

Building Business on the Moon

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The space ecosphere has been expanding from LEO and beyond even into plans for deep space operations for the last few years. Cis-lunar and lunar surface operations are now targeted for economic development as well as exploration for science and space resource utilization and so on, which has brought diversity into the deep space business ecosystem. We will soon enter the age where human beings will live on multiple planetary bodies and ultimately create a society on the Moon within the next few decades.

According to the Cis-Lunar 1000 vision which was published by ULA in 2016, it is predicted that 1000 people will live in space with a \$2.7T space economy within 30 years. Now 6 people live on board the ISS with a \$380B space economy. Within the next 5 years, 20 people will live in space with \$500B per year. Within 15 years, 300 people will live in space with \$900B per year. In addition, Jeff Bezos' Blue Origin drives head with the vision of 'Millions of people living and working in space' as their long term business driver.

It is not enough just to construct permanent space infrastructure, but it will also be necessary to create a new society and culture for human beings in these challenging and remote environments.

To create a peaceful, sustainable and prosperous multi-planet civilisation, economic activities should be developed so that the space business ecosystem will be created on the Moon with the cis-lunar and the earth market as a universal 'Only One Market'.

A Commercial Lunar Surface Exploration Program Including the First Lunar Cave Mapping Mission

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Spacebit Global is now in the engineering development phase for the first ever UK mission to the Moon in the summer of 2021. The mission is enabled by the NASA Commercial Lunar Payload Services (CLPS) program which began a few years ago and awarded its first two landing services contracts in summer 2019. CLPS landing services companies are flying most of their payloads from government and university research program under the NASA funding, but purely commercial payloads are also allowed to fly on these landers. Spacebit booked its 2021 lunar flight with Astrobotic on its Peregrine lander, which will fly to the Moon on the first Vulcan rocket launch by United Launch Alliance. The technical focus of Spacebit is on microrobotics development, software for data acquisition, and the use of Distributed Ledger Technologies for space applications.

There are many challenges in commercial space projects, including access to capital, insurance matters, the creation of self-sustaining markets which no longer need government help, access to the latest technologies, know-how and skilled workforce resources, and a longer return on investment. Spacebit intends to answer these challenges with a step-by-step mission plan and investment strategy. The 2021 initial mission costs about \$3 million including the launch, with a rapid robotics development program completed in about 12 months using low risk flight proven modular components. The first rover (called Asagumo) is a 1U Cubesat body with four legs for walking in rugged terrain. Future missions in 2022 and 2023 will feature swarms of Asagumo rovers deployed from a wheeled Mother Ship rover and will enter into lunar lava tube caves to provide the first subsurface mapping of lunar feature to validate their suitability for future human habitation.