

A photograph of Earth from space, showing the curvature of the planet and the blue atmosphere. The surface is dark with some bright spots, likely cities or industrial areas. The text is overlaid on this image.

# Mining the Moon for Profit: A Case Study in Space Resources Utilization

Provision of Private Services

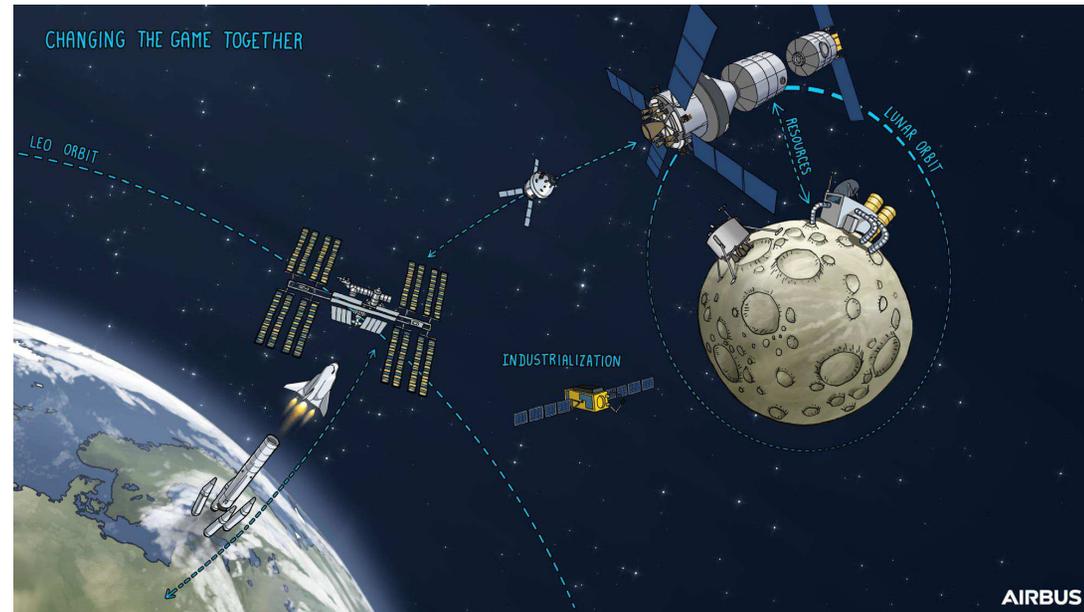
DEFENCE AND SPACE

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**AIRBUS**

## The socio economic landscape

- We are living in formidable times: the need to set new space exploration destinations driven by political ambitions, emerging technologies and potentials for economic return is nurturing concrete space programs with firm budget.
- Moon is the “chosen” short term destination: both orbital and surface objectives are targeted by Governments and private institutions, experienced and emerging stakeholders in small and large scale.
- The paradigm of a new economic market is outlined. We are at the dawn of what Airbus calls an “**Orbital Society**”



# Demand Sustainability and Risk Mitigation

*Need for a pioneering phase to sustain market development*

## – To assess demand sustainability

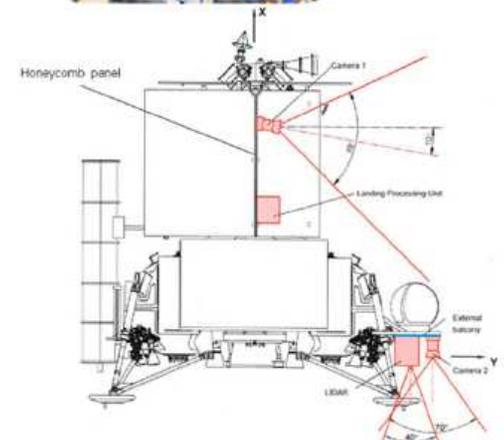
- Technological: e.g. can technology be miniaturized, energy be optimized and autonomously operated to resist the extreme environment of Moon surface?
- Launch costs: if the cost ratio (transportation/exploitation) in LEO is 70/30, this is even larger for a Moon surface mission
- Affordability: exploited resources will be for indigenous use. Not only a “local” demand has to develop, but it has to be compatible with the various business plans.
- Return of Investment period. It has to be compatible with industry standards to enlarge the investors base
- Can business cases be closed without human presence on the Moon surface? Human missions require a completely different level of mission assurance and safety, making the mission costs higher. Is the human presence providing economic added value to the resources extraction business case.

## – To generate risk mitigation actions

- Governments can help in de-risking specific business initiatives, e.g., by creating recurrent demand for the offered solutions
- Governance and Regulatory aspects. Space Resources Act (Lux), Space Resource Exploration and Utilization Act – SREUA (US) have set the first ground rules. More to be settled in terms of service definition, liabilities, sustainability ...
- Can Low Earth Orbit help? To test enabling technologies, business models, in a more “familiar” environment.

# Moon resources Exploitation: Airbus as service provider

- Airbus, as a space infrastructure and service development company, is engaged all the major mission steps to enable the exploitation of lunar resources:
  - Space transportation system to ferry humans and cargo to and from the Moon orbit/surface (Orion, Moon Cruiser)
  - Develop the necessary technologies to enable sustainable mission scenarios (PILOT, landing legs, ECLSS, fuel cells)
  - Develop payloads to characterize the lunar environment and exploit in situ resources
- These initiatives are the result of technologies developed out of Agencies contract and R&D investment by the company that are finding their way into commercial market via dedicated PPP's.
- Airbus is working with its partners to develop commercial service and products stemming from these technologies. Namely, technical feasibility and business potential. Develop a set of solutions tailored to the customers demand



# Create Momentum: The Moon Race Challenge

**A 5 years global competition challenging teams to develop breakthrough technologies enabling sustainable Lunar resource utilization.**

