

Outline of the Basic Plan on Space Policy (Provisional Translation)

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Preamble

Today, the role of space systems becomes more important than ever, in the context of our national security, economy, and society. This trend is likely to further develop in the years to come. Under these circumstances, space activities are entered into an era driven by public-private collaborations instead of conventional government-led initiatives. As a result, wide-ranging fields of industries are being invigorated through space utilization. Moreover, progress in space exploration expands the sphere of human activities beyond the earth's orbit to reach the lunar surface, and further beyond into deep space. **Space assumes more importance as a frontier of science and technology and a driving force for economic growth. It has also potential to be a major driving force for the economic growth of Japan.**

On the other hand, space security is a matter of urgency, as an increasing number of countries, including the United States, **regard outer space as a “Warfighting Domain” or an “Operational Domain”**, while there is suggestion of the increasing threats in outer space, including the development of various means of disturbance not limited to destruction of satellites by missile strikes or other ways as has been discussed. In addition, a growing number of small satellites constellations is changing the game for the space industry. Japan's space equipment industry is, however, lagging behind these trends. While space-related technologies are undergoing a rapid evolution, **the reinforcement of the industrial, scientific and technological basis is an immediate challenge to maintain the autonomy of space activities that Japan has built up since the end of the Second World War.**

The Government of Japan, recognizing such huge potential of outer space and the severe challenges that it is facing, hereby decides **a basic plan on space policy for coming ten years foreseeing the next two decades. It will secure necessary resources including sufficient budget and effectively and efficiently utilize these resources to strengthen its space policy through a whole-of-government- approach,** while promoting public-private collaborations.

For the time being, Japan faces one of the worst socio-economic challenges ever in the postwar era, posed by the impact of Coronavirus Disease 2019 (COVID-19). While the response to this crisis is the highest priority in the current situation, it is necessary to build a resilient social structure foreseeing the future especially in such time. **Space systems providing positioning, and timing information, images, communication and other functions, are expected to further contribute to the society and economy, since they constitute the basis for a secure, digitalized and remotely-controlled society.**

The basis of our space industry, including local and start-up businesses has been considerably damaged in the midst of the socio-economic crisis. The Government of Japan needs to continuously support its maintenance and growth **with a view to ensuring the sustainable development of space systems.**

Moreover, particularly in such a difficult time, it is important to move forward with a long-term perspective to give hopes to people. Japan needs to continue an intellectual endeavor on the frontiers of outer space.

1. Awareness of Current Situation surrounding Japan's Space Policy

(1) Increasing importance of outer space on national security

- The achievement of superiority in outer space is essential as a matter of national security.
- Some countries have strengthened the use of outer space, such as the establishment of a space force by the United States and France.

(2) Rising dependence of society on space systems

- Space systems will be indispensable in Society 5.0.
- Space systems are expected to play a larger role in disaster management, national resilience, solving global issues including climate change, and achieving the SDGs.

(3) Emerging serious risks interfering with sustainable and stable use of outer space

- Risks interfere with the sustainable and stable use of outer space become more serious, such as congestion of outer space and development of counter space capabilities.
- In order to address those risks, states have to engage in proactive actions, such as confidence building and international rule-making.

(4) Expanded space activities in other countries

- Outer space has been transformed into a multipolar structure. China and India have rapidly strengthened their presence in addition to the United States and Russia.
- Other countries are also actively engaged in space activities. Demand for space systems is expected to grow.

(5) Expanded space activities in the private sector and emerging new business models

- A game change by large capital investments of the United States and other countries (e.g. low-cost launch services, small satellite constellations).
- Japanese start-ups also become active, while the existing space equipment industry is lagging behind that of the United States and Europe.

(6) Emerging areas of space activities

- New space businesses such as sub-orbital flight and space debris-removal services are actively launched.
- Participation in the US-led international space exploration (the Artemis Program), which aims for sustainable activities on the moon with a prospect for Mars exploration.

