

Recent Trends in Japan's Space Policy — Centered on Promoting the Space Industry

By Hidekazu Takakura



Author
Hidekazu Takakura

Introduction

International circumstances in the space realm are currently undergoing major developments. In the United States, President Donald Trump has resurrected the National Space Council after a 29-year hiatus, while NASA has released its Lunar Orbital Platform Gateway outpost near the Moon. With Europe's Moon Village plan and Chinese President Xi Jinping declaring that China will become a "global space giant", each nation is scrambling to venture into space.

Against this backdrop, the development and utilization of space in recent years has been characterized by a transition from state-led projects to private business, with private sector vitality — largely composed of venture companies from the US — spearheading innovation.

This trend is exemplified by venture companies providing rocket-launching services that have dramatically curtailed costs by reusing certain components, and the emergence of low-price compact-sized satellites, which have ushered in venture companies planning satellite constellations by launching multiple satellites into orbit. This in turn spawns a rapid expansion of new businesses based on using AI to process the wealth of satellite data provided courtesy of these nano-satellites.

Amid such a rapidly changing international landscape, Japan is also steadily pursuing its own space policy, and in order not to trail behind others it is more crucial than ever before to promote the development and utilization of space as well as the space industry.

Japan will pursue its space policy based upon the Basic Plan on Space Policy and its operational schedule (determined by the Strategic Headquarters for National Space Policy in January 2015, approved by the Cabinet in April 2016) which hinges on the three pillars of guaranteeing space security, promotion of space utilization in the commercial sphere, and bolstering/maintaining the foundation for industry, science and technology.

In particular, with regard to the commercial sphere, in May 2017 the Committee on the National Space Policy released its "Space Industry Vision 2030", based upon which it will promote a raft of initiatives.

Concretely, this will involve promoting the open and free availability of government satellite data with a view to improving overall access to satellite data, which, alongside space utilization model verification enterprises, will expedite the creation of leading-edge utilization precedents of satellite data. Furthermore, as seen in

the holding of "S-Booster 2017" — a business idea contest that is a first in the space sector — and the furnishing of risk money by the Development Bank of Japan (DBJ) and the Innovation Network Corporation of Japan (INCJ), initiatives are afoot towards expanding the horizons of space-related businesses.

Last year saw the successive and successful launches of Quazi-Zenith Satellites 2, 3, and 4 in June, August and October, establishing the 4-pronged QZS system. Concurrently, from November of this year Japan is carrying out the final adjustment of satellite signals with the aim of commencing a world-class high-precision positioning service.

Coupled with these advances, the effectuation of two space-related laws in 2016 ("Act Regarding Launching and Control of Satellites" and "Act on Ensuring Appropriate Handling of Satellite Remote Sensing Data") paved the way for the apparatus for promoting the space industry.

With the situation *vis-à-vis* space changing rapidly both at home and away, there is a need to promote an ever more powerful space policy. This paper will mainly focus on initiatives geared towards promoting the space agency, which is increasingly effervescent in the last few years.

Space Industry Vision 2030

In May 2017, the Space Industry Vision 2030 (hereafter "Vision") was mapped out, following 12 rounds of deliberations by the Panel on Space Industry Promotion, which falls under the Subcommittee on Space Industry/Subcommittee on Space Research Development. The Vision positions the space industry as the frontier for constructing the driving force and growth industries that will advance the Fourth Industrial Revolution. It also ushers in the dawn of a new paradigm shift for the space industry marked by innovation in space technology, the fusion of big data, AI and IoT, as well as lower costs through increasingly compact satellites and rockets. By early 2030, the Vision aims to have doubled the overall space industry market size (currently 1.2 trillion yen) including the space utilization industry. Towards this goal, it is laying the foundations upon which to construct the space utilization industry, space equipment industry, and for overseas expansion and business environment in anticipation of new types of space business — encompassing the current status quo, issues and countermeasures for each of these domains (*Chart 1*).

