Law. On 9 May 2008, the new Basic Space Bill, with a minor modification, was submitted to the House of Representatives as a bipartisan bill⁴ and passed into a full-fledged law considerably smoothly, on 21 May 2008.⁵

Art.24 of the Basic Space Law (hereinafter referred to as "BSL" unless the formal name is required in the context.) provides that Strategic Headquarters for Space Development (hereinafter referred to as "Strategic Headquarters") shall formulate a basic plan on space activities including the matters: (a) the basic policy with respect to space development and use; (b) the measures the Government shall implement to promote space development and use comprehensively and systematically; and (c) any

other items necessary for promoting space development and use comprehensively and systematically.⁶ Strategic Headquarters is established under the Cabinet to reorganize Japan's space management structure based on the BSL. The Prime Minister serves as Director-General and all Ministers are members, thus enabling the Strategic Headquarters to formulate a comprehensive national space policy.⁷

2.2. Process of the Endorsement of the Basic Space Plan

On 12 September in 2008, the Experts Research Committee on Space Strategy (hereinafter referred to as "The Experts Research Committee") was set up to study the matters required by the Strategic Headquarters and to give advice thereto.⁸ The Experts Research Committee held 8 meetings before the first Basic Plan for Space Policy was formally endorsed by the Strategic Headquarters on 2 June 2009. 5 Pillars to be included in a BSP were agreed upon at the 3rd meeting held on 27 November 2008. 5 Pillars naturally overlap with the basic measures to be taken by the Government specified in the BSL.⁹

⁶ Art. 24 (1), (2)(i)(ii)(iii).

⁷ Arts.25-34 of the Basic Space Law.

⁸ The Experts Research Committee was established pursuant to the Cabinet Order 251 of 2008. This Committee, comprising of 16 members, has two working groups: one is to study the restructuring of the current space organizations (8 members) and the other is to draft Space Activities Law for enhancing private space activities (11members). The present author is a member of the Experts Research Committee and the 2 working groups.

⁹ Chapter I (General Provisions) provides for the purposes of the Law (Art. 1), Basic Principles (Arts.2-7) and the obligation of the central and local Governments to implement the basic principles of this Law. Then Chapter II (Basic Measures), especially Arts. 13-19 of which, stipulates the concrete measures to achieve basic principles. Arts. 2-7 and 13-19 are the sources of

² Basic Space Bill, Bill No.50 of the 166th Diet.

³ The New Komeito was of the view that the "non-military" policy shall be maintained.

⁴ Bill No. 17 of the 169th Diet.

⁵ Basic Space Law was promulgated a week later. See, *supra*, note 1.

5 Pillars are: (1) space as a tool for realizing secure, safe and affluent society on the Earth;¹⁰ (2) space as a tool for strengthening international and national security;¹¹ (3) the promotion of “space diplomacy”;¹² (4) the advancement of the strategic space industry;¹³ and (5) the pursuit of the aspiration of mankind and the investments for the next generation.¹⁴

Draft BSP was adopted at the 7th meeting of the Experts Research Committee, on 3 April 2009. After the period of the public comments recruitment (from 28 April to 18 May),¹⁵ it was formally adopted at the Experts Research Committee on 26 May before its formal endorsement at the third meeting of the Strategic Headquarters on 2 June 2009.

In the process of making the first BSP, divided opinions were recognized especially on the two points: first is the future development of the already problematic GX rocket (referred to in the section 4 of this paper) and the second is the possible manned lunar exploration.¹⁶ The conclusion reflected in the BSP and the latest developments on those points will be considered below.

3. Contents of the Basic Space Plan

3.1. Table of Contents of the BSP

the 5 Pillars.

¹⁰ BSL, *supra*, note 1, Arts. 3 & 13.

¹¹ *Ibid.*, Arts. 2 & 14.

¹² *Ibid.*, Arts. 6 & 19.

¹³ *Ibid.*, Arts. 4, 15, 16 & 17.

¹⁴ *Ibid.*, Art. 5 & 18.

¹⁵ Exceptionally large number of about 1.500 opinions were submitted to the Strategic Headquarters. See, <http://www.kantei.go.jp/jp/singi/utyuu/pc/090526/090526pc.html> (last visited 5 July 2009) (in Japanese).

¹⁶ Materials submitted to the each meeting of the Experts Research Committee are found: <http://www.kantei.go.jp/jp/singi/utyuu/senmon/> (last visited 6 August 2009) (in Japanese).