(7) Rapid evolution of science and technology

- Miniaturization, lowering costs, satellite constellations, greater flexibility, mass production, space optical communications, quantum key distribution, artificial intelligence, robotics, and more.
- The US, Europe and other countries use advanced science and technologies developed for national security to enhance competitiveness of the space and other related industries.

2. Targets of Japan's Space Policy

To contribute to a wide range of national interests, Japan cooperates strategically aims to become a self-sustained space faring nation strategically collaborating with its ally and partners, strengthens its industrial, scientific and technological bases for autonomous space activities, and expands space utilization which enables it to become self sustained with a virtuous cycle of strengthened foundations and expanded space utilization.

(1) Contributing to a wide range of national interests

① Ensuring space security

- Ensuring the sustainable and stable use of outer space
- Strengthening capabilities to ensure superiority in use of space
- Strengthening space cooperation with the United States and other partners in the area of national security

② Contributing to disaster management, national resilience, and solving global issues

- Contributing to large-scale disaster management as well as maintenance and management of infrastructure
- Contributing to solving global issues and to achieving the sustainable development goals (SDGs)

③ Creation of new knowledge through space science and exploration

- Creation of world-class outcomes by strengthening space science and exploration, which has contributed to securing Japan's presence

④ Realizing economic growth and innovation for which space is the driving force through

- Strengthening space systems further as an important element of infrastructure and expanding their use by which economic growth and innovation are achieved

(2) Strengthening the comprehensive foundations of Japan's space activities including industrial, scientific and technological bases

- Recreation of an ecosystem for Japan's space industry by proactively promoting international cooperation where necessary, while thoroughly aiming to become self-sustained in areas where necessary and incorporating new entrants.
- Promoting the following actions in accordance with a strategy based on intensive research and analysis; (1) upgrading of space transportation systems, (2) development and demonstrations of satellites incorporating leading-edge technologies, (3) arrangement of the regulatory environment for geospatial information use, (4) cultivation and mobilization of human resources, and (5) international rule-making and space cooperation.

3. Basic stance in promoting space policy

(1) Goal-oriented approach

- Sticking to a goal-oriented approach to ensure that systems developed under an appropriate division of roles between private and public sectors function effectively in the entire system.
- Demonstrating technology strategically in a timely manner to obtain a concrete outcome.

(2) Making the most use of private-sector vitality

- Promoting space policy by securing necessary financial resources while providing investment predictability to the private sector.
- Maximizing procurements from the private sector.

(3) Effectively utilizing human resources and funds

- Enhancing space policy as a whole, while effectively and efficiently utilizing resources.
- Improving leading-edge technologies for national security and space science exploration, and diverting the outcomes to the space industry to utilize them effectively.
- Enhancing personnel exchanges with other industries and activating the flow of funds.

(4) Strategic cooperation with the ally and partners

- Promoting international rule-making and international cooperation, and taking a primary role in achieving economic prosperity and ensuring peace and stability in cooperation with the ally and partners (contributing to maintaining and promoting the Free and Open Indo-Pacific).
- Cooperating strategically with the ally and partners as appropriate in developing technologies, while utilizing Japan's strengths.

※ Based on the National Security Strategy, due consideration should be made to mid-to long term national security in promoting the development and use of space

4. Specific Approaches to Space Policy (1) Ensuring space security

<Basic concepts>

- Developing space systems for positioning, communication, information gathering, and maritime domain awareness (MDA) and further improvement of their capabilities.
- Cooperating with the ally and partners to build systems necessary for space situational awareness (SSA) and other functions.
- Strengthening capabilities for mission assurance and engaging in international rule-making.

<Major Programs>

i Quasi-Zenith Satellite System (QZSS)

- Establishing a seven-satellite constellation and commencing development of successors in order to maintain and improve capabilities for sustained positioning.

ii X-band defense satellite communications networks

- Launching the third satellite by the Japan fiscal year 2022.

iii Information-gathering satellites

- Increasing the number of satellites to establish a ten-satellite constellation.

iv Operationally responsive small satellite systems

- Investigating the needs and operational concepts for operationally responsive small satellites.

v Utilizing commercial satellites

- Ensuring redundancy through the use of commercial satellites.

vi Early-warning function

- Studying the use of small satellite constellations taking into account collaboration with the United States.

vii Maritime Domain Awareness (MDA)

- Promoting the use of space technologies for enhanced MDA.

viii Space Situational Awareness (SSA)

- Commencing operation of a SSA system.

ix Strengthening mission assurance for the entire space systems

- Investigating policies to maintain and strengthen mission assurance for the entire space system in a comprehensive and continuous manner.

x International rule-makings through strategic collaborations with the ally and partners

- Promoting effective rule-making in strategic cooperation with the ally and partners.