CHART 1

Overview of the Space Industry Vision 2030

- ◆ Space industry provides driving force to advance Fourth Industrial Revolution. As well as enhancing productivity in other industries, it is the frontier for constructing growth industries.
- ◆ Innovation of space technology and binding of innovation through big data/AI/IoT.
- ◆ Through expanding role of private sector, aiming to double scale of overall space industry (currently 1.2 trillion yen) including space utilization industry by early 2030s.

Space Utilization Industry

Issues

- ◆ Continuity of satellite data lacking, channels for acquisition are confusing.
- ◆ Satellite data solution businesses have not gotten off the ground.
- ◆ Lack of steady demand until businesses get off the ground

↓ Countermeasures ↓

1. Improving access to satellite data

Improving environment conducive to promoting usage of satellite data

- Listing up types of satellite data, storage location etc. In future, add data utilization methods. Bolster data continuity.
- Provisions of data utilization hubs (data centers)

Promotion of open and free government satellite data

- Enable usage of satellite data by venture companies, encourage business creation

2. Encourage the use and application of satellite data

Promoting model businesses

- AI/big data analysis and application of its human resources
- Create new application case examples that meld satellite data from remote sensing satellites and quasi-zenith satellites etc. with ground data
- Linkages with potential users such as government ministries and local governments, toward expanded usage and industrialization

Space Equipment Industry

Issues

- ◆ Need to bolster global competitive edge (technological development, track record, cost etc.)
- ◆ High hurdles to new entrants in technical aspects

↳ 2015 Basic Plan on Space Policy includes intention to: "In ten years, take scale of Japan's spacecraft industry to a cumulative total of 5 trillion yen for government/private sector combined." ↳

↓ Countermeasures ↓

1. Ensuring Global Competitive Edge

Continuous Satellite Development (Serialize)

- Continuous development aligned to market needs

Development/promotion of new type mainstay rocket (H3)

- Halving of costs and shrinking manufacturing period

Promoting technical strategy for parts/components

- Selection/development of key parts/components

Improving procurement system/strengthening technological development support

2. Support for new entrants

Full provision of space orbit demonstration opportunities

- Full provision of demonstration opportunities and creation of one-stop service for related support measures

Provision of launch sites for small-scale rockets

- Establishing guidelines, survey market trends including venture trends for small-scale rockets

Overseas Expansion

Issues

- ◆ Strategic initiatives that are aware of stage of development of partner countries, strengthening international linkages
- ◆ Deliberation/promotion of long-term/ongoing strategies

↓ Countermeasures ↓

Composition/bolstering of packages in line with needs of partner countries

- Close linkage with Strategic Committee on Infrastructure & Economic Cooperation, putting together/strengthening packages including equipment and services, personnel development etc.

Promoting international linkages

- Developing high-precision positioning services geared towards Asia and Oceania, using quasi-zenith satellites.
- Stronger linkages with APRSAF^{*1}, ERIA^{*2}, NASA and DLR

Constructing function for coordinating continuous support

- Establish project managers, continuously and proactively promote projects

*1. Asia-Pacific Regional Space Agency Forum
*2. Economic Research Institute for ASEAN and East Asia

Improving Business Environment in Anticipation of New Types of Space Business

Issues

- ◆ Lack of risk money, new entrant strata is faint
- ◆ Other countries are enacting laws in anticipation of new business

↓ Countermeasures ↓

Inducement/promotion of new ideas and businesses

- Bolster supply of risk money
- Hold ideas contests and support for industrialization (S-NET etc.)

Put in place system corresponding to new business

- Consider response measures for orbit indemnification and space resource exploration

(Prime Minister's Award + Minister's Awards (8 Ministries))

Source: Cabinet Office of Japan

A key tenet of the Vision is that instead of focusing solely on the spacecraft industry such as manufacturing of rockets and satellites, it also purports to drive forward the use and application of satellite data including remote sensing and positioning information.

There are two points in the background to this that are closely related: improved image frequency of satellite remote sensing, and the innovation of analytical technology including AI. The former is rooted in the fact that thanks to the emergence of small-size satellites that are cheaper than ever, it is now possible to launch multiple satellites into orbit (so-called constellations). Sending satellites into orbit *en masse* makes it possible to capture images of the same place on Earth with better frequency — for example, once a

day — allowing observation of changes that could not be abstracted using traditional satellite data. Meanwhile, although the amount of data has enlarged significantly, recent strides in AI processing technology mean that instead of humans analyzing satellite data point by point, processing can be done automatically, which heralds the creation of added-value hitherto unknown.