Basic Space Plan consists of 4 chapters and 2 appended charts. After the Introduction, Chapter I explains the status of the BSP and relations with the BSL. Chapter II states the basic policy to promote space development and use that is reflected in the 6 Basic Targets. Chapter III, the most important chapter of the BSP, enumerates the Governmental measures to be conducted and Chapter IV specifies the general requirements to realize the goals described in Chapter III. The contents of Chapter III are summarized in the two appended charts attached at the end of the Plan with detailed figures and concrete names of satellites and rockets.

3.2. Six Basic Targets for the Japanese Space

6 Basic Targets are basically taken from the 5 Pillars endorsed by the Strategic Headquarters at its second meeting on 2 December 2008.¹⁷ 6 Basic Targets consist of 5 Pillars plus consideration for the environment, taken from Arts. 7 and 20 of the BSL.

6 Basic Targets are as follows:

- (1) Realization of Safe, Secure and Affluent Society Using Space;¹⁸
- (2) The Strengthened Security Using Space;¹⁹
- (3) Promotion of Space Diplomacy;²⁰
- (4) Creation of a Bright Future through the Promotion of State-of-the-Art Research and Development (“R & D”);²¹
- (5) Nurture of the Strategic Industries for the 21st

¹⁷ 6 Basic Targets are, naturally adopted based on the basic principles (Arts.2-7) and basic measures (Arts. 13- 23) of the BSL. <http://www.kantei.go.jp/jp/singi/utyuu/honbu/dai2/siryuu2.pdf> (last visited 6 July 2008) (in Japanese).

¹⁸ Strategic Headquarters for Space Development, *Basic Plan for Space Policy: Wisdom of Japan Moves Space* (2 June 2009) (in Japanese), p.5.

¹⁹ *Ibid.*, pp.5-6.

²⁰ *Ibid.*, pp.6-8.

²¹ *Ibid.*, pp.8-9.

Century;²² and

(6) Consideration for the Environment;²³

In order to realize 6 Basic Targets, first section of the Chapter III describes in detail what kinds of satellites, launch vehicles and other space objects will be needed. That is 5 utilization systems (System A to System E) and 4 R & D programs (Program F to Program I) selected as concrete measures which the Government has to take for the next 5 years, based on a hard look at what things will be like 10 years from now, or 10-year goal.²⁴ Such 9 systems and programs will be conducted, taking note of the views and opinions by the future “Promotion and Coordination Committee of the Space Development and Use” (hereinafter referred to as the “Coordination Committee”) comprising of the experts from the industry, universities and other research institutions as well as the Government.²⁵

Second section of the Chapter III describes how the 6 Basic Targets shall be translated into 7 concrete Action Plans. Target 4 is divided into 2 plans, one is for the pursuit of the state-of-the-art space R & D and the other is the nurture of the human resources for the next generation. In the latter plan, human resources imply both space experts and Japanese nationals in general whose space science literacy has to be enhanced as a taxpayer and a supporter of the national space activities.

This section contains explanation on how A to I systems and programs will be used to achieve 6 Basic Targets which are concretized in 7 Action Plans.²⁶

A to I systems and programs are as follows:

A Land and Ocean Observation Satellite System to Contribute to the Asia and Other Regions;

B Earth Environmental Observation and Meteorological Satellite System;

C Advanced Information and Telecommunications Satellite System;

D Navigation Satellite System;

E Satellite System for Security Purposes;

(A to E are satellite utilization systems)

F Space Science Program;

G Human Space Activity Program;

H Space Solar Power System R& D Program; and

I Small Demonstration Satellite Program

(F to I are R & D programs)

3.3. 7 Action Plans to Achieve 6 Basic Targets

3.3.1. Action Plan 1: The Promotion of Space Development and Use to Contribute to Realization of a Safe, Secure and Affluent Society (to Achieve Target 1)

Utilization Systems A to D will be made use of for attaining the safe, secure and the affluent society.

10-year goal of System A (Land and Ocean Observation Satellite System) is to contribute to the public safety of Asia such as disaster management, land protection and management, as well as stable supply of the food, resources and energy. The construction of the land remote sensing satellites and data relay satellites as well as the extensive use of the GPS are required for constructing this system.²⁷ For that purpose, the goal for the next 5 years is to collect images of the area hit by a natural disaster within 3 hours from the occurrence of such a disaster and to provide the necessary data to the affected area. ALOS-2

²² *Ibid.*, pp.9-11.

²³ *Ibid.*, p.11.

