

**Proactive and Strategic Space Development & Utilization
-For Economic Growth and Security & Safety-
(tentative translation)**

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1. Foreword

We are now living in a “century of data” and it is said that data is a “fuel” of economic growth. In this situation, there will be an increasing need for proactive and strategic space utilization in order to achieve economic growth and provide the people’s overall security and safety.

Space has unparalleled advantages in collecting various data from various places on the earth and distributing some data to numerous businesses and individuals in an efficient and easily accessible manner. For example, timely maritime monitoring of typhoon paths, sea-surface temperatures, fluctuations in fishery resources, and the navigation of ships near remote islands is surely possible with the utilization of space. Satellite positioning data contributes significantly to the availability at affordable prices of car navigation systems and other course-plotting devices using digital maps. Satellite communications services are able to support the foundation of the people’s daily life even when terrestrial infrastructures are damaged.

Today, as part of big data, satellite data is combined with various data, and plays a role in creating new values in economic activities and resolving social issues through such means as sophisticated analysis by artificial intelligence (AI). It is not an exaggeration to say that satellite data holds a crucial key to the realization of Society 5.0, a super-smart society. Under the present situation in which even unpredictable major disasters need to be taken into consideration, it is now essential for government ministries and local governments to actively utilize satellite data through working together.

Amid the increasing importance of satellite data, the international market for space-related equipment and services, or the “space economy,” reportedly exceeded \$400 billion in 2018, expanding by over 20% in three years from 2015.¹ Japan needs to catch up with the expanding trend of the global space economy.

The government has now initiated discussions to revise its Basic Plan on Space Policy that primarily sets the basic policy and comprehensive measures for space development. Therefore, Keidanren has compiled the proposal as following, for the more proactive and strategic space development and utilization to achieve economic growth and provide the people’s overall security and safety.

¹ \$344.20 billion in 2015, \$357.18 billion in 2016, \$383.52 billion in 2017, and \$414.75 billion in 2018 (source: Space Foundation, *The Space Report 2018* and *The Space Report 2019*).

2. Basic Stance and Relevant Policies

(1) Expansion of Public-Private Synergy

In 1969, the year mankind first set foot on the moon, Japan also launched its National Space Development Agency (currently, the Japan Aerospace Exploration Agency or JAXA) which took on space development. Since then, the national government has consistently been the leading player in space development and utilization in the last 50 years. While the important role played by the government in this undertaking will remain unchanged, there has been a dramatic surge in private companies taking up the challenge of space business worldwide in recent years, mainly as a result of the growing importance of data in economic activities, the advancement of communications, sensor, and other aerospace-related technologies, and the maturation of some of those technologies. Investment in space start-ups reportedly reached \$3.2 billion in the single year of 2018.² Private companies have become another major player in space development and utilization. From now on, it is necessary for the public and private sectors to work more closely in each aspect of this undertaking, both playing their respective roles more actively to bring about greater synergy. Toward this end, they should achieve by all means the target size of the space equipment industry set under the current Basic Plan on Space Policy (a cumulative total of ¥5 trillion for the public and private sectors in 10 years from 2016), and incorporate in a new Basic Plan the new goals that are adapted in light of future developments, such as more active participation in the global market.

The Private Sector's Role

The private sector in Japan is making steady progress toward future development. In terms of launch vehicles, 42 consecutive launches of flagship rockets were conducted successfully since 2005, marking a success rate of 97.9%, which surpasses the international standard. With respect to the new flagship rocket H3, which aims at significant reduction in price and maintenance cost, sales activities have started for overseas companies and other potential clients, despite its maiden flight yet to be undertaken. In terms of satellites, the quasi-zenith satellite *Michibiki*, which provides reliable positioning data with world-class accuracy, started operations in 2018. In July 2019, *Hayabusa2* became the world's first space probe to successfully collect subsurface rock samples from an asteroid.

Space start-ups have also been very active. In May 2019, a rocket developed and manufactured independently by a private company reached space for the first time. Several start-ups are also developing business plans or have actually implemented plans to use small satellites. At present, Japan is second only to the United States in the world in terms of the number of corporations investing in space start-ups.³

However, international competition is intensifying by the day. Numerous companies which defy valuation with the existing yardsticks in terms of cost, technology, and

² Bryce Space and Technology, *Start-Up Space 2019*.

