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A HOLISTIC APPROACH TO LUNAR SETTLEMENTS

Abstract

This paper discusses the larger view on lunar settlement creation. Such an endeavor is exceeding complex, requiring the talents of all disciplines, from physiology to engineering to human factors. While narrow sub-problems can be tackled in isolation, any significant aspect of lunar settlement creation needs to be solved as a multi-disciplinary endeavor. And here multi-disciplinary means across classes of disciplines, for example, technology and psychology.

The process of creating settlements on the Moon for permanent human habitation is a task that crosses all disciplinary boundaries. It is not possible to tackle one discipline in isolation of all others and still come up with a useful result. At a minimum, tackling a single disciplinary problem requires that its solution be coupled to at least one or two relevant disciplines.

For example, the design of a lunar surface structure needs to be considered in conjunction with models of the environment as well as of human shielding needs, among other models. And then when the designer begins to consider the requirements for shielding against radiation and micrometeorites, another box of constraints become apparent. Again, for example, a selection of appropriate materials for shielding against radiation requires an understanding as to how the material will react to the radiation of concern. Some materials will emit particles more harmful than the ones they are meant to shield against.

This process of gathering the relevant information to create a lunar settlement can be viewed as building a pyramid – backwards – from the top. We want to design a structure, but now we find that there are several topics and disciplines that we need to invoke before we can start. Those topics and disciplines require additional topics and disciplines – so the base of the pyramid grows beneath us. Pretty soon, the pyramid is very large and we find ourselves beyond our domain of expertise.

The above process seems like a reasonable way to map out the disciplines and their interactions.