

Recommendation for a Comprehensive Space Strategy  
to Implement Japan's National Strategy

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With the Basic Act on Space instituted in May 2008, Japan's space policy, which focuses on science and technology (R&D), has expanded to include National security and industrial promotion – a shift from space development to space use.

Since the Basic Space Law, however, Japan's efforts to develop and use space have not necessarily been in line with the principle of the law in terms of budget, political measures and systems, which can be partly attributed to the regime change from the LDP to the DPJ in 2009. In the US, Russia and China, meanwhile, space policies are positioned as national strategies set out by the heads of states.

Japan's space budget is separately administered by the ministries and agencies concerned, which makes government of Japan to spend its whole resources inefficiently and causes the disproportionate portfolio of 3 major perspectives, National security, Industrial promotion and Science and Technology.

The space budget should be allocated to National security and Industrial promotion in addition to Science and Technology. The space policy has not been sufficiently discussed from the perspective of National security, which means that space has yet to be fully used to ensure security.

At the same time, the sectionalism among the ministries and agencies hampers information sharing, resulting in the absence of an integrated system to address national security, industrial promotion and science and technology and, by extension, in a decrease in the space industry's workforce, companies' withdrawal from the space industry and uncertainties in satellite projects (including those for remote sensing satellites) in and after 2018; Japan's space development efforts are stalled.

Based on the recognition of these problems, the subcommittee focuses on National security, which has not been fully discussed in the space policy. Taking into account changes in the environment surrounding Japan, the subcommittee has held discussions with experts eight times already, the results of which are summarized herein as recommendations by the LDP.

It is recommended that the Strategic Headquarters for Space Development reflects these recommendations in the New Space Development Plan (which was set by the headquarters in January 2013) and, in line with the policy of Japan's National Security Council, ensures consistency with other policies (for maritime security, cyber-attacks, etc.) and carries out the space policy as part of the national strategy, transcending the boundaries between the ministries and agencies.

## **1. Recognition of the status**

### **(1) Changes in Japan's security environment**

Japan's security environment is becoming increasingly severe, while China, India, etc. are rising in the 21st century, causing a major shift in the power relations in the international community.

On the international front, there are growing risks of the proliferation of weapons of mass destruction and terrorisms, with global commons, human security and the global economy also being at risk.

In the Asia Pacific region, meanwhile, North Korea is strengthening its military power and provoking neighboring countries, while China is extending its reach outside its territory, raising tensions in the region (The National Security Strategy, which was endorsed by the Cabinet on December 17, 2013).

China, moreover, is beginning to claim command of space (the right to secure space as a national territory) in addition to that of the seas and air.

Other critical issues include technological advancement, changes in the nature of threats and risks, multilateral cooperation in security in each region, an increase in serious conflicts that should be resolved by the international community and changes in the role of the Self-Defense Forces in the international community. The environment surrounding Japan's diplomacy, security and self-defense is changing as well at an unprecedented scale and pace (the report dated May 15, 2014 on the round-table conference on reconstruction of the legal infrastructure for National security).

## **(2) Development of the National Security Strategy**

Under such circumstances, the National Security Strategy and the National Defense Program Guidelines were endorsed by the Cabinet of Prime Minister Shinzo Abe on December 17, 2013, based on a long-term perspective to secure Japan's national interest. They are designed to determine the direction Japan should be heading in the international community and to take national measures to ensure security.

The National Security Strategy aims to address risks that hamper free access and use of global commons (the seas, space and cyberspace), based on the recognition that the significance of space in view of national security has increased substantially in recent years – e.g., enhanced information gathering and warning/surveillance activity, and security of communications for military purposes.

Specifically, measures that should be taken to ensure national security vary, including: development of international rules for space activities; strengthening of the Japan-US alliance through cooperation in space development; strengthening of MDA (Maritime Domain Awareness) using space; establishment of SSA (Space Situational Awareness) systems; integration and sharing of satellite information in the fields of information gathering/analysis, military information communications and positioning technology; defense against ballistic missile attacks; countermeasures for large-scale disasters; and security of autonomous launching systems

## **(3) The advent of the new era of Japan-US space cooperation**

In line with the proactive pacifism based on the principle of international cooperation, cooperation with each country needs to be promoted, based on the Japan-US alliance, in order to address national security issues and achieve the said objectives.