²⁴ *Ibid.*, pp.12-25.

²⁵ *Ibid.*, p.12.

²⁶ *Ibid.*, pp.25-42.

²⁷ Detailed information on the R & D and launching schedule are shown in the Appended Charts-2 to the BSP.

(L-band radar) of Japan Aerospace Exploration Agency (JAXA), public-private ASUNARO small demonstration remote sensing satellites, and another Data Relay Technology Satellite (DRTS) will be developed and launched.²⁸

The 10-year goal for the system B (Earth Environmental Observation and Meteorological Satellite System) includes public safety, the improvement of food supply and constructing a low-carbon society. It is suggested that much improved capability of the meteorological satellites and the effective operation of Greenhouse Gases Observing Satellite, GOSAT (“IBUKI”), launched in January 2009, should be realized.²⁹ For the 5-year plan, Global Change Observation Mission (GCOM)-W satellite will be launched and GCOM-C will be developed.³⁰

System C (Advanced Information and Telecommunications Satellite System) aims at deploying engineering demonstration satellite for the mobile telecommunications within 10 years for securing the telecommunications when a disaster takes place. For the 5-year plan, operational demonstrative experiments on the ultra high speed internet will be carried out in the Asia-Pacific region and remote islands of Japan using Wideband InterNetworking engineering test and Demonstration Satellite, or WINDS (“Kizuna”). Demonstrative experiments on the mobile telecommunications will be conducted using the Engineering Test Satellite VIII

²⁸ Currently, one DRTS (“Kodama”) is used for relaying ALOS-1 (“Daichi”) satellite. BSP, *supra*, note 18, pp.12-16, 25-27.

²⁹ *Ibid.*, pp.16-17. For instance, with respect to the meteorological satellites, the frequencies of the observation of the clouds and water vapor in the air will be observed every 10 minutes down from the interval of every 30 minutes currently, and the resolution would be twice as good. *Ibid.*, p.16.

³⁰ *Ibid.*, pp.16-18.

(ETS-VIII)(“Kiku” No.8).³¹

System D (Navigation Satellites Systems) has an ambitious goal. Planned Japanese navigation system, known as a 3 Quasi-Zenith Satellite (QZS) constellation is to supplement the US GPS. For the next 5 years, engineering and application test will be conducted to put the first QZS in an operational phase. The future of a QZS system remains to be well decided, and in the BSP, the possibility is suggested that 7 satellite constellation may be pursued. If it is realized, then, the self-contained navigation system will be maintained covering the East Asia and Oceania.³²

To effectively utilize systems A to D, it is underlined in the BSP that user-friendly satellite data utilization system is essential. That is planned to be fulfilled through (a) the respect of the user’s needs and their opinions on the sensors, satellites and data modalities;³³ (b) the establishment of a more user-friendly archiving and distribution system of satellite imaging data; and (c) standardized data policy. The data policy will be adopted within 2 years in a manner that strikes a good balance between the data made by the public funds for the distribution as widely as possible for the public interests and the data made by the commercial entities to obtain proceeds.³⁴

3.3.2 Action Plan 2: Strengthening Japan’s Security (To Achieve Target 2)

For the purpose of Target 2, system E, or satellite systems for security purposes will be utilized. Carrying out this action plan, civil technology will be made the most of and, dual use of the space technology shall be enhanced by all the Governmental Authorities. One example of

³¹ *Ibid.*, pp.18-19.

³² *Ibid.*, pp.19-20.

³³ The Coordination Committee will play a central role to reflect the user community’s preferences.

³⁴ BSP, *supra*, note 18, pp. 25-27.

dual use, stated in the BSP, is an early warning sensor useful for detecting a missile launching as well as a forest fire. Cooperation among related agencies will be accelerated due to the lack of Japan's experience in the security use of space.³⁵

As tasked by Art. 23 of the BSL, data management of the images for security purposes has to be a mandate in the near future. In most spacefaring nations, so called "shutter control" or the restriction to sense and distribute data on a certain area for a certain period is usually employed. Necessary rules on the satellite data distribution shall be considered in cooperation with the "Council on the Promotion of the Use of Geographic Information".³⁶

For the 5-year plan, IGS constellation comprising of two optical satellites and two radar satellites shall be realized so that an IGS will be able to revisit a certain point on the Earth within 24 hours.³⁷ As a 10-year plan, improving information gathering capabilities by the IGS and the strengthening the warning and monitoring systems in the surrounding area shall be acquired. In this connection, the research on the early-warning sensors has to be accelerated.³⁸ It is stated in the BSP that the military space program will be also determined in the new National Defense Program Outline (NDPO) and in the Mid-Term Defense Buildup Program (MDBP) slated to be released in December 2009,

³⁵ *Ibid.*, p.27.