For example, venture companies in the US are using AI to process massive amounts of satellite data captured by nano-satellites, in order to analyze the number of cars parked in a supermarket car park and oil stockpiles from the shadows reflected on oil tanks. In turn, by providing this information to investors, they are improving their bottom line. In Japan also, various initiatives are in the pipeline

based on the Vision, in order to create innovative businesses one after another by using satellite data in this manner.

Improving Access to Satellite Data

Promoting the use and application of satellite data rests primarily upon improving access to satellite data. To begin with, there is a basic lack of information for those who have never made use of satellite data before, such as what kind of data can be used, whether it is free or not, and where they can get hold of it. Pursuant to providing such information in a package, in July 2017 the Japan Aerospace Exploration Agency (JAXA) released a remote sensing catalogue that bundles together basic information related to the various types of remote sensing data that exist in Japan and overseas. By referencing this catalogue, IT businesses and others who have never dealt with satellite data before should be empowered to start thinking about how to use and apply satellite data.

On another front, toward improved access to satellite data, it will be crucial to proactively promote open and free usage of government satellite data and to improve the environment conducive to handling it. At present, satellite remote sensing data that can be used in Japan is largely that obtainable from satellites operated by government organs such as JAXA. Meanwhile, due to the fact that the processing to render satellite data easy-to-use for industry requires a certain level of cost, satellite data is not open and freely available for anybody to use, and this is an issue that requires surmounting if the industrial usage of satellite data is to pick up speed. Similarly, it is often the case that ordinary computers cannot process satellite data in terms of computer resources, storage and software environments, highlighting the need to provide the basic platform conducive to utilizing satellite data.

Toward resolving these issues, from the current fiscal year the Ministry of Economy, Trade and Industry (METI) has joined forces with the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and JAXA to lay the foundations for making government satellite data open and free as well as providing a platform for its utilization.

From this fiscal year, as well as the unified and free usage of government satellite data, METI is dedicated to developing and consolidating a user-friendly data platform equipped with AI and other analytical tools, with the intention of launching operation of a prototype by the end of the current fiscal year. Provision of such a platform is expected to be conducive to the widespread utilization of satellite data across various domains.

Creating Precedents for Advanced Utilization

The promotion of use and application of satellite data relies upon promoting the creation of precedents for advanced utilization, and through proactively sending out information about these usage examples to widely promulgate them into society.

The Cabinet Office, from the previous fiscal year, has carried out demonstration projects regarding advanced usage models for satellite data. These projects involve demonstrating advanced use models for satellite data such as satellite remote sensing and positioning information, purporting to verify their effectiveness. Such projects are based on the condition that demonstrations are conducted by a team composed of the party providing a service using satellite data, and a counterparty who will actually be making use of that service in their business. The aim is that appropriately reflecting real actual needs into the usage model of the satellite data being verified will lead to resolving issues on the end-user side, creating genuinely useful services. Furthermore, it is anticipated that demonstrations will combine satellite data with other kinds of ground data, and that demonstration teams will not only feature parties already working in the space realm, but will also bring in entities from outside the space realm such as IT businesses.

The last fiscal year saw 25 applications, and seven case examples were adopted. These were diverse case examples spanning the fields of agriculture, disaster management and sports, setting the scene for satellite data to be applied across a broad spectrum. This project will continue to run for the current fiscal year, with high hopes for the spawning of cutting-edge usage examples of satellite data that have never been seen before.