(2) Contribution to disaster management, national resilience, and solving global issues

<Basic concepts>

- Steadily developing and utilizing space systems for positioning, communications, broadcasting, meteorology, environmental observation, earth observation, and other purposes according to user needs, improving disaster prevention and management capabilities, and contributing to achieving the SDGs and solving global issues.
- Pursuing development of new satellites and upgrading sensor technologies under appropriate inter-agency collaboration.

<Major programs>

i Meteorological satellites

- Commencing the operations of “Himawari-9” in Japan fiscal year 2022.
- Commencing to manufacture a successor satellite in Japan fiscal year 2023.

ii Greenhouse gases observing satellites

- Launching the third satellite in Japan fiscal year 2023. Contributing to the implementation of the Paris Agreement.

iii Earth observation satellites and sensors

- Launching the Advanced Land Observing Satellite-3 (ALOS-3) and the Advanced Land Observing Satellite-4 (ALOS-4) and continuously upgrading core satellite technologies, such as radar and microwave radiometer technologies, as well as strengthening the Data Integration and Analysis System (DIAS).

iv Quasi-Zenith Satellite System (QZSS)

- QZSS Safety Confirmation Service (Q-ANPI) will be available to around twenty prefectures in fiscal year 2021 in cooperation with the Strategic Innovation Promotion Program (SIP).

v Information-gathering satellites

- Use of images for early detection of damage in the event of a large-scale natural disaster.

vi Utilizing satellite data for disaster management and national resilience

- Developing and utilizing a system to analyze and to share satellite data for a timely ascertainment of the situation at the time of disaster by Japan fiscal year 2022.

vii Resource exploration sensors (Hyperspectral sensors)

- Commencing nominal operations of “HISUP”, a hyperspectral sensor launched and installed on-board the ISS at the end of 2019 at an early date.

(3) Creation of new knowledge through space science and exploration

<Basic concepts>

- Enhancing space science and exploration by leading international missions.
- Taking a whole-government approach on the US-led Artemis Program to maintain autonomy in participating in the program, while considering it from the perspectives of other fields, such as economic activities, diplomacy and national security.
- Utilizing the ISS for international space exploration activities as well as pursuing efficient operations.

<Major Programs>

i Space science and exploration

- Taking a bottom-up approach of space science and exploration, based on highly evaluated technologies such as those used in the “HAYABUSA” mission and proactively participating in international missions.
- Promoting research and development of common and innovative technologies that should be acquired first in the world.

ii Participation in international space exploration

- Leveraging the participation in the US-led international space exploration program (the Artemis Program) to make Japan’s presence as a leading space power such as securing opportunities for Japanese astronauts to play an active role and pursuing significant programs by taking a whole-government approach.
- Contributing with habitation technology, resupply supply and lunar-surface mobility where Japan has technological advantages. Moreover, investigating areas in positioning, communications, remote sensing, multi-site exploration by small satellites, three-dimensional exploration, sample return and astronomical observation.

iii Low-earth orbit activities, including the International Space Station (ISS)

- Making full use of the ISS as a site for technological demonstration for international space exploration activities, while working on cost-effectiveness.
- Connecting cooperation with ISS partners with international lunar surface exploration and future low-earth orbit activities in a seamless and efficient manner.