³⁶ *Ibid.*

³⁷ *Ibid.*, pp.20-21. The first 2 IGS (1 optical and 1 radar) were successfully launched into orbit in March 2003. But the radar satellites failed to function since as of March 2007. Second launching of the 2 IGS constellation failed in November, 2003. Third launching of 2 IGS was successful in February, 2007. Thus, as of August 2009, 2 optical and 1 radar IGS have been in the operation.

³⁸ BSP, *supra*, note 18, pp.20-21.

and that the coordination has to be made between the contents of NDPO, MDBP and BSP.³⁹

3.3.3. Action Plan 3: Space Diplomacy (to Achieve Target 3)

"Space Diplomacy" has two meanings. The first is "Space-for-Diplomacy" implying the utilization of the space capability to accomplish the foreign policy goal of Japan. In its context, space capability is regarded as a kind of "soft power". The second is "Diplomacy-for-Space", which means that diplomatic efforts have to be made to advance Japan's space activities and to make favorable international conditions for them. For that purpose, Japan will use the special diplomatic ties and the public funds such as Official Development Assistance (ODA) to launch a joint space project with a developing country, to deepen cooperation with spacefaring nations, and to actively engage in the rule-making in space law at the international fora. In the sphere of space law, a short-term target is to actively engage in rule-making in space debris mitigation and the medium-to-long term targets include the active participation in the rule-making of the property rights of natural resources on the Moon and space traffic management.⁴⁰

All the systems and programs referred to in the BSP, or systems and programs A to I will be utilized for the "space diplomacy". The following 3 areas are especially strongly pursued:

(a) Contribution to the Asia-Pacific Region

"Sentinel Asia" project launched in 2006 under the Asia-Pacific Regional Space Agency Forum (APRSAP) led by Japan will be extensively used as a cooperative project within this region. ODA and other financial assistance should be used, in order to deepen bilateral space

³⁹ *Ibid.*, p.6.

⁴⁰ *Ibid.*, pp.6-8.

cooperation.⁴¹ However, considering the limitation of APRSAF as a forum between the space agencies of the Asia-Pacific region, a governmental-level space network shall be constructed.⁴²

QZS constellation shall be used, taking the special note that the data will be useful especially for some parts of the Asia-Pacific region, because it is covered by the QZS constellation. Advanced meteorological data by MTSAT (“Himawari”) will be made available for disaster management and environmental observation to the region. Such cooperation has to be conducted in a manner that the Japanese space activities will be openly recognized by the partners and their nationals. Depending on Japan’s future capability, contribution shall be extended to the Middle East, Africa and Latin America.⁴³

(b) Contribution to the Earth Environmental Issues

Japan will actively engage in Group on Earth Observation, especially in its Global Earth Observation System of Systems (GEOSS) 10-year Implementation Plan.⁴⁴ Data and analyzed information of GOSAT, GCOM constellation and advanced MTSAT-8 and 9 will be widely distributed, and capacity building in human resources will be actively conducted so that Japan will play a leading role at the global frameworks for the environmental observation and monitoring.

⁴¹ Examples would be the data provision collected by Sentinel Asia to the nations participating in the APRSAF and the construction of a ground station in an Asian country using ODA and other public funds. *Ibid.*, p.28.

⁴² An Asian regional science and technology ministerial meeting is a candidate on which an intergovernmental network will be established. *Ibid.*

⁴³ *Ibid.*, pp.27-28.

⁴⁴ *Ibid.*, p.7.

(c) Enhancing Bilateral Relationship

In addition to the already strong relationship between the US and European countries, deepening bilateral relationship with other areas will be endeavored, taking the special account of the following conditions: (i) bilateral relationship will start when the demand of a potential partner is clearly identified. Overseas offices of the Ministry of Foreign Affairs (MOFA), other Governmental agencies and private companies will help to collect information about the demand of a local government; (ii) the coordination among internal agencies of Japan shall be strengthened; (iii) a future bilateral space project arrangement with developing countries will start with the help of the various public funds such as ODA and financing from Japan Bank for International Cooperation (JBIC) as well as technology transfer and capacity building in human resources; (iv) Prime Minister’s “top-level sales” initiative shall be actively utilized; and (v) bilateral cooperation will start only when a certain project is believed to surely help to increase “human security” in the partner country.⁴⁵

3.3.4. Action Plan 4: Promotion of the State-of-the-Art R & D to Play a Leading Role in the International Society (to Achieve Target 4)⁴⁶

Fundamental importance of the state-of-the-art R & D is reconfirmed in the BSP. In order to promote the state-of-the-art R & D in space science, programs F (Space Science Program), G (Human Space Activity Program) and H (Space Solar Power System R & D Program) are relevant.

