

FOCAL POINT ON SPACE EXPLORATION AND DEVELOPMENT IN JAPAN

PRODUCED IN PARTNERSHIP WITH JAXA

AN ECOSYSTEM FOR SPACE EXPLORATION AND DEVELOPMENT

The role of Japan's national space agency, JAXA, is shifting towards **BRINGING STAKEHOLDERS TOGETHER FOR AMBITIOUS PROJECTS.**

Once the exclusive domain of a handful of national space agencies, space exploration is undergoing a rapid democratization. This is moving in two directions simultaneously: many countries that haven't reached space before are launching rockets, and an array of commercial companies are becoming increasingly involved in these efforts.

Japan is an active participant in this exploration and commercialization of space and its national space agency, the Japan Aerospace Exploration Agency (JAXA), has ambitious, long-term plans for new projects, including establishing permanent bases on the Moon. Similar to other national space agencies, its role is evolving from single-handedly running projects to working alongside and coordinating companies and universities to achieve their goals.

EASIER ENTRY POINTS

"The barriers to entering the space business are daunting, and many private companies are understandably hesitant," says Kyoko Dateki, director of JAXA's Business Development and Industrial Relations Department based in Tokyo. "So we help them understand space technology and they then consider how they can best use it."

Some of these companies are far from obvious space exploration contenders. An excellent case in point is the Japanese toy manufacturer Takara-Tomy, which in collaboration with JAXA and researchers at Doshisha University near Kyoto, is producing small transformable robots designed to be deployed from Japanese lunar



MORE THAN MEETS THE EYE

A tiny, transformable lunar rover dubbed SORA-Q — designed by Takara-Tomy for space agency JAXA — was aboard the Smart Lander for Investigating Moon (SLIM) mission, which launched in early September 2023.

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In 1970, Japan became **THE FOURTH NATION** to launch a satellite.



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JAPAN IS PARTICIPATING IN ARTEMIS

— an international programme seeking to establish a long-term presence on the Moon, and eventually serve as a relay point for missions to Mars.



JAXA

landers to explore the Moon's surface. This draws on Takara-Tomy's expertise in producing intricate toys that can transform into different shapes.

It's a win-win situation for all involved, says Ikkoh Funaki, who is director of the Space Exploration Innovation Hub Center at JAXA. "Takara-Tomy benefits by advertizing how these robots will be used on the Moon and from selling replicas, while JAXA benefits from gaining robots to explore the lunar surface," he explains. "This is a great example of collaboration between JAXA and a non-space industry that benefits both parties."

But Dateki sees JAXA's role as going far beyond simply informing companies about the benefits of engaging in the space industry and providing practical assistance. "We believe it's important to create an ecosystem for the space industry by bringing together various players — not only manufacturers, but also academia, non-space-related industries, financial institutions, lawyers and the government," he says.

AIMING FOR THE MOON

Japan has already demonstrated its prowess for ambitious space projects that stretch technology and engineering to their limits. Through JAXA's Hayabusa 1 mission, it became the first country to collect samples from an asteroid and bring them back to Earth.

Japan is now setting its sights on the Moon, with a long-time goal of establishing a lunar settlement. In particular, JAXA's innovative TansaX programme aims to create key technologies for space exploration and lunar activities over 20 years by fostering collaboration between all kinds of players.

The programme seeks to address the challenges associated with what JAXA says are the three main phases of establishing a permanent base on the Moon: frontier exploration, production and construction, and habitation.

Frontier exploration requires rovers and robots able to operate on the Moon's surface. Examples of construction projects and those that produce materials and resources needed on the Moon include developing

a system for extracting hydrogen and lightweight construction machinery able to function on the Moon. Finally, habitation requires — among other things — sustainable housing, fuel cell systems and closed systems in which to grow crops for food.

Japan's most recent venture to the Moon — and JAXA's first attempt at a lunar landing — was the so-called Smart Lander for Investigating Moon (SLIM) mission, which launched in early September 2023.

SLIM is a small lunar lander that was designed to reduce the size and weight of equipment used in Moon landings. It also tested pinpoint landings on the Moon, enabling access to previously inaccessible spots. "SLIM is the world's smallest smart lander to land on the lunar surface," says Funaki.

DRAWING ON STRENGTHS

TansaX has 140 research and development projects, some of which are already underway. And 200 groups and organizations are participating in it, with more than 90% of them being from outside the space sector. This has the benefit of drawing on Japan's strengths in manufacturing and production industries.

"While Japan has the capability of launching rockets and constructing spacecraft, we have many non-space industries such as chemical and material companies," says Fumiya Tsutsui, technological director for space exploration at JAXA's Space Exploration Center. "Since the Moon has gravity, many non-space industries can apply their technologies on the Moon, and we can harness the strength of Japanese industry."

Faced with such ambitious goals, a long-term outlook is crucial, Tsutsui stresses. "The exploration and development of space are very long-term activities," he says. Collaboration between many countries and private companies is very necessary.

Funaki echoes this. "We're always open to international collaboration, not only with space agencies, but also with universities and private companies through our exploration programmes, and open innovation schemes." ■

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There are plans to construct regional spaceports in four locations across Japan, from Hokkaido to Okinawa, which will **SERVE AS SPACE TRANSPORTATION HUBS.**



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