New Space Businesses — S-Booster

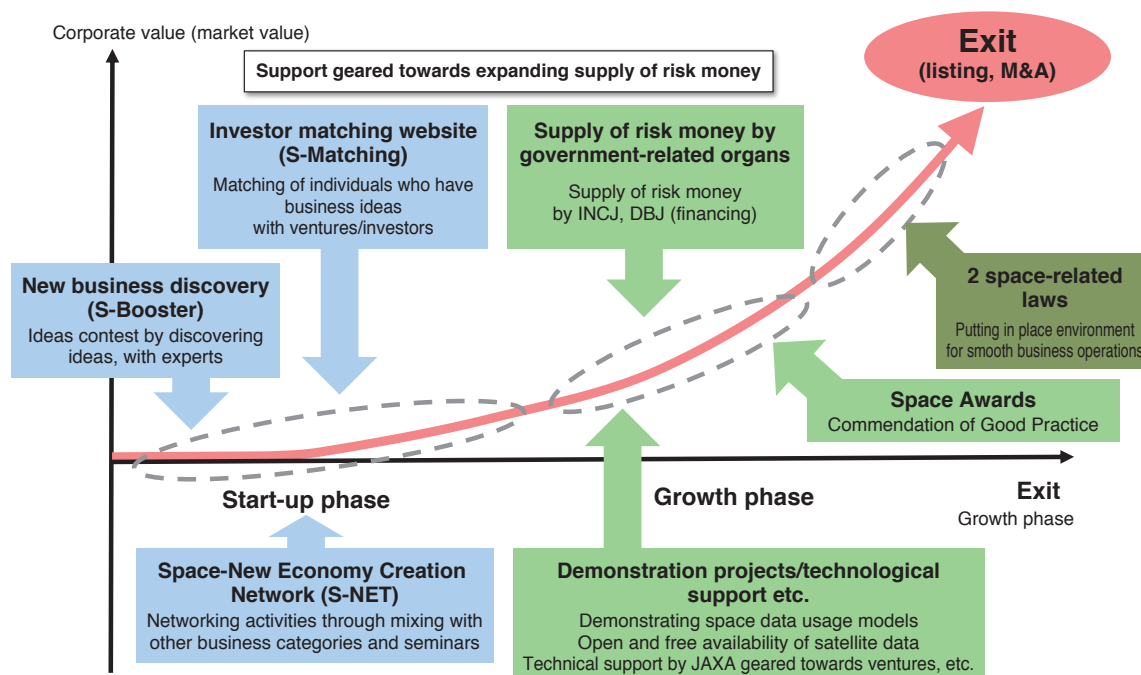
So far I have introduced the promotion of the space industry focusing on initiatives designed to promote the use and application of satellite data. From here, I will focus on initiatives for encouraging the creating of new businesses by venture companies (*Chart 2*).

One of these is “S-Booster”, the space industry’s first ever business idea contest, newly launched last fiscal year. This enterprise solicits business ideas from various entities, with the aim of turning up new space businesses. In the previous fiscal year there were over 300 entries during the approximately one-month application period. Those that passed the initial screening receive mentoring from an expert, in order to polish them up towards commercial viability. At the final selection event held on Oct. 30 last year, 15 finalists presented their ideas to investors; live streamed on the Internet, it drew in over 13,000 viewers. Last year, the top prize went to a business idea tendered by an individual working for an airline, which involved using three-dimensional wind speed data obtained from satellites to calculate the optimal flight path and altitude for airlines. The idea is that by relaying such information to airlines in mid-flight, it is possible to greatly improve fuel efficiency and dramatically curtail costs. This idea stood out in that it came from the user’s line of vision, born from the needs of a business that the entrant is involved in on a daily business (*Photo 1*).

S-Booster 2018 is underway, and there are high hopes for a plethora of ideas to emerge during the current fiscal year.

CHART 2

Overview of support during growth phase of space ventures



Source: Cabinet Office of Japan

Popularizing the Space Business — Space Awards

The Space Awards have been held every other year since fiscal 2014, with the aim of recognizing outstanding cases of best practice that have made major contributions to the promotion of space development and utilization in Japan.

The awards for fiscal 2017, held for the third time, were a departure from the existing approach, which focused on track

record, and instead welcomed applications from new market entrants such as venture companies. With this in mind, and to break the mold in terms of existing concepts, adjudication criteria were revised to evaluate groundbreaking ideas that set global precedents as well as initiatives in new domains. Another new facet was the Ministry of Agriculture, Forestry and Fisheries Award in addition to the existing 10 prize categories, in light of high hopes for the development and usage of space in the domains of agriculture, forestry and fisheries.