In the BSP, focus is placed upon the promotion of space science to challenge for scientific

⁴⁵ *Ibid.*, p.29.

⁴⁶ Target 4 is divided into two Action Plans, or Action Plan 4 and Action Plan 7.

discovery, human space activity and the leading R & D for contributing to address the environmental and energy problems. As the only Asian participant in the International Space Station (ISS) project, BSP notes that Japan should offer the experimental opportunities in “Kibo”, Japan’s module of the ISS for other Asian nations. H-II Transfer Vehicle (HTV) will be transported to the ISS every year since 2009 to provide necessary materials.⁴⁷ One unique plan is, while it largely depends on the future feasibility study, “Kibo” will be intensively used, in part, as an “Earth Observation and Examination Station”(EOES). It is required in the BSP that Japan should decide its plan on the future of the ISS, or after the planned termination year of 2016, taking a special note of Japan’s future human space program.

With respect to the planetary exploration, lunar exploration is given the top priority. Still much remains to be decided as of June 2009, tentative program is that in the first phase (until 2020), the goal is the exploration of the Moon by advanced robots. Such robots may include human figured two-leg robots, as a substitute of a human being presence. In the second phase, the exploration will be conducted by both human astronauts and robots using the lunar post. The time table remains to be decided.⁴⁸ The mixed evaluation on the independent human space activity as a goal for Japan to pursue is reflected in the ambiguous reference about the lunar manned activity plan in the BSP.⁴⁹ As referred to in the BSP, manned exploration of the Moon satisfies, on one hand, multiple goals of Japan’s space activities such as the contribution to the intellectual assets of

humankind, obtaining the cutting-edge technology to generate new industry, effective space diplomacy, the enhancement of the international presence, national pride and aspiration. However, on the other hand, such program is exorbitantly costly for one country and it has to be reminded that the life loss in the process may affect the whole space program.⁵⁰ A study will be conducted taking about a year from 2009 about the issues including its significance, goal, targeted results, technological steps, medium-to-long term schedule and cost of the robots-human exploration program.⁵¹

For shifting to the low carbon society, more efforts shall be made to establish a system of photovoltaic power generation in outer space. That is why the R & D on the solar power satellite (SPS) system will be conducted. The time schedule of realizing SPS will be measured based on the development of the renewable energy technology such as solar power and wind power generation on the Earth.⁵²

3.3.5. Action Plan 5: Promotion of the Nurturing of Space Industry as a Strategic Industry (to Achieve Target 5)

All A to I systems and Programs will be used to achieve this goal. Measures to encourage space industrialization is most comprehensively

⁵⁰ *Ibid.*

⁵¹ Based on the request of the BSP, Council on the Lunar Exploration was established under the Minister of State for Space on 17 July 2009. First meeting was held on 4 August. The present author is a member of this Council.

⁵² For the 5-years plan, relevant agencies will investigate the appropriate system for the SPS along with the technological experiments of energy transmission on the Earth. On-orbit experiments will start in around 2012 using the “Kibo” or small satellites in order to investigate the effect in the atmosphere. BSP, *supra*, note 18, pp.31-32.

⁴⁷ *Ibid.*, p.23. The first launching of the HTV was successfully conducted on 11 September 2009 and it was attached to the Space Shuttle on 18 September.

⁴⁸ *Ibid.*, pp.30-31.

⁴⁹ *Ibid.*

enumerated among the 7 Action Plans to achieve 6 Basic Targets in the BSP.

Because Japan's space industry is not only lacking in the international competitiveness, but also declining,⁵³ it is stated that the Government shall take necessary measures to reverse the trends. Central measures recommended for the Government and the industry includes the effective Public-Private-Partnership (PPP) and, product-purchase guarantee.⁵⁴ Taxational, financial and other Measures shall be taken in consideration of the great financial risks for private entities and so as to make an internationally competitive environment in the space service market.⁵⁵

Other Governmental measures to enhance the international competitiveness are as follows: for instance, in order to double the sales of the satellites, rockets, and their parts and components, the Government will enlarge the opportunity to make available public facilities and installations to the private sector, and will endeavor to acquire necessary radio frequencies and orbital slots from the ITU as well as duly publicize mid-to-long term R & D plans to the private sector for the

⁵³ One estimate says that the proceeds of the space industry have decreased by about 40 percent from 1998 to 2006 and number of employees, about 30 percent. *Ibid.*, p.10.