It is obvious that Japan cannot cope with changes in the security environment mentioned above and ensure its national security without the Japan-US alliance, while Japan must contribute to keeping regional peace and security through cooperation with the US and other allies.

With this as a backdrop, the Japanese and the US governments agreed to review the Japan-US Defense Cooperation Guidelines at the Japan-US Security Consultative Committee (2+2), which was held in October 2013, with discussions underway to promote security and defense cooperation, including role sharing between the two countries to contribute to maintaining the regional peace and security.

At the same time, the second meeting of the Japan-US Comprehensive Dialogue on Space, which was held in May 2014, confirmed that “a new era of Japan-US space cooperation has emerged where Japan’s space activities contribute to enhancing the resilience of space assets indispensable to the security of the two countries, with the security issues they face taken into account.”

Specific areas of interest include remote sensing data policies, positioning through the US GPS and Japan’s quasi-zenith satellite systems, SSA and MDA. In particular, where the US defense and space budget is expected to be cut for financial reasons, changes in the international security system and possible impacts on the security of Asia and Oceania should be factored in.

In the new era of the Japan-US space cooperation, therefore, Japan should promote cooperation with the US in the security of space and with other allies in the consistent use of space, taking into account technological advancement and changes in the nature of threats and risks. In other words, Japan should play a key role in the international community, including Asia and Oceania.

## **2. Recommendations**

### **2.1 Implementation of the national space business and security of the space budget**

#### **(1) Development of space policy guidelines**

The following policy guidelines should be developed immediately to practice the principle of the Basic Act on Space, thereby characterizing the national space business and designating the ministries and agencies in charge of space development.

##### **a) National Security Space Strategy**

It is a document presenting the principle of the security of space (the definition of the strategic space environment, strategic objectives, strategic approaches, etc.). The National Security Council and the Strategic Headquarters for Space Development should work together to develop Japan's National Security Space Strategy (NSSS).

#### **b) Long-term Space Infrastructure Development Plan**

It is a document designed to implement the national space strategy, presenting a space infrastructure development plan for 2030-2050. The Strategic Headquarters for Space Development and The National Security Council should work together to map out technological strategies and develop the Long-term Space Infrastructure Development Plan.

#### **(2) Allocation of sufficient budget for space development and promotion of space business**

Projects designated in Japan's NSSS and the Long-term Space Infrastructure Development Plan should be funded separately from the existing space budget.

Specifically, budget should be allocated to National security and industrial promotion, separately from the existing budget for science and technology, to secure a maximum of about 2.5 trillion yen (five years) in the public and private sectors (from about 300 billion yen/year today to about 500 billion yen/year in the future), a commitment made in the Space Development Plan, which was set up when the Basic Action on Space was instituted. As for the space budget of the Ministry of Defense, ballistic missile expenditures should be excluded to focus on the development and use of space infrastructure.

When sectionalism and other circumstances unique to each ministry and agency prevent an increase of the budget for space policy and smooth operation of the projects, the prime minister, as the head of the Strategic Headquarters for Space Development, should consider new measures based on the suggestion from the space policy committee to increase budget and new governmental frameworks to promote space policy from mid and long term perspectives, including the integration of budgets to the Cabinet Office and the establishment of the "Space Agency" (provisional name) .

### **(3) Strengthening of the Japan-US alliance through the space policy**

The Japan-US alliance is key to Japan's policy for national security. The space policy will be defined in the Japan-US Defense Cooperation Guidelines, which are scheduled for revision this year, while the alliance will be strengthened through space cooperation between the two countries, specifically through positioning (quasi-zenith) satellites, SSA, MDA, etc.

In particular, quasi-zenith programs are expected to play a pivotal role in positioning policies in Asia and Oceania, with the complementary relationship with the US GPS system strengthened further. In promoting MDA through the alliance, meanwhile, data from remote sensing satellites that can also be used for MDA should be shared between the two countries. Japan, therefore, needs to develop a policy for handling data from remote sensing satellites.

As for SSA, JAXA should provide SSA data immediately, while those controlling JAXA (the Ministry of Education, Culture, Sports, Science and Technology, the Ministry of Economy, Trade and Industry, the Cabinet Office and the relevant ministries and agencies being in charge of national security etc.) should be responsible for careful handling of security data.