Entries were publicly recruited from Oct. 2 to Dec. 11, 2017, and following adjudication and deliberation by the selection committee, 10 projects were awarded, each by a specific government department. The Prime Minister's Award went to Prof. Shinichi Nakasuka of Tokyo University for the Hodoyoshi Project, recognized for "contributing to the industrialization of micro-satellites and to international collaboration". As well as having a tremendous impact as a pioneer of the current global trend for micro-satellites, this project was highly evaluated as an initiative linked to the creation of many venture companies in Japan. It was also praised for its focusing on popularizing and bringing about public awareness with a view to overseas expansion.



Photo 1: Cabinet Office of Japan

S-Booster 2017 — Final Selection Committee photo session

Photo 2: Prime minister of Japan and his Cabinet website



Prime Minister Shinzo Abe announces new support package.

On March 20, the awards ceremony was held as part of a space symposium convened by the Cabinet Office, and with Prime Minister Shinzo Abe in attendance for the first time, winners were presented with certificates of commendation along with trophies.

Bolstering Provision of Risk Money to the Space Business (S-Matching)

In his speech delivered at the Space Symposium, Abe announced a new support package designed to cultivate space ventures, including the possibility of providing approximately 100 billion yen in risk money over the next five years for the space business through the public and private sectors, including the DBJ and the INCJ (Photo 2).

With regard to the provision of risk money in particular, there is an issue where for the initial start-up phase, while on one hand risk money to the tune of several billion yen is required from private sector investors such as angel investors and venture capitalists, there are no networks bridging individuals with business ideas and venture companies, nor between investors and industrial companies. To remedy this state of affairs, the Cabinet Office and METI decided to create the space business-matching platform (S-Matching). As well as enabling individuals and companies to directly pitch their business ideas year-round to investors, this platform makes it possible for investors to come into contact with a great many business ideas from the stage of their inception. As of the launching ceremony held on March 20, 46 corporate/individual investors/industrial companies are onboard, with plans not limited just to risk money, but also to roll out initiatives regarding matching of personnel.

Improving the Business Environment to Underpin New Space Business

For Japan, while the effectuation of two space-related laws, as previously mentioned, laid the legal foundations for promoting the space industry, in the space domain which changes at a rapid pace venture companies are starting to emerge that are planning business not envisioned under the existing framework.

For example, with regard to exploitation of space resources, while multiple venture companies in Japan and overseas are promoting initiatives, there are no clear stipulations pertaining to the exploitation of space resources under treaties regarding principles for regulating State activities on the probing and usage of outer space including the Moon and other planets. Meanwhile, the US and Luxembourg, within the scope of international obligations, have put in place domestic laws stipulating the intention to allow space resource exploitation, and are boosting initiatives by companies planning the exploitation of space resources.

In the coming months and years, while it is anticipated that companies will emerge conducting businesses involving aggressive action in orbit, this in turn will inevitably usher in the possibility of satellites colliding with each other. In anticipation of this, the United Kingdom and France are preparing a system for providing some level of government indemnification for payment of damages resulting from collision accidents between satellites.

Japan will take onboard such trends from home and abroad as it deliberates how to consolidate the foundations for underpinning its space business in the coming years.

Conclusion

The modern-day space industry changes at breakneck speed, and it is thought that the next one or two years will be the proving ground. With a space industry running the gamut of satellite manufacture to rocket building and launching services, Japan is almost peerless. It also boasts venture companies with a competitive edge and unique business models. In an increasingly competitive global market environment, there are high expectations for redoubling efforts to promote a space industry where Japan's industrial companies can exert an ever-stronger presence and rise to the top. **JS**

Hidekazu Takakura has been director of the National Space Policy Secretariat at the Cabinet Office since July 2017. He joined the Ministry of International Trade and Industry (currently METI) in 1992. Since then, he has been in charge of energy, nuclear power, global environment and local economic realization issues.