⁵⁴ *Ibid.*, pp. 9-11.

⁵⁵ Financial measures include export finance of JBIC, trade insurance of Japan Trade Insurance, and public funds of the Development Bank of Japan (DBJ), Japan Finance Corporation (JFC), etc. Such funds are used with regard to R & D of space objects and provision of the space-based service. Special tax reduction programs such as R & D tax program, investment promotion tax program for smaller businesses, small business capital investment tax program (Angel Tax Credit Program) and exemptions from customs are considered in the BSP. Consumption tax for the export of launching services is exempted. *Ibid.*, pp. 36-37.

predictability of private sector's investments.⁵⁶

BSP underlined that the risk for the new technology development has to be minimized by building up an ingenious assistance mechanism to advance space industry. An example is the use of a small satellite for a technological experiment before putting state-of-the-art sensors on-board an operational and practical-use satellite. The Government will grant support on manufacturing, launching and operating small satellites (from about 100 kilograms to about 1000 kilograms) and micro satellite (no heavier than 100 kilograms) for the next 5 years, especially to small venture businesses and universities.⁵⁷

It is stated that strengthened cooperation on the short-term and mid-to-long-term R & D is required among the public and the private sectors, and most advanced scientific research circle and the space industry. Also stated is the efforts to be made to sell a whole set of space assets, i.e., from a satellite to ground stations, to the maintenance service and also to the personnel training.⁵⁸

Governmental obligation to assist the competitiveness of the Japan's mainstay rockets, H-IIA and H-IIB⁵⁹ by a variety of measures is also noted including by enhancing its technological reliability.⁶⁰ A Japanese rocket will be given a priority in concluding a launch contract with a Governmental mission, and Japanese companies are also encouraged to use a Japanese

⁵⁶ *Ibid.*, pp.32-33.

⁵⁷ *Ibid.*, pp.24-25.

⁵⁸ *Ibid.*, pp.32-34.

⁵⁹ H-IIA rocket was transferred to the private Mitsubishi Heavy Industry (MHI) from JAXA on 1 April 2007. H-IIB was successfully launched on 11 September 2009.

⁶⁰ Space Activities Law of Japan, planned to be submitted to the Diet in January 2010, may help the private industry concerning the governmental indemnification as found in the US Commercial Space Launch Act(1984 as amended), French Space Operations Law (2008), etc.

rocket for launching their satellites. Launching capability and reliability of Japan's mainstay rockets, H-IIA and H-IIB shall be enhanced along with the efforts for decreasing the operational costs. A next generation solid propellant rocket, currently developed,⁶¹ is important for the prompt launching when it is needed, and it will be developed in order to launch the scientific research probes and smaller satellite for the Earth observation.⁶² R & D of the future transportation system shall be conducted including a reusable transportation system, orbit transfer vehicle and air-launch system.⁶³ The fate of the medium-sized GX rockets, under the development phase, remained to be decided in the BSP. What happened to the GX rocket will be briefly referred to in the section 4 of this paper.

Launching sites and the important infrastructure to assure the access to outer space, are maintained and operated by JAXA. Many facilities and installations at the launching sites are already aged and need to be appropriately renovated. Renovation and the improvement of the capability of the launching sites have to be systematically carried out along with the improvement of the better launching environments such as the termination of the 190-days restriction set for the fishermen's interests.⁶⁴

For the promotion of the industry, capacity building of the small businesses, coordination among industries, universities and Governmental agencies, technology transfer and the provision of

the satellite data to the private sector will be facilitated.⁶⁵

3.3.6 Action Plan 6: Environmental Protection (to Achieve Target 6)

Space activities shall be conducted without compromising the space and the Earth environment. A to I systems and programs, or all the systems and programs relate to the goal of the environmental protection. BSP states that further contribution by Japan is also required concerning the space debris mitigation.⁶⁶ For that purpose, enhancing space situational awareness capability,⁶⁷ efforts to minimize the generation of debris in accordance with COPUOS Space Debris Mitigation Guidelines (2007) and Inter-Agency Space Debris Coordination Committee (IADC) Guidelines, as well as R & D of the disposal of the generated debris⁶⁸ are needed. Space weather forecast will be steadfastly studied since natural phenomena such as solar winds affect the space activities.

