

22nd IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)

Interactive Presentations - 22nd IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (IP)

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SUSTAINABLE LUNAR SETTLEMENT DESIGN CHARRETTE: OFF-WORLD ANTHROPOLOGICAL SPACE INFRASTRUCTURE SETTLEMENT (OASIS)

Abstract

The Offworld Anthropologic Space Infrastructure Settlement (OASIS) project is a Kepler Space University (KSU) initiative to develop a prototype simulation analog for a sustainable lunar settlement buildable within a ten-year time horizon. The OASIS project began as an ideation exercise to ask and begin to answer fundamental questions concerning how science, systems engineering, and architectural design would drive a program where the desired outcome is a sustainable, scalable lunar settlement where the inhabitants would thrive, not just survive, thereby maximizing the probability of mission success. The OASIS postulate is that the signatories to the Artemis Accords achieve a confluence of interest whereby:

- Developing sustainable offworld human settlements is deemed a priority outcome.
- The endeavor to accomplish the same is best served by fostering cooperation, collaboration, and competition.
- Our evolving understanding of science, systems engineering, and architectural design fosters our ability to survive and thrive as a species.
- We must translate all we learn into being the best stewards of our Earth and life as we know it.

The OASIS Project consists of three phases:

- Phase 0 – OASIS Earth and flight analog testing for required elements distributed systems
- Phase 1 – OASIS in-situ checkout and evaluation of required elements distributed systems
- Phase 2 – OASIS Main Buildout Operations

The process of suspending disbelief, learning how to build the future, and the relevance of different perspectives are integral to the design process. The definition and flow down of the Program and Systems level requirements to the elements and distributed systems must be accomplished. The overall management of the program's cost, schedule, technical risk, and the orchestration of all available program

resources to maximize the probability of mission success (a.k.a., “herding” cats) are critical workflow considerations. Interface accommodation requirements, as well as interface standards, must be defined, tested, and applied as an integral part of the design, build, and test processes to ensure the integrated system can function properly (i.e., in a manner that meets or exceeds the requirements in terms of performance, availability, and safety/security). The resulting flow down and definition of verifiable functional requirements into the elements and distributed systems and the flow up of the evaluated efficacy of their implementation by testing, verification, and validation are part of orchestrating the systems engineering processes. This paper provides a top-down introduction and overview of the OASIS project.