Note: The policy for handling data from remote sensing satellite concerns data acquisition (judgment of requests for taking images, evaluation of imaging priorities, etc.), data storage, security, data distribution (restrictions on data distribution abroad), pricing, data ownership, copyrights, etc.

### **(5) Development of systems to use and manage space infrastructure by the Ministry of Defense**

Systems to use and manage space infrastructure by the Ministry of Defense has yet to be developed; there are no clear guidelines in place to make use of space security.

The Ministry of Defense, therefore, needs to set guidelines for the use of space infrastructure based on the newly developed National Security Strategy and the National Defense Program Guidelines. At the same time, space infrastructure that contributes to building flexible defense capabilities should be developed and operated as soon as possible through, for example, establishment of the space department in the ministry.

The ministry should also study measures against cyber-attacks on artificial

satellites, ground stations, etc. to ensure the security of the use of space, thereby enhancing the resilience of the space infrastructure of the Ministry of Defense.

## **2.3 Development of the foundation including a legal system**

### **(1) Maintenance and reinforcement of industrial infrastructure supporting Japan's space policy**

The government should provide industry with a technology strategy map to set up a long-term space infrastructure development plan toward 2030-2050, thereby reducing business risks for private businesses and promoting capital investment and the development of human resources.

In addition to forecasting demand based on the plan, the government should also promote the private sector's investment in the space industry, develop a legal system to encourage new entries, provide technically advanced Japanese companies with opportunities for in-orbit demonstration to help them go global, examine measures to reduce the procurement costs of parts and equipment, promote cooperation with US on industry and R&D, establish a resilient supply chain that is not heavily dependent only on US-made parts, and come up with measures to enhance the global competitiveness of Japan's space industry.

JAXA, on the other hand, should support independent R&D programs to be implemented in the private sector in accordance with the long-term space infrastructure development plan, develop and demonstrate advanced technologies such as hyper-spectral sensors and next-generation satellite communication systems, and promote exports of space infrastructure packages through a public-private alliance to help Japanese companies go global, which in turn is expected to drive the domestic economy.

Also essential is to boost the Asia-Pacific Regional Space Agency Forum (APRSAF) (upgrading it to a cabinet-level council) to enhance Japan's diplomatic power and to fundamentally strengthen international space cooperation in the Asia-Pacific region primarily through the Japan-US alliance.

Hyper-spectral sensors are optical sensors that can monitor the land surface using about 200 observation frequencies – e.g., advanced oil resource



exploration, identification and exploration of mineral deposits, etc.)

## **(2) Development of a legal system**

While Article 35 of the Basic stipulates that laws and regulations governing space activities be developed, the Cabinet Committee of the House of Representatives and the House of Councilors decided to develop them (provisionally called the Space Activity Law) within two years after the enforcement of the act. The legal framework, however, has yet to be established.

Rockets are being developed entirely with private funds in the US, where the private sector is playing an increasing role in the space industry. The Space Activity Law (provisional name) should thus be instituted as soon as possible to help the private sector promote their space business.

In addition, the Japanese version of the Remote Sensing Law (provisional name), which is key to encouraging private business to operate remote sensing satellites and promote sales of satellite data in the global marketplace and contributes to promoting MDA, should be instituted. The Japan-US Agreement on Satellite Procurement, which was made in 1990, needs to be reconsidered.

(Reference: The Space Activity Law)

The law complies with international commitments, such as supervision and permission by the government (with respect to launching and retrieval of space objects, management of satellites, etc.), registration of space objects (registration, retrieval of space debris, etc.), compensations for damages in space (liabilities for satellite-launching businesses, compensations for damages in space relevant to satellite management, etc.). It also sets out regulations for the development of the space industry (support for small- to medium-size businesses, etc.).

(Reference: The Japanese version of the Remote Sensing Law)

The law sets out regulations, such as data and security policies (protection of users' information, qualification requirements, operators' security clearances, access rights, requirements for the security of operation centers, etc.).

