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Introduction: Human lunar exploration requires access to the lunar surface for crew and cargo. While a large payload performance is a pre-requisite for crew access and initial outpost build-up, a variety of missions do not necessitate such capacity. Therefore a cargo lander system can be a key element of a lunar exploration architecture.

A lunar lander using the full Ariane 5 capability to Lunar Transfer Orbit could deliver up to about 2 tons of gross payload mass to the lunar surface depending on the launcher version considered. The lunar cargo lander needs to be operational in the timeframe of the human return to the moon around 2018-2020. In order to develop such a vehicle several capabilities including soft precision landing, hazard avoidance (LIDAR, camera), night-time survival on the lunar surface (e.g. RHU) are required together with an engine class not available currently in Europe.

The medium thrust engine development which is a pre-requisite for the lunar cargo lander could have applications within other programs such as VEGA upper-stage, crew space transportation vehicle (abort to orbit) and could open further opportunities in Exploration/science missions (e.g. Mars soft landing).

The payload capacity of the Ariane 5 based lander opens a broad range of lunar exploration scenarios, even though they may have quite distinct mission objectives. The cargo lander could form a significant contribution as a major element in an international lunar exploration architecture while providing a versatile and flexible system for utilisation in a broad range of lunar missions based on European own interests and objectives.

The possible scenario options for the cargo lunar lander include:

- Independent lunar exploration missions for science, technology demonstration and research;
- Delivery of regular logistics to a lunar base;
- Provision of consumables for extended surface exploration range and duration;
- Delivery of surface assets, be they stationary or with mobility, in order to support and accelerate lunar outpost build-up or for science and technology demonstration.

For example, the provision of two logistic landers a year during the early lunar base build-up can improve significantly the early crew surface stay duration through the deployment of life support and crew consumables and can also save a full AresV/Altair cargo mission after a few years.

The availability of such a logistic vehicle would simplify the operations of the large crew lander and extend crew surface activities by providing a dissimilar redundancy in the critical delivery of supplies to the crew and thus improving the overall mission assurance.

Such a system could especially be utilised by NASA in its proposed lunar activities as mentioned before, but could also be of high interest for other potential International Partners interested in the Moon, such as China, Russia, India and Japan.