(4) Realizing economic growth and innovation for which space is the driving force

<Basic concepts>

- Strengthening space systems and expanding their use in Society 5.0, with making them a driving force for Japan's economic growth and innovation..
- Building a basis to sustain Japan's space activities and expanding space utilization as well as boosting local economies by collaboration with the Regional Revitalization initiative.
- Aiming to double the size of the space industry (approximately 1.2 trillion yen) by the early 2030s Accelerating the spread of automated driving and smart agriculture and creating a positive economic effect on a wide range of areas by expanding space utilization..

<Major programs>

i Expanding the use of satellite data

- Promoting the use of satellite data and establishing a task force.
- Promoting Geospatial Projects based on the use of Quasi-Zenith Satellites.

ii Open and freely accessible government satellite data

- Establishing a system of open, free and accessible data.

iii Government satellite data platform

- Improving the functions of “Tellus” making the most of private-sector vitality.

iv Development of a framework for SSA services provided for the private-sector

- Starting inter-ministerial study in early Japan fiscal year 2020 to seek to develop the framework.

v Expansion of procurement from private entities including start-ups in government projects

- Maximizing procurement from private entities including start-ups.

vi Enhancing business creation- and open innovation by JAXA

- Stimulating business creation through the use of research and development outcomes by utilizing the investment function and effectively using intellectual property.

vii Promotion of the entry of companies from other industries and start-ups into the space industry

- Promoting various programs such as matching, business idea contests, supplying risk money, and forming communities.

viii Regulatory environment

- Facilitating systems for regulatory environment necessary for suborbital flight, space resource exploitation, and on-orbit servicing.

ix Launch site and spaceports

- Identifying necessary measures for the development of launch sites and spaceports.

x Promotion of overseas activities

- Facilitating overseas business activities in both areas of providing space-based solutions overseas as well as exporting equipment.

xi Promotion of the participation of the private sector in lunar exploration

- Building a community of interested companies and enterprises and developing a common platform technologies in collaboration with the private sector.

xii Promotion of economic activities in low-earth orbit, including the ISS

- Promoting the creation of new business services in low-earth orbit.

(5) Strengthening the comprehensive foundations of Japan's space activities including industrial, scientific and technological bases

<Basic concepts>

- Strengthening the capacity to develop and operate satellites that offer functions vital to ensuring national security, disaster management, national resilience, and space transportation systems in a self-sustained manner.
- Strengthening the foundations of space activities, such as enhanced cultivation of human resources to expand the space sector, a preferable environment for intellectual property activities, international rule-making and international space cooperation.

<Major programs>

i Development and operation of mainstay rockets

- Promoting the development and continuous upgrading of mainstay rockets and using them as the first choice for launching government satellites.

ii Research and development of future space transportation systems

- Promoting research and development of innovative future space transportation system technologies with the aim of drastic reductions in cost.

iii Establishment of a framework for strategically promoting the development and demonstrations of satellites (satellite development and demonstration platform)

- Establishing a framework for promoting the development and demonstrations of satellites to meet anticipated future user needs.

iv Development of innovative basic technologies related to satellites

- Developing and demonstrating platform technologies for technologies pertaining to quantum key distribution, space optical communications, greater flexibility, satellite constellations and terahertz wave, and establishing technology transformation satellite program using small satellites, etc. under the framework of iii.

v Consideration of ideal human space activities

vi Space debris management

- Developing technologies for removing and mitigating space debris and leading international rulemaking.

vii Research and development of space based solar power system

- Promoting initiatives including consideration for moving to demonstration experiment phase.

viii Monitoring of space environment (space weather)

- Promoting space weather forecasts and upgrade systems.

ix Strengthening the basis of human resource sustaining space activities

- Cultivation of next-generation human resources and individuals specializing in the humanities and social sciences, mobilization of human resources, and incorporating diverse human resources into the space field.

x Developing environments for intellectual property activities in the space field

- Collecting and providing information on space-related patent application trends.

xi Strengthening supply chains in the space industry

- Investigation to identify important technologies and providing selective support.

xii Promoting international rule-making

- Assuming a larger role in effective international rule-making.

xiii Enhancing international space cooperation

- Promoting multilayered international cooperation on wide-ranging areas.

xiv Strengthening research and analysis and strategy planning functions

xv Enhancing greater public awareness