## **2.4 Promotion of key space projects**

### **2.4.1 Satellites and ground facilities for the National Security Strategy, etc.**

#### **(1) Measures to build MDA quickly**

While capitalizing and sharing available information on MDA and taking into account relevant programs underway in the US and Europe as well as technical

aspects for the use of satellites, appropriate measures should be taken to build space-based MDA. Specifically, they include the use of satellites with different masses (2-ton, 500-kg and 100-kg class satellites), leveraging their characteristics (performance, costs, etc.), and examination of options such as unmanned airplanes and airships. Accordingly, the government should consolidate the information for sharing purposes and establish a system to mobilize a working group as needed.

In promoting MDA, moreover, it is important to strengthen satellite communication capabilities (data relay), ground data processing systems and dedicated organizations for the use of satellite images as the number of satellites increases. At the same time, the world's most advanced analysis system (ID → data extraction → data identification → data tracing) should be developed to keep track of seaborne objects, taking into account multipurpose use by the private sector.

As MDA is a critical issue in the framework of multilateral coordination as well as for the Japan-US alliance, Japan's National Security Council, the Strategic Headquarters for Space Development, the Headquarters for Ocean Policy, the Maritime Self-Defense Force, the Japan Coast Guard, the Ministry of Foreign Affairs etc. should work together to further share the information they need.

## **(2) Establishment of an SSA system as early as possible**

An SSA system consisting primarily of optical and radar facilities should be established according to the agreement made between Japan and the US in order to strengthen the alliance.

In addition, the SSA Integrated Monitoring and Analysis Center (provisional name) should be established for information sharing purposes. There is also a need to create a communication security system for JAXA, an SSA provider, and to establish procedures for the exchange of information with the US forces, etc.

## **(3) Establishment of a system consisting of 7satellites as early as possible**

The Cabinet decided on September 30, 2011 to establish a system consisting of 4satellites in the latter half of the 2010s, with a total of 7satellites scheduled for operation in the near future for continuous positioning. Accordingly, succeeding

satellites of Michibiki should be developed to establish a new system consisting of 7 satellites (4 in quasi-zenith orbits and 3 in geostationary orbits), thereby strengthening the Japan-US alliance. The complementary relationship with the US GPS system should also be strengthened to play a pivotal role in positioning policies in Asia and Oceania.

#### **(4) Development of a remote sensing satellite plan as early as possible**

As part of the Long-term Space Infrastructure Development Plan, a remote sensing satellite development plan for 2018 and beyond should be developed as early as possible to strengthen the basis of the space industry, which is key to manufacturing satellites and sensors.

In developing the plan, all technological maps imaginable need to be presented, including measures to maintain Japan's technological advantages, establish a presence in the global community, promote resource diplomacy, monitor large-scale disasters, make efficient use of national land and leverage remote sensing satellites in the field of MDA (monitoring of the Arctic Ocean, sea lanes, suspicious vessels, etc.). In addition, development priorities should be determined by selecting policies to serve Japan's national interests from a comprehensive viewpoint.

#### **(5) Coordination between information-gathering satellites and small satellites**

The current information-gathering satellites systems are consist of 4 satellites. It needs to be expanded to 10 satellites including the data-relay communication satellites. The obtained data will also be used for other purposes such as disaster monitoring according to some specific rules with paying attentions to ensuring information control.

The data relay satellites on the table should be deployed as early as possible. Also, the usability of a fleet of small satellites (each with a mass of 100-500 kg) designed for observing specific areas should be investigated with considering some cooperation with the information-gathering satellites.

#### **(6) Deployment of defense satellites including early-warning satellite**

Informed discussions are needed to deploy an X-band communication system

and deploy defense satellites as early as possible, including early-warning satellites and those designed to gather image and radio wave information.

Early-warning satellites track ballistic missiles, which take only several minutes to reach Japan from neighboring countries. With this in mind, there is a pressing need to develop and deploy early-warning sensors in cooperation with the US, given that it takes time to accumulate and analyze data from early-warning satellites.

Satellites designed to gather radio wave information are more “real time” in their nature than imaging satellites, while Japan’s space industry is technologically capable of developing them in a short period of time. As their operation doesn’t require ground stations, they should be discussed as a viable option.