³ Ibid.

business models are on the rise not only in the United States and Europe, but also in China and other countries. It is most important for Japanese businesses, regardless of such factors as their size and length of business operation, to have the courage to open up new frontiers in space business on their own and actively take up challenges without being bound by existing frameworks and practices. Herein lies the key to expanding public-private synergy in the space sector.

Government: Lead User in Space

Furthermore, the government is strongly urged to enhance its functions as the “lead user” of space—namely, utilizing space to achieve relevant ministries’ missions and bringing maximum benefits to the people. Now that utilizing space proactively and strategically is more needed than ever for economic growth and for the people’s security and safety, the government must first present a clear philosophy on what Japan aims to achieve in promoting space development and utilization, embodying it in the next Basic Plan on Space Policy, which can be characterized as its new vision for space policy. In accordance with that philosophy, it should identify the space infrastructure to be owned and space projects to be implemented by the nation. The government should then declare its will to steadily build the infrastructure and promote the projects, including the enhancement of the mission assurance of the overall space system, in the next Basic Plan. It is only possible to gain greater support from the people for space development and utilization by presenting such core values.

With regard to government satellite data, it is necessary to redefine the objectives and frameworks for using such data and clarify various matters including: the nature, scope, and duration of data collection; how this will be utilized within the government; how intra-government cooperation in this area will be promoted; and how services can be improved to be user-friendly ones from the viewpoint of people. In addition, building institutional and technical foundations to promote the ministries’ utilize and inter-ministerial usage of government satellite data is a crucial issue. At present, some elements of government satellite data are different for each satellite, like rules for the level of processing or file structure, rendering the integrated use of data from various satellites quite difficult. In the area of government satellite data, Japan should consider setting up an agency to promote collaborative efforts across various organizations—such as drawing up uniform data standards that take into account trends in the standardization of data from commercial observation satellites—modelled on the U.S. National Oceanic and Atmospheric Administration, the U.S. Geological Survey, or the European Union’s Copernicus program. With regard to intelligence-gathering satellites of Cabinet Secretariat, consideration should be given to allowing other ministries and private organizations to use the data to the extent possible.

The promotion of utilizing new technologies is also an important role of the lead user. In this regard, in addition to strengthening research and development (R&D) activities in the relevant ministries, the government should establish a mechanism for timely updating of the relevant regulatory frameworks in response to technological advances while closely following international developments and heeding the opinion of the private sector. It should also actively participate in establishing international standards

for new space-related technology. Discussions on technical standards for future private space businesses are currently taking place at the United Nations specialized agency International Civil Aviation Organization (ICAO) based on the work of such bodies as the U.S. Federal Aviation Administration and the British Civil Aviation Authority. Japan should make active contributions to the discussions in ICAO and other organizations.

The current National Defense Program Guidelines state that “it has become essential that Japan achieve superiority in new domains” including space. The Medium Term Defense Program puts forth policies to secure the stable use of space and to further improve information-gathering, communications, positioning, and other capabilities by utilizing space. In promoting these policies, a priority should be placed on ensuring the ability to freely use advanced technology and the relevant data.

Local governments are also lead users of satellite data for disaster prevention and in other areas for the citizens’ security and safety. It is necessary to build the hard and soft infrastructure that will enable local governments to collaborate effectively and efficiently with the relevant government ministries and nearby local governments and to utilize data from observation and other satellites.

Improving the Environment for Encouraging Vitality of Private-Sector

Improving the environment to encourage the private sector to fully exercise its vitality is another major responsibility of the government. Both soft and hard infrastructures need to be improved.

In terms of soft infrastructure, it is important to improve the overall business environment, including the conditions for space start-ups. The government should review regulations and systems and their implementation in a flexible manner. For example, as setting up satellite communications networks requires the approval of the International Telecommunication Union (ITU) for frequency allocation, Japan’s Ministry of Internal Affairs and Communications currently recommends that service providers consult it on their schedules at least two fiscal years in advance of their commencing the ITU procedure.⁴ Yet for space start-ups using small satellites, the success of their business depends on a race against time. Therefore, speeding up the relevant domestic procedures is strongly called for. Furthermore, the government should ensure smoother and more efficient implementation of the Act on Launching Artificial Satellites and Managing Satellites, which authorizes rocket launches and other operations spearheaded by private companies.