Likewise, space development and use shall be conducted in order not to adversely affect the Earth environment. For that purpose, space activities have to be undertaken based on the ISO 14.000 standards, etc.⁶⁹

3.3.7 Action Plan 7: Investment for the Next

⁶⁵ BSP, *supra*, note 18, pp.36-37.

⁶⁶ *Ibid.*, p.11.

⁶⁷ Japanese capability to catalogue orbital space debris is limited to meters-level debris recognition in the low earth orbits. Therefore, coordination and cooperation with Ministry of Defense (MOD) of Japan and the use of observation data from spacefaring nations have to be initiated to have sub-meter level precision data. *Ibid.*, p.38.

⁶⁸ BSP reads that technology for catching space debris and disposing them from the orbits shall be studied aiming at on-orbit technological experiments using devices such as small satellites through international cooperation. *Ibid.*, p. 39.

⁶⁹ *Ibid.*, pp.38-39.

⁶¹ BSP, *supra*, note 18, p 34. Japan's solid propellant rocket, M-5 series ended its missions in 2006.

⁶² *Ibid.*, pp. 34-36.

⁶³ *Ibid.*, p.36.

⁶⁴ The contract between JAXA and the local fishermen restricts the number of possible launching days up to 190 days a year.

Generation Human Resources and the Promotion of Nation-Wide Participation (to Achieve Target 4)

System A to Program I, or all the systems and programs relate to the seventh Action Plan. The necessity of the nurture of the researchers and engineers for the next generation is underlined, facing up to the increasing difficulties to maintain the able and experienced engineers under the circumstances of continuous decrease in proceeds and number of employees in Japan's space industry. Measures to be taken are: the strengthening of the space education and research at universities and other research institutions; the nurture of engineers and scientists through the coordination between space agencies and universities; long-term plans to nurture human resources; and strengthening of the capacity building in the Asian region by various measures such as accepting foreign students and young professionals from Asian countries and carrying out joint development programs, e.g., developing small satellites within the framework of APRSAF.

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So as to secure the continuous advancement of space development and use, appropriate knowledge and information have to be shared among the children nation-wide. Also, taxpayers' understanding is essential for the sustainable space exploration and use that needs great amount of costs. For that purpose, space outreach programs have to be conducted.⁷¹

3.3.8. Other Requirements to Realize BSP

In Chapter IV of the BSP, 6 requirements to comprehensively fulfill the mandates of the BSP

⁷⁰ *Ibid.*, pp.39-40.

⁷¹ *Ibid.*, pp.41-42. Detailed outreach programs are proposed in this section especially for elementary school students.

are specified. Such requirements are as follows: first, the Government shall endeavor to take necessary measures for the smooth implementation of the BSP in accordance with the supplementary provisions of the BSL; second, appropriating a necessary budget for each fiscal year must be realized to the extent permitted by the State's finances in order to ensure payment of the expenses required for the implementation of the Plan; third, annual outcome of the measures taken pursuant to BSP, or a follow-up report will be publicized through the internet and in other appropriate means. Based on the follow-up report and opinions of the Coordination Committee between suppliers and users, necessary changes shall be made both on the Plan itself and the concrete measures; fourth, the functions to do research and analyze the present situation and future prospective of the space development and use of the international society have to be strengthened; and fifth, Space Activities Law containing appropriate licensing systems, third party liability and insurance requirements, will be enacted; and finally, coordination with other laws has to be ensured for the smooth implementation of this BSP.⁷²

4. Assessment of the Basic Space Plan

Governmental activities based on BSP have just begun with asking for a budgetary appropriation for the goals enumerated. While it is too early to evaluate the impact of the BSP, a preliminary assessment and future speculation will be made in this last section.

⁷² Such law and governmental instruments include, e.g., Science and Technology Basic Plan, Economic Growth Strategy Guidelines, Basic Maritime Plan, Basic Plan on the Promotion of the Use of Geographic Information and other policies of relevant ministries and agencies. *Ibid.*, p.44.

