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A METHODOLOGY TO EVALUATE REQUIREMENTS FOR MINIMUM FUNCTIONAL MARS  
MISSION

**Abstract**

The first mission to Mars will require the development and integration of multiple elements. To mount a journey of such proportions it is necessary to evaluate all requirements. History teaches us that having sufficient resources can be a bridge between life and death. Being the product of large international investment it is necessary that it be a success thus, promoting large scale investment in the space sector. Multiple concepts exist for the first Mars missions. Each concept entails its own set of requirements and assumptions. To optimize such a mission to extract maximum scientific output, it is essential to know all required functions from the proposed base. This paper produces a methodology to evaluate the minimum functions required to conduct an initial mission to Mars. It studies the effects of parameters such as ISRU, surface mobility, plant growth, local manufacturing on the functions, design and layout of the base. It concludes the best possible parameters required to conduct the first Mars mission with minimal use of resources. This methodology can be expanded to conduct similar studies for various parameters for other environments such as the moon.