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The Search for Extraterrestrial Reliability

Reliability is at the core of aerospace systems design, yet does not share the analytical foundation of other disciplines like structure or guidance and control system design. The viability of small, lower cost and rapidly developed space missions rests on their ability to achieve reliability comparable to or better than conventional systems without resorting to the classical methods they employ: space qualified parts; heritage components; redundancy; and oversight by an external quality organization. Even amateur built micro/nano satellites have demonstrated reliability comparable to or exceeding conventional systems though integrating none of these practices in their development.

Ameliorating the cost of conventional methods to achieve reliability, their impact on the engineering process and its results, on the development and execution of missions, and their deficiencies in practice might present our best opportunity to improve space systems utility, reduce cost and schedule and improve reliability. Can alternative perspectives teach us what are alternative approaches to reliability and when they might be applicable to space systems? Are there existing models for reliability that could be adapted to space engineering? How would we work differently using a different approach to reliability?

The Search for Extraterrestrial Reliability is only a starting point - to ask these questions, review some ways current methods may fail us, and review a few potential alternatives.