

Lunar Exploration (2)
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LUNAR SURFACE SYSTEMS STUDY: FROM MINIMAL FUNCTIONALITY TO
INFRASTRUCTURE DEVELOPMENT

Abstract

This paper presents a part of the six-month study of lunar surface architectures sponsored by The Boeing Company. The work presented in this paper aimed to develop conceptual design options for (1) Lunar Terrain Vehicle (Rover) and (2) Small Lunar Habitat. Both elements were designed as a system that evolutionary to become a part of an overall Lunar Surface Systems Infrastructure. The goal of the design study was to provide a comprehensive design concepts evaluations and derived from them recommendations based on space architecture strategy of designing all surface elements interconnected with each other's capabilities and satisfying cross-elements requirements. A space architecture "big picture" approach therefore utilized the following steps: 1) Literature overview and analysis of comparable design proposals; 2) Outlining possible surface operations scenarios (ConOps), development of evaluation criteria (or Figures Of Merit) and surface ConOps analysis; 3) Refinement of systems and design requirements, deriving the most important design considerations and defining the major design challenges; 4) Evaluating design concept(s) in accordance with the proposed overall surface mission scenarios; and 5) Reviewing of the conceptual design and recommendations for additional systems concept definition, strategic mission planning, and potential applications beyond the initial scope of work. During the development of this study as more information became available, some initial design assumptions were challenged and therefore required additional design refinement. Such discoveries resulted in certain diversion from the initial concept of the surface mission architecture and therefore additional follow up studies are necessary for adjustments of overall systems as well as their elements.