First, it has to be underlined that the plan for security use of space is considerably modest. As described in the Action Plan 2 (Strengthening Japan's Security) (To Achieve Target 2 "The Strengthened Security Using Space"), the security to be pursued is more for the human security in connection with the first Target, "Realization of Safe, Secure and Affluent Society Using Space" rather than just for the pursuit of national military security. While IGS constellation is to be maintained and augmented in number, the goal is a modest 4 satellite constellation, as planned even before the BSL was enacted. Due to the lift of the ban of the military use of space, the precision of the sensor resolution on board IGS does not have to be restricted within that is available in the market, but it does not seem to proceed with a full-scale militarization of space. Adding to that, R & D of the early warning satellites are not planned in the BSP albeit it is thought to be a priority in enhancing the missile defense capability. Only the research on the early-warning sensors is suggested in the BSP, and the significance of the R & D of the dual-use technology and the utilization of civilian technology ("spin-on") is repeatedly underlined.

Further, NDPO, originally planned to be released in December 2009 may be delayed due to the change of the government from LDP led Coalition to DPJ that is more cautious about Japan's defense programs in general, not only in space. Thus, it may be said that in the near future, military use of space in Japan will not be seriously pursued.

Second, the shift of the focus is most clearly declared from R & D for the pursuit of the state-of-the-art technology to the user-friendly application satellites, responding to the societal needs. The need of producing a same series of practical-use application satellites is also

underscored to provide the data and analysed information to the users in and out of Japan on stable basis. Likewise, among the Governmental measures to take, nurturing strategic industry seems to be given the top priority. Most detailed concrete measures to be taken by the Government are specified in the BSP.

Although the fate remained uncertain in the BSP about the further development of public-private medium-sized GX rocket, on 25 August 2008, it was formally cancelled as the decision of the Strategic Headquarters except the LNG engine parts that has a competitive edge.⁷³ It is a sound judgement, considering the development was far behind the schedule and tight budget for the various goals in space development and use. Also, that the cancellation was decided based on the technological viability by the experts, not being so much influenced by the politico-industry connections, seems to give a hope for the future industrialization and commercialization of space. It means that the leadership of the Strategic Headquarters is duly demonstrated, which seems one of the first accomplishments of the BSL.

Third, the concept of "space diplomacy" is clearly introduced to Japan's space policy with the focus in the Asian region. In connection with one of the space application Targets to make a "Secure, Safe and Affluent Society", if a series of planned satellites are to be successfully launched and operated, "space diplomacy" in the Asian region may have a good possibility of a success. For that purpose, the first QZS has to be successfully launched as scheduled in 2010 and the complete plan on its constellation has to be

⁷³ That decision was released by the name of the vice-directors of the Strategic Headquarters, or Chief Cabinet Secretary and Minister of State for Space.

decided at the earliest opportunity including if it stays 3 satellites as planned before or will endeavor to have 7 satellite fleet. Needless to say, the appropriate allocation of the resources must be duly taken into consideration.

Fourth, the roadmap of a lunar exploration has to be clarified. Although an exploration by the robots until 2020 and the combined human and robots exploration beyond 2020 were specified in the Action Plan 4 of the BSP, several points remain considerably unclear. Points to be clarified include the clear and detailed goal of Japan's lunar exploration; technological challenges on the advanced robots to function on the Moon; the expected outcome from the robots development toward the fostering the Japan's industrial capability as a whole; and the timetable, manner and scale of the human activity on the Moon. The conclusion is slated to be reached at the "Council on the Moon Exploration" in the summer of 2010. Among the points of discussions mentioned just above, two of them have more importance: first is a detailed plan on a human space program including the possibility of independent manned space program. Japan produced the largest number of astronauts in Asian countries within the international cooperative program. If only international programs will be conducted in the future as well, or parallel efforts be made for the independent program will be clearly decided with a detailed schedule. Also, if two-leg robots will be introduced for the lunar exploration as a symbolic substitute of a human astronaut shall be discussed fully in terms of technological feasibility and efficiency as well as the cultural implications in the coming space age.

Last, Space Activities Bill is planned to be submitted to the Diet in January 2010. Effective mechanisms have to be constructed in the third party liability provisions and the appropriate

Governmental support for the private sector in addition to the easy and clear licensing system. Considering that the BSP suggests an air-launch system that can offset the deficiencies of 190 launching days at Tanegashima Space Center, it may be an idea to amend the current aviation law to enable an air-based launching of a space object.

It has to be noted that an adequate legal regime can assist the commercialization of space as much as the subsidy in financial means. Because the success of commercialization of space hinges on various factors including the contents of a future Space Activities Law, the situation of the international markets, the satisfactory execution of the BSP and the technological capability of Japan's private sector, it is difficult to foresee the success at this stage, but at least it may be said that it is not a bad start.