In addition, the government should establish open and free use of satellite data in its possession as a new infrastructure of the economic society, with the aim of enabling researchers and companies to produce greater values through its use, by defining the scope, continuity, and accessibility of such data. At present, apart from the Tellus

⁴ Ministry of Internal Affairs and Communications, *Manual for international frequency coordination procedures for small satellite communications networks* [in Japanese], first edition, March 31, 2016.

satellite data platform released in February 2019, there are also other platforms in Japan operated by different ministries and entities. These should be made seamless and data accessibility should be improved from the users' standpoint in order to stimulate the private sector's needs for satellite data use.

The government is currently implementing a policy of enabling the provision of ¥100 billion in risk money for the nurturing of space start-ups in five years up to 2023. However, overseas, start-ups and major manufacturers are joining hands to undertake very ambitious projects. From the standpoint of encouraging Japanese companies to take up such challenges, Japan should facilitate priority funding for ambitious high-risk projects by government-affiliated and other financial institutions, regardless of such factors as the size or years in operation of the participating enterprises.

With regard to hard infrastructure, now that expectations are high for the growth of the space business, it is necessary to continue improving launch complexes, launch pads, and other equipment and to enhance R&D facilities. For example, in order to ensure successful rocket launches even in the face of unforeseen circumstances, Japan needs to return to a system of multiple movable launchers. The enhancement and updating of facilities directly related to the development of key technologies—such as supersonic wind tunnels for spaceplane research, and vacuum chambers for the effective development of advanced satellites—is also essential from the standpoint of achieving economic growth and ensuring security and safety.

(2) Promotion of International Cooperation

It goes without saying that international cooperation is necessary in the development and utilization of space, which has no national boundaries. Today, in addition to scientific exploration, dreams of yesteryear, such as the development of space resources and space tourism, are about to become reality. On the other hand, there are also risks that may hinder the sustainable and stable use of space, such as increasing congestion and space debris. For this reason, international cooperation in space development and utilization is becoming even more important. Japan should play a leading role in promoting international cooperation, including in the area of drawing up international laws.

Strengthening Japan-U.S. Cooperation

Building up stronger cooperation between Japan and the United States is particularly important. Japan should give full play to its industrial and technological capabilities, and realize a form of cooperation unique to the two nations that are allies and technological powers. From this standpoint, it needs to draw up a comprehensive road map for a truly win-win strategic cooperation in space between the two countries. This road map that covers both the civilian and security sectors should address such issues as carrying U.S.-made payloads on quasi-zenith satellites, establishing a strategic

partnership under the Artemis program,⁵ promoting cooperation in space situational awareness and space traffic management, and expanding industrial technology contributions to the U.S.'s international supply chains. In order to upgrade Japan-U.S. cooperation in space-related industries, the two governments should consider creating a mutual recognition system for technical and management standards relating to design, manufacturing, testing, and other processes.

Contributing to the vision of a “Free and Open Indo-Pacific”

Space can play an important role in addressing climate change, disaster prevention, food security, maritime domain awareness, and other global issues and in fostering greater prosperity in the Indo-Pacific region. As a strategic initiative for the vision for a free and open Indo-Pacific, Japan should go beyond its principle of request-based assistance and give full play to its industrial technology capabilities to reinforce its capacity building assistance and cooperation in providing equipment, especially in the East Asian and Oceanian nations. Specifically, it should actively consider and implement the following: 1) building advanced observation satellite systems for disaster preparedness and other purposes in the Asian region; 2) developing hard and soft infrastructure in the East Asian and Oceanian nations for space and maritime monitoring and for timely information sharing among the relevant countries; and 3) building quasi-zenith satellite-related infrastructure in the East Asian and Oceanian nations.

(3) Increasing Economic Utility

In June 2019, the U.S. National Aeronautics and Space Administration (NASA) announced its policy of opening up the International Space Station for commercial use. This is symbolic of the fact that any space program cannot be unrelated to economic utility. The Japanese government also needs to come up with creative policies to motivate a broad range of companies and other organizations to participate actively and invest in its space-related projects.

