Luna Gaia: a closed loop habitat for the Moon


Abstract

Luna Gaia posits a pathway towards new technologies, philosophies, systems applications and infrastructure aimed at achieving a closed loop habitat model for human settlement on the Moon. This report makes recommendations pertaining to the systems architecture, engineering processes, and the research, development and orchestration of separate phased precursor missions which will be required to achieve this vision by the year 2030. The framework that we propose is designed to support an ideal profile of an optimum 11 (maximum 12) member human crew on the lunar surface for a period of 18 - 36 months.

The Luna Gaia design solutions focus on the coupling power for all regenerative processes of a network of closed loop life support. Using proven and innovative solutions that produce relatively independent and highly reliable cycles of oxygen, water, energy, food growth and waste processing, the modular, hybrid bio-regenerative network of systems particular to the Luna Gaia design architecture is ambitious but feasible.

This report also details ethical and philosophical considerations of lunar settlement and the wider implications for international law, policy and future interplanetary social governance. The authors intend to evolve the current status of thought and practice on these issues to consider new and responsible configurations of resource assets - on Earth and the Moon - and to inspire the will and confidence necessary to propel humanity, and its technology, towards the next frontier of human settlement. The management principals are sound, the Earth-based applications are considered and the legal frameworks have been clearly defined. Certain risks are apparent but there are significant opportunities and benefits which will occur. More importantly, the project vision is consistent with the preservation of life and responsible evolution into the solar system.

We appeal to interested agencies and research organisations to support the Luna Gaia vision and to encourage author participation in advancing these mission studies.

Luna Gaia affirms our commitment to global participation in the extension of human presence on the Moon, and beyond...

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