#### **(7)Technology demonstration, test satellites and enhancement of the international competitiveness of Japan’s space industry**

There is a need to develop a fleet of ALOSs (Advanced Land Observing Satellites) equipped with innovative sensors (infrared sensors, hyper-spectral sensors, etc.) indispensable for future earth observation satellites (at least two units in five years) and of engineering test satellites for the demonstration of large-scale bus systems and new elemental technologies, both of which are key to surviving competition in the communication satellite market (at least one unit in five years).

There is also a need to provide technically advanced Japanese companies with opportunities for in-orbit demonstration to help them go global, examine measures to reduce the procurement costs of parts and equipment, promote cooperation with US on industry and R&D, establish a resilient supply chain that is not heavily dependent only on US-made parts and deal with the privatization of the US space industry, all designed to enhance the international competitiveness of Japan’s space industry.

#### **2.4.2 Rockets and launching sites**

While major countries such as the US, Russia, China and those in Europe are promoting space transportation systems as the basis of space infrastructure, which is key to ensuring national security, such awareness remains low in Japan due to the interpretation of the parliament’s longstanding resolution on the

peaceful uses of outer space.

With emphasis on defense purposes, multiple functions and resilience/robustness, there is a pressing need to build new launching sites and review existing systems including those for operation to establish a new core system.

### **(1) Development of new main rockets**

It is essential that the H-III rocket (provisional name) be developed to maintain Japan's capability of launching satellites on its own. New types of first-stage and second-stage liquid rocket engines, therefore, should be developed before fuselages, etc. according to a phased-plan.

### **(2) Improvement of the performance of the Epsilon rocket**

While the Epsilon rocket is playing a vital role in promoting space probe and science, immediate measures should be taken to improve its performance and build launching sites, thereby launching low-earth-orbit satellites, which contribute to Japan's national security, in a prompt, safe and cost-efficient manner.

### **(3) Development of launching sites**

As the launching sites and facilities in Tanegashima and Uchinoura are both dilapidated, immediate measures should be taken to renovate them or to develop a wide-area space center, including new launching sites that have little restrictions on launching periods and capacities, with rigorous security measures in place.

## **2.5 Issues to be addressed in FY 2015**

The following pending issues identified by the subcommittee should be studied and examined further in FY 2015 to be materialized.

### **(1) Effective use of satellite data**

A national system should be discussed and examined for the effective and integrated use of data from reconnaissance/surveillance satellites (gathering of images and radio-wave information, early-warning purposes), communication satellites, positioning satellites, earth observation satellites, meteorological

satellites with paying attention to protecting classified information carefully in addition to developing common infrastructure (such as satellites and data centers to be shared among ministries and agencies) and constellations consisting of single-function, small-size, low-cost, mass-produced satellites.

### **(2) Effective use of technologies for future space transportation systems**

LNG engines should be demonstrated in space as early as possible to tap the international market as they can readily be stored, reused and maintained in space and are compatible with lunar/mars landing engines, orbit transfer vehicles and sub-orbital space planes for space tourism. Air-launch systems should also be demonstrated as they are cost effective and compatible with launching small satellites in a timely manner, which is key to ensuring Japan's national security. In addition, the feasibility of supersonic ramjet engines and reusable space planes should be examined, taking into account the integration of spacecraft and aircraft.

### **(3) A wide-area space center including new launching sites**

Plans to set up new launching sites should be implemented, with emphasis on their independence and security, and the feasibility of building a wide-area space center should be examined, including launching facilities for observation rockets, suborbital rockets for space tourism, satellite-launching rockets, unmanned vehicles, high-altitude balloons, unmanned airships, research aircraft, etc.

### **(4) JAXA's National security system and advanced R&D programs**

JAXA is expected to develop a system to establish Japan's NSSS in cooperation with the Ministry of Defense. Specifically, JAXA should cooperate with the ministries and agencies concerned in promoting advanced R&D programs, while serving as Japan's DARPA in Japan's space policy.

Note: DARPA (Defense Advanced Research Projects Agency) is an agency of the US Department of Defense, tasked with R&D for military purposes.

### **(5) Think tank function**

The feasibility of establishing a permanent, independent think tank should be examined to gather/analyze information, provide policy options and contribute to Japan's grand design (Japan's NSSS, the Long-term Space Infrastructure Development Plan, etc.), responding changes in world affairs in a timely manner.