In this connection, it is hoped that JAXA will make further efforts to embody its management philosophy “To realize a safe and affluent society using space and the sky.” Toward that end, it should strengthen R&D of new technologies including the expansion and updating of infrastructure—in particular, the continuous improvement of launch complexes and launch pads as well as enhancement of R&D facilities as mentioned above. At the same time, to better tap private-sector vitality, it also needs to consider setting research topics with an eye to develop them into businesses in the future and promoting the transfer of various activities to the private sector, among other measures. It should incorporate a time schedule for handover to the private companies in the Implementation Plan for the Basic Plan for Space Policy to encourage voluntary private-sector initiatives.

⁵ U.S. space program aiming at human landing on the moon in 2024 and on Mars in the 2030s. Building a manned space station, Gateway, that will orbit the moon is the first stage (Gateway Program). Japan announced its cooperation with lunar exploration including the Gateway, in October 2019.

As part of this overall effort, with respect to lunar exploration including the Gateway, it is hoped that in addition to representing the government in this undertaking based on international division of labor, JAXA will engage in close dialogue with Japanese companies, the U.S. government, and other parties on the pertinent matters including future commercial use and private-sector participation in order to set a policy direction in advance.

Furthermore, from the standpoint of facilitating international cooperation, contract systems (i.e., approaches to public-private cost sharing, profit margins, and compensation) should be aligned with those in the United States and other countries.

3. Enhancing International Competitiveness

(1) Increasing Technological Autonomy and Competitiveness at the Same Time

In order to promote proactive and strategic space development and utilization and achieve significant results in this endeavor, it is necessary for Japan to maintain the required key technologies at an internationally competitive level. Considering the importance of data for economic growth, security, and safety, technological autonomy and competitiveness must be increased at the same time, in the areas of both launch vehicles and information systems, including satellites.

Greater competitiveness is not possible without all-out corporate efforts. On the other hand, the government should strengthen its functions as the lead space user both in terms of technology and data, as discussed above, in order to provide the greatest benefits to the people. In addition, it should cooperate with Japanese companies in overseas operations and other activities in order to support the upgrading of their competitiveness by leveraging pressure from the international market. It also needs to promote the development of the underlying technologies that will be crucial for future space development and utilization.

(2) Rockets

Taking these into account, the government should reconfirm and implement its policy of preferential use of core rockets in government projects. In terms of indirect support for the export of rockets to other countries, it should follow the example of the U.S. government in making an appropriate commitment to future government procurement in order to encourage investment and other initiatives by the relevant companies. It is also necessary to implement and speed up R&D that addresses both security and civilian needs, such as reusable rockets that will help significantly cut launching cost and next-generation avionics.

(3) Satellite Systems

Disruptive changes are occurring in approaches to and utilization of satellite systems, among other areas. Therefore, the government needs to initiate and consistently promote R&D programs—especially for mass production and autonomous operation technologies for satellite constellations, full-digital payloads supporting 5G and other next-generation communications, and optical satellite communications and sensor technologies—from the strategic standpoint of strengthening underlying technologies and enhancing international competitiveness. It also needs to work on upgrading the ground systems and other infrastructure for the promotion of satellite utilization and operational efficiency.

4. Systems for the Promotion of Space Policy and Public-Private Collaboration

The Strategic Headquarters for Space Development headed by the prime minister was established after the enactment of the Aerospace Basic Act in 2008. The Committee on National Space Policy was set up in 2012 for specialized discussions on space development programs from a broad perspective. These resulted in a fundamental reinforcement of the organizational structure for the promotion of Japan's space policy. In light of the growing importance of proactive and strategic promotion of space development and utilization in the future, the government as a whole, under the leadership of the prime minister, should exert greater effort to strengthen the functions of its role as the lead user, step up the creation of an environment to fully tap private-sector vitality and other measures, and broaden the understanding and support for the importance of space development and utilization for economic growth and the people's overall security and safety.

Keidanren will contribute even more actively to the discussions at the Committee on National Space Policy and its subcommittees and task forces, continue to create opportunities for dialogue and cooperation with the relevant parties both in Japan and other countries, and cooperate in the proactive and strategic promotion